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ARCHITECTURAL
CATALOGUES

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Johnson, S. C., & Son.....C4094
Martin Varnish Co.....C4097
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Glidden Co.....C4079
Hilo Varnish Corp.....C4092
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Merchant & Evans Co. B1844
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Horn, A. C., Co..... A207
Toch Brothers A272
Bar-X A207
R.I.W. A272

Paint
See Paint, X-Ray Proof

Proofing
(See also specific products)
Bar-Ray Products, Inc.....B2645
Bar-Ray B2645

Z

Zeolite Water Softeners

See Softeners, Water

Zinc

Oxide
New Jersey Zinc Co.....C4113

Shingles
See Shingles, Metal

Sulphide
New Jersey Zinc Co.....C4113

PLUMBING FIXTURES

Bashlin Co. D4956–4958
Batchelder-Wilson Co. D4980–4983
Bead Chain Mfg. Co. D4961
Beaton & Cadwell Mfg. Co. D4902
Blickman, S., Inc. D4965
Bradley Washfountain Co. D4978–4979
Brunswick-Balke-Collender Co. D4912–4917
Central Brass Mfg. Co. D4959
Century Brass Works, Inc. D4984
Church, C. F., Mfg. Co. D4907–4910
Conover Co. D4966–4967
Crane Co. D4922–4929
Curtin, A. F., Valve Co. D4911
Ebinger, D. A., Sanitary Mfg. Co.—
Drinking Fountains D5001
Kitchen Sinks D4968
Wash Sinks D4977
Fiat Metal Mfg. Co. D4934–4936
General Porcelain Enameling & Mfg. Co. D4970–4971
Hays Mfg. Co. D4960
Higgin Mfg. Co. D4962
Hoffmann & Billings Mfg. Co. D4946
Imperial Brass Mfg. Co. D4903
Individual Drinking Cup Co., Inc. D5006
International Nickel Co., Inc D4969
Ketcham, G. M., Mfg. Corp. D4937
Lawson, F. H., Co. D4963
Lehman Sprayshield Co. D4938
Leonard-Rooke Co. D4947
Lucke, William B. D4964
Milwaukee Stamping Co. D4939
Never Split Seat Co. D4918–4921
Oregon Brass Works D5002–5005
Peerless Shower Door Co., Inc. D4940
Powers Regulator Co. D4948–4949
Scovill Mfg. Co.—
Flush Valves D4904–4905
Shower Baths B4950–4953
Smith & Wesson Inc. D4906
S. M. Shower Door Co. D4941
Speakman Co. D4954–4955
Taylor, Halsey W., Co. D4985–5000
Trageser, John, Steam Copper Works D4972–4973
Vogel, Joseph A., Co. D4930–4933
Walker Dishwasher Corp. D4976
Weis, Henry, Mfg. Co., Inc. D4942–4943
Zahner Mfg. Co.—
Shower Stall Doors D4944
Sinks D4974–4975
Zouri Co D4945

ESTABLISHED 1894

THE BEATON & CADWELL MFG. CO.

Manufacturers of Flush Valves

NEW BRITAIN, CONN.

NEW YORK OFFICE: 234 Water Street—Telephone Connection

Product

SIMPLEX FLUSH VALVES.

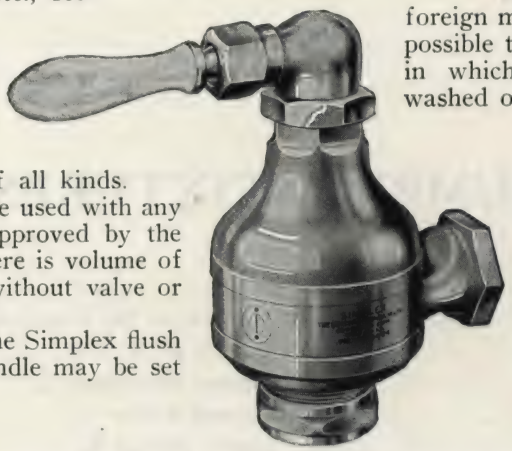
For our page on Floor and Ceiling Plates, Radiator Air Valves, etc., see Manufacturers' Index.

Simplex Flush Valves

Simplex flush valves are especially designed for schools, apartments, office buildings, factories, public installations of all kinds.

Simplex flush valves may be used with any standard bowl that has been approved by the Bureau of Standards, where there is volume of water sufficient to flush bowl without valve or tank.

The oscillating handle on the Simplex flush valve is constructed so that handle may be set in any position desired.



Siphon Proof

Simplex flush valves are constructed with integral "vacuum break" which allows air to enter, preventing contents of closet bowls siphoning to water supply pipe and contaminating water supply.

Outside By-pass Control

The Simplex flush valve has a time plug arrangement that allows valve to be adjusted from the outside of valve (when necessary). All valves are regulated at the factory for the usual conditions.

The by-pass is so constructed that there are four different channels. If foreign matter accumulates in one of these it is possible to turn plug to one of the other three in which case the accumulation should be washed out without taking valve apart.

Finish

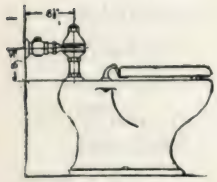
Unless otherwise specified all valves except concealed type will be furnished nickelplated. Exposed parts of concealed valves are nickelplated.

Chromium plated Simplex valves can be furnished at higher prices. This finish is especially recommended for long life; resists tarnish and corrosion indefinitely. No polishing required on chromium plated Simplex flush valves.

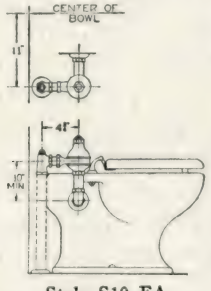
Illustrations

The following line cuts show various roughing-in measurements. Special variations can be complied with.

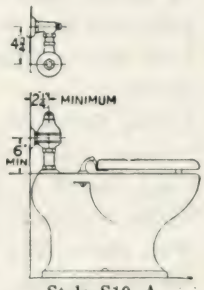
Either oscillating metal handle or metal push button can be supplied as desired. Oscillating handle can be furnished where push button is shown, and vice versa.



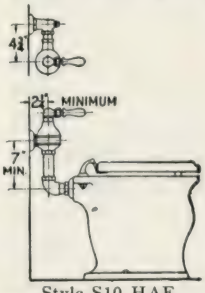
Style S10 D
1¼-in. flush connection
Style S10 DR
1½-in. flush connection
List price, $23.00



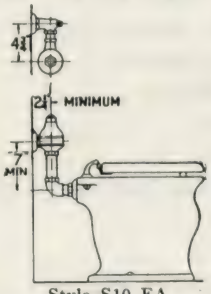
Style S10 EA
1¼-in. flush connection
Style S10 EAR
1½-in. flush connection
List price, $24.50



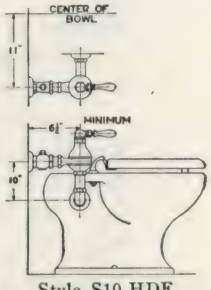
Style S10 A
1¼-in. flush connection
Style S10 AR
1½-in. flush connection
List price, $23.00



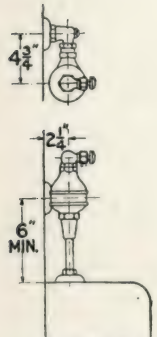
Style S10 HAE
1¼-in. flush connection
Style S10 HAER
1½-in. flush connection
List price, $24.50



Style S10 EA
1¼-in. flush connection
Style S10 EAR
1½-in. flush connection
List price, $24.50

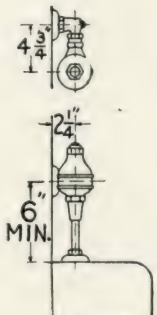


Style S10 HDE
1¼-in. flush connection
Style S10 HDER
1½-in. flush connection
List price, $24.50

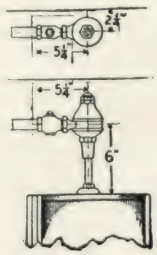


S-10-FUA ¾-in. angle stop and ¾-in. outlet
List price each, $22.00

Can be furnished with oscillating handle or top push button

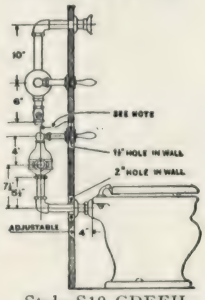


Style S10 UA
¾-in. angle stop and ¾-in. outlet
List price, $22.00



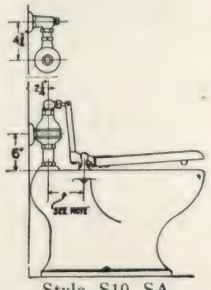
Style S10 UD
¾-in. straight stop and ¾-in. outlet
List price, $22.00

Style S10 QFA
1¼-in. flush connection
Style S10 QFAR
1½-in. flush connection
List price, $24.00



Style S10 CDEEH
1¼-in. flush connection
Style S10 CDEEHR
1½-in. flush connection
List price, $26.00

Can be furnished with push button instead of oscillating handle. Same list price



Style S10 SA
1¼-in. flush connection
Style S10 SAR
1½-in. flush connection
List price, $55.00

Note: Distance between center of supply and top of bowl, also distance between center of spud and center of post holes must be given.

When wall is more than 1 in. in thickness add to list price as follows: 1 to 2 in., 60¢, and 30¢ for each additional inch in thickness.

THE IMPERIAL BRASS MFG. CO.

Manufacturers of the Watrous Line of Plumbing Specialties

1222 West Harrison Street
CHICAGO, ILL.

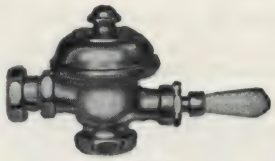
Products

WATROUS FLUSH VALVES.

Also, Watrous Duojet Water Closet; Watrous Combination Lavatory Fixtures, Watrous Lavatory Wastes, Watrous Self-closing Faucets.

For Imperial Window Washing Devices Safety Belts, Builders' Hardware and Watrous Liquid Soap Fixtures, see Manufacturers' Index.

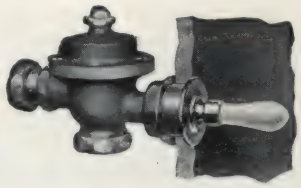
Watrous Flush Valves



No. M-1

No. M-2

No. M-3



No. M-51

Water Saved and Clogging Prevented—The special features of the Watrous flush valve assure correct flushing action, even in the face of low pressure and small volume of water conditions. They also greatly reduce water consumption, and eliminate the possibility of obstruction of refill port due to foreign particles in the water.

Used with any make of closet bowl, the Watrous valve can instantly be set to deliver the exact amount of water required for a thorough flush and refill and no more.

A Short or Long Flush, as Required—The duration of each flush is determined by the position of the screw (A), see diagram, which may be easily adjusted to assure the exact quantity of water for a perfect flush and refill.

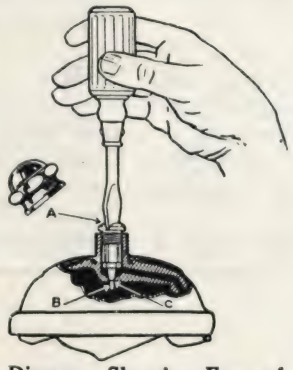


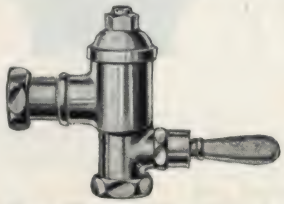
Diagram Showing Ease of Adjustment for Water Volume

A simple turn of the screw adjusts the valve. It is not necessary to turn off the water, or remove any of the working parts of the valve, when this is being done. The adjustment, once made, remains permanent.

Self-cleansing Mechanism—The action of the valve does not depend on the condition of the water, and is not impaired by the presence of foreign particles in it. Every time the valve is flushed, a spring plunger (see B in diagram) is raised off its seat (C), leaving an opening through which grains of sand and other particles can be washed out of the refill port.

New Art Crodon Flush Valve

No Regulation Required; "Top-Floor" Problems Solved—The adjustability just described, which controls the quantity of water supplied to the closet bowl, should not be confused with regulation to conform with varying degrees of water pressure. The Watrous valve requires no regulation—from highest pressure down to as low as 5 lb. This means the elimination of "top-floor" trouble—problems frequently encountered on the upper floors of tall buildings where water pressure is likely to be insufficient.



New Plunger Type Flush Valve

Correct "Shut-off" Action—The area of the diaphragm in the control chamber of the Watrous valve is exceptionally large—25% larger than the area usually found in other flush valves.

The total area gathers sufficient force, even at low pressures, to insure correct action by the shut-off mechanism.

Correct Bowl Action—The Watrous valve also has an unusually large waterway per second of opening. It delivers to the bowl a sudden, extra-large volume of water, with sufficient "punch" to insure prompt flushing action.

This flushes any bowl more thoroughly than a larger quantity of water introduced at a slower speed, particularly where supply pipes are small and pressure is low.

Styles of Finish—All Watrous Flush Valves can be furnished in nickel, *guaranteed* chromium plating or in solid "white metal." Our "Art" style is also furnished in satin or burnished gold plate.

Art Crodon Flush Valve—The beautiful appearance of this artistic design makes it possible to have this important fixture harmonize with the new "Art" line, Master Craft and Colonial bathroom fixtures now being sold by leading manufacturers and also with Colonial design closet bowls, etc.

Plunger Type Flush Valve—This is a small, low priced flush valve intended for use in types of buildings where low priced fixtures must necessarily be used.

Catalogues and Blue Prints—Complete catalogue and roughing-in blue prints of all Watrous fixtures on request.

SCOVILL MANUFACTURING COMPANY

PLUMBERS' BRASS GOODS DIVISION

Scovill Flush Valves

WATERVILLE, CONN.

BRANCH OFFICES

NEW YORK, N. Y., 280 Broadway
BOSTON, MASS., 80 Federal Street
CHICAGO, ILL., 1229 West Washington Boulevard
SAN FRANCISCO, CAL., 651 Folsom Street
ATLANTA, GA., 95 Fairlie Street

For Scovill Showers and Bath Fixtures, see Manufacturers' Index

Scovill Flush Valves

The Scovill Flush Valve offers long trouble-free performance with unusual quietness. These are the two foremost requirements specified by the building industry. Scovill, however, has gone further and added several outstanding features which set a new standard for flush valves.

Features

Self-lubricated—The Scovill Flush Valve is of the plunger type. The center chamber of the plunger is packed with lubricant and keeps the cylinder walls smooth as glass.

Self-cleaning By-pass—This by-pass is in the exact center of the plunger. A phosphor bronze rod, suspended from the valve cap, extends through the by-pass and cleanses it each time the valve is operated.

No Waterhammer—The valve opens with, and closes against the water pressure, thereby assuring smooth shut-off and eliminating waterhammer.

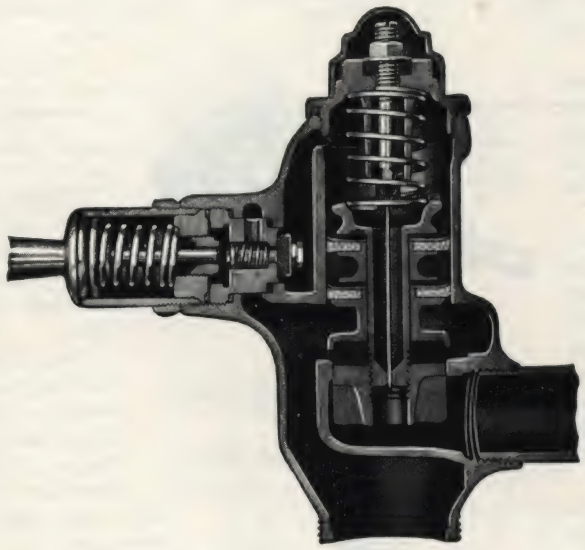
Quietness—The plunger glides up and down a smooth bearing surface which is much longer than its diameter. Close fitting cylinder walls prevent side motion and the noise which such motion causes.

Simplicity—Simplicity of construction is a factor which has drawn favorable comment from architects, sanitary engineers and builders. Aside from the handles, the plunger is the only working part in the valve body, and will operate for years without attention, servicing or replacement. Upkeep cost is negligible.

Regulation of Flush—The length of flush is regulated externally without shutting off the water supply. Adjustment is easily made on the top of the valve cap and secured by a lock nut.

Styles

Scovill Flush Valves are available with back or side inlets, in both polished and nickeled or chromium finish. Metal or china handles are also furnished as specified. These valves are available with 1¼ in. or 1½ in. tail pieces and elbows, and with bumpers to suit installation.



Cutaway View Showing Details of Scovill Flush Valve

Continued on next page

Details of Scovill Flush Valves

No. A13095-T1—Illustrated. Used with top spud bowl. Equipped with 1-in. angle stop, 1½-in. 17 Brown and Sharpe gauge tail piece 6 in. long, wall and spud flanges and spud nut, china handles. Can be connected to supply inlet on either right or left side. Bumper for seat with cover furnished. Polished and nickeled or chromium finish as specified.

No. A13095-T2—Same as illustrated except with 1¼-in. Brown and Sharpe gauge tail piece.

No. S14249-T1—Illustrated. Used with top spud bowl. Equipped with 1-in. straight stop, 1½-in. 17 Brown and Sharpe gauge tail piece 6 in. long, wall and spud flanges and spud nut, china handles. Bumper for seat with cover furnished. Polished and nickeled or chromium plated as specified.

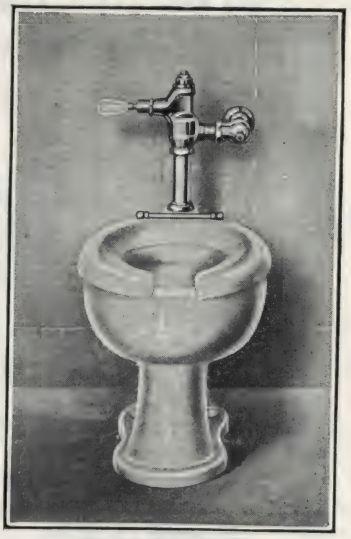
No. S14249-T2—Same as illustrated, except with 1¼-in. Brown and Sharpe gauge tail piece.

No. A13095-T1-E1—Illustrated. Used with back spud bowl. Equipped with 1-in. angle stop, 1½-in. 17 Brown and Sharpe gauge elbow, wall and spud flanges and spud nut, china handle. Can be connected to supply inlet on either right or left side. Bumper seat with cover furnished. Polished and nickeled or chromium plated as specified.

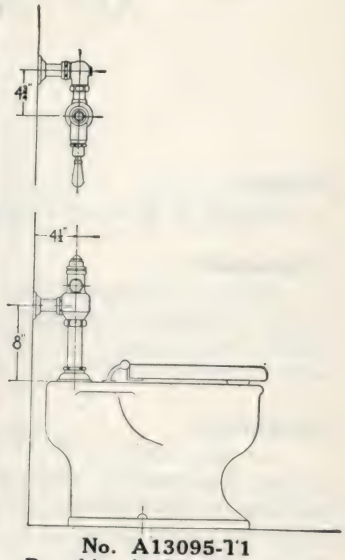
No. A13095-T2-E2—Same as illustrated except with 1¼-in. 17 Brown and Sharpe gauge tail piece and elbow.

No. S13095-T1-E1—Illustrated. Used with side spud bowl. Equipped with 1-in. straight stop, 1½-in. 17 Brown and Sharpe gauge tail piece 6 in. long, 1½-in. 17 Brown and Sharpe gauge elbow, wall and spud flange and spud nut, china handle. Polished and nickeled or chromium plated as specified.

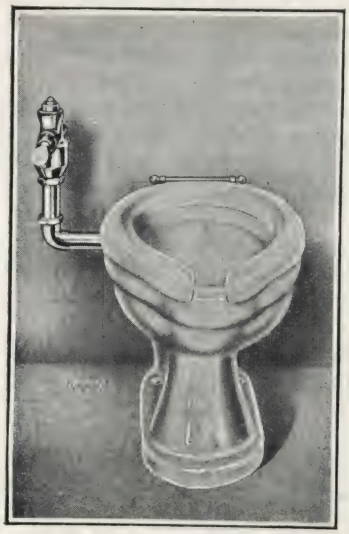
No. S13095-T2-E2—Same as illustrated except with 1¼-in. Brown and Sharpe gauge tail piece and elbow.



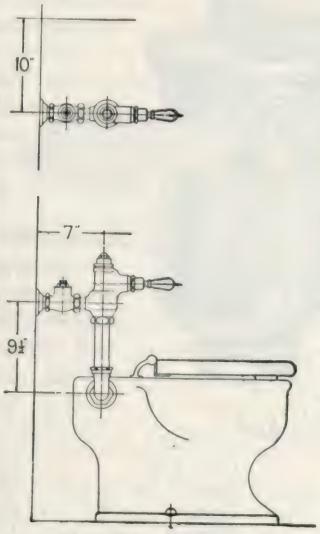
No. A13095-T1



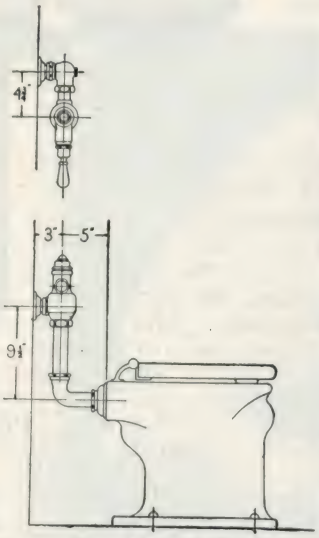
No. A13095-T1
Roughing-in Measurements



No. S13095-T1-E1



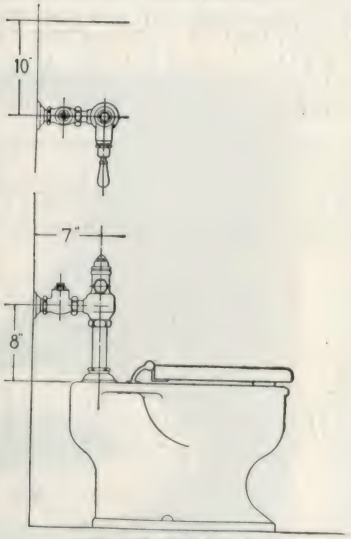
No. S13095-T1-E1
Roughing-in Measurements



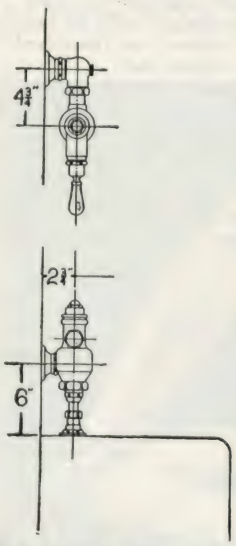
No. A13095-T1-E1
Roughing-in Measurements

No. A13095-T1-E1

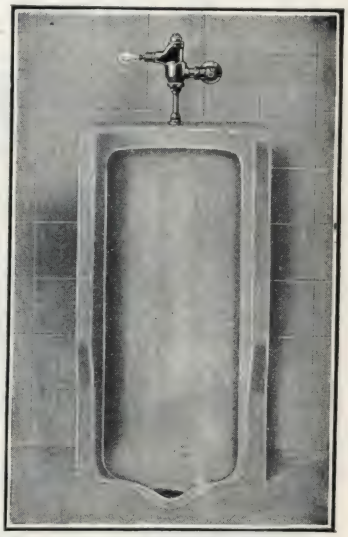
No. S14249-T1



No. S14249-T1
Roughing-in Measurements



Roughing-in Measurements



No. A13095-T3

No. 14249-T3—Not illustrated. Equipped with ¾-in tail piece 6 in. long, wall flange, chain handle. Supply handle can be reduced to any size desired with a bushing. No stop with this valve. Polished and nickeled or chromium plated.

No. A13095-T3—Illustrated. Equipped with 1-in. angle stop, ¾-in. tail piece 6 in. long, wall flange, china handle. Can be connected to supply inlet or either side. Supply inlet can be reduced to any size desired with a bushing. Polished and nickeled or chromium plated as desired.

ESTABLISHED 1855

SMITH & WESSON INC.

Manufacturers of Flush Valves

SPRINGFIELD, MASS.

Product

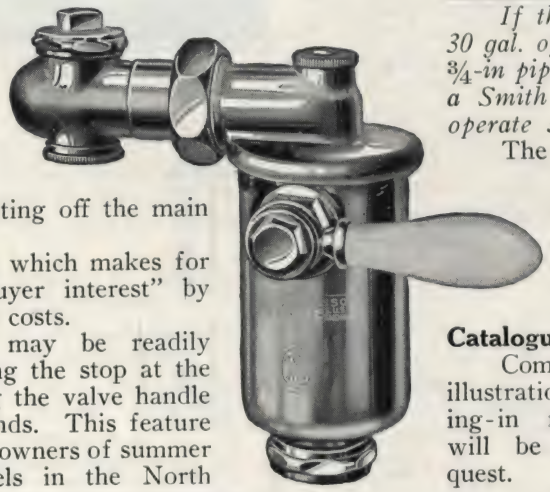
SMITH & WESSON FLUSH VALVES.

Adaptability

Smith & Wesson Flush Valves can be used on any standard plumbing fixtures and are furnished for exposed or concealed installations. *The valve operates equally well with either hot or cold water.*

Advantages

As the Smith & Wesson Flush Valve is all-metal in its construction, having no packings or diaphragms, there is no deterioration either in service *or in stock.* The design of the valve is such that the necessity of any by-pass is done away with. It may be adjusted quickly and easily without special tools and without the necessity of shutting off the main water supply.



It operates on a ¾-in. supply which makes for a degree of "buyer interest" by lower installation costs.

The valve may be readily drained by closing the stop at the inlet and holding the valve handle open a few seconds. This feature is appreciated by owners of summer homes and hotels in the North where it is necessary to draw off the water during the winter months. It may be readily seen that the Smith & Wesson Flush Valve will require *no organized servicing.*

The valve can be furnished in nickel or chromium plate with either white Isolantite or metal handles, and the valve is guaranteed by SMITH & WESSON, who will furnish *new valves* in exchange for any which may prove to be defective within five years of the purchase date.

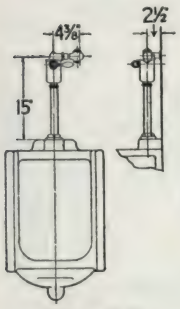
Installation

If there is a flow of not less than 30 gal. of water per minute through the ¾-in pipe at a pressure not under 15 lb., a Smith & Wesson Flush Valve will operate satisfactorily.

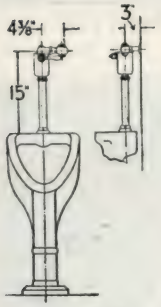
The approximate pressure at the valve may be obtained by deducting 1 lb. from the pressure at the main for each 2 ft. that the flush valve is above the main.

Catalogue

Complete catalogue, showing typical illustrations and roughing-in measurements, will be mailed on request.



Type 6-R



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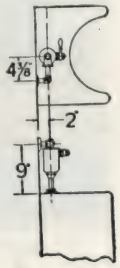
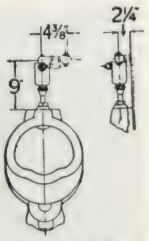


Type 5-L



Type 5-R

Price List

Type 1-S	Complete	$23.00	Type 4-L	Complete	$26.00
Type 1	Complete	24.00	Type 5	Complete	23.00
Type 2	Complete	24.50	Type 6	Complete	24.00
Type 3-L	Complete	24.50	Type 7	Complete	24.50

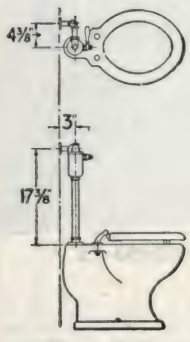
The Smith & Wesson Flush Valve complete consists of nickelplated valve with ¾-in. ground key stop (angle or straight), white or metal handle, 1¼-in. outside diameter nickelplated flush connection with nickelplated nut, spud nut, wall and spud flanges.

Type 1-S (shown) is furnished with right inlet (1-R-S) and left inlet (1-L-S). Type 1-R (shown) is furnished with back inlet (Type 1) and left inlet (Type 1-L). Type 2-L (shown) is furnished with back inlet (Type 2) and right inlet (Type 2-R). Type 6-R (shown) is furnished with left inlet (Type 6-L). Type 7-R (shown) is furnished with left inlet (Type 7-L).

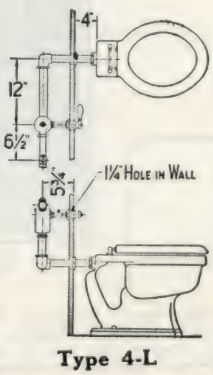
When ordering, designate which type is required, and for concealed installations (4-L), thickness of wall should be given.

With the Type 5 valve, the flush connection is nickelplated ¾-in. outside diameter.

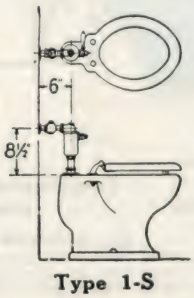
Smith & Wesson Flush Valves may be used to replace other makes of valves, and when ordered for this purpose, the center to center measurement of valve to be replaced should be given.



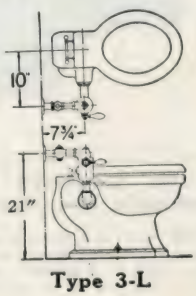
Type 1-R



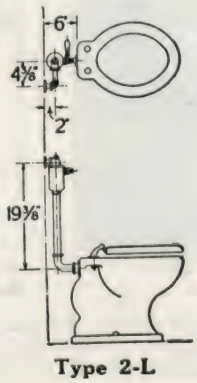
Type 4-L



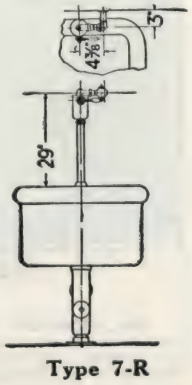
Type 1-S



Type 3-L



Type 2-L



Type 7-R

C. F. CHURCH MANUFACTURING CO.

Closet Seat Manufacturers

MAIN OFFICE

HOLYOKE, MASS.

FACTORIES: HOLYOKE, MASS., BRATTLEBORO, VT., WASHINGTON, N. J.

SERVICE

ATLANTA, GA. BOSTON, MASS. CHICAGO, ILL. CLEVELAND, OHIO DALLAS, TEX. DES MOINES, IOWA DETROIT, MICH. HALIFAX, N. S. TULSA, OKLA. HOUSTON, TEX. INDIANAPOLIS, IND. KANSAS CITY, MO. LOS ANGELES, CAL. MIAMI, FLA. MINNEAPOLIS, MINN. MONTREAL, QUE. NEW HAVEN, CONN. NEW YORK, N. Y. PHILADELPHIA, PA. PITTSBURGH, PA. ROCHESTER, N. Y. WASHINGTON, D. C. ST. LOUIS, MO. SAN FRANCISCO, CAL. SEATTLE, WASH. TAMPA, FLA.

Products

CHURCH SANI-WHITE TOILET SEATS.

CHURCH SANI-BLACK TOILET SEATS.

Church sani-Seats

Also CHURCH SANI-COLORED TOILET SEATS in models similar to the Sani-White seats.

Church Sani-White and Sani-Colored Toilet Seats

Construction—***Lumber***—The wood used in Church Sani-White and Sani-Colored seats is selected hardwood, air dried and thoroughly seasoned in our own kilns. These seats are all made from full 1½-in. stock.

Reinforcement—Closed front seats are reinforced both front and back by means of spiral grooved dowels. These dowels measure ⅝x7 in. and are forced into the seat cross grain rendering it splitproof. Open front seats are doubly reinforced by two spiral grooved dowels inserted cross grain in the back.

Finish—Church Sani-White and Sani-Colored seats are sheet covered which means that a heavy white sheathing is veneered on the hardwood base by our special lap-weld process, resulting in a seamless surface which affords the greatest amount of protection against wear, tear, and atmospheric conditions.

The superfeature of all Church sheet covered seats is the lap-weld method of sealing the sheathing to the hardwood base. Lap-welding is recognized as the strongest method of joining, and by this exclusive Church process the surface becomes a smooth homogeneous finish.

Hinge—Hinges are cast from pure ingot brass heavily nickel plated and buffed. Brass wing nuts, nickel plated washers and rubber washers furnished on all hinges.

Guarantee—Church Sani-White and Sani-Colored seats are guaranteed for five years not to crack, split, peal, craze, or to discolor.

Catalogue

There is available for any architect or builder a new complete catalogue giving full information and specification data on the complete line of Church products.

Plate 220

Church Sani-White Sheet Covered Seat and Cover

For regular bowl, with No. 32 heavy nickel plated cast brass bar hinge and white cushion bar bumpers. No metal showing on underside of seat or cover

Plate 142

Church Sani-White Sheet Covered Seat and Cover

For regular bowl, with white cushion bar bumpers. All white (including hinge) which eliminates exposed metal

Plate 425

Church Sani-White Sheet Covered Seat and Cover

For regular bowl, with No. 68 nickel plated cast brass bar hinge and white cushion bar bumpers

Continued on next page

Plate 500

Church Sani-White Sheet Covered Open Front and Open Back, Full Saddle Seat and Cover

For regular bowl, with No. 98 heavy nickel plated cast brass bar hinge and white cushion bar bumpers

Plate 560

Church Sani-White Sheet Covered Open Front Semi-extended Lip Seat and Cover

With No. 32 heavy nickel plated cast brass bar hinge and white cushion bar bumpers. No metal showing on underside of seat or cover. The semi-extended lip seat is longer than the open front seat for regular bowl, but shorter than the full length of an extended lip seat. It measures over all 17½ in. long

Plate 162

Church Sani-White Sheet Covered Open Front Full Saddle Seat and Cover

For regular bowl, with white cushion bar bumpers. All white (including hinge) which eliminates exposed metal

Plate 186

Church Sani-White Sheet Covered Open Front Full Saddle Seat and Cover

For extended lip bowl, with white cushion bar bumpers. All white (including hinge) which eliminates exposed metal

Plate 251

Church Sani-White Sheet Covered Open Front Full Saddle Seat—No Cover

For regular bowl, with No. 35 extra heavy nickel plated cast brass check hinge and white cushion bar bumpers

Plate 530

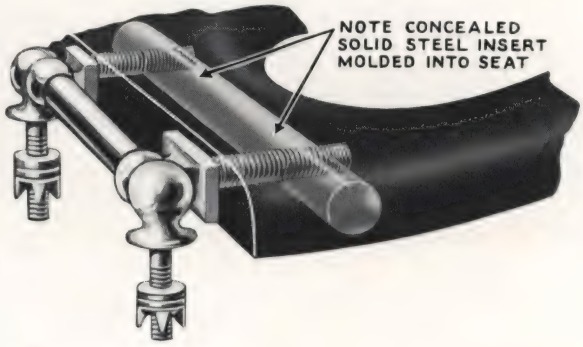
Church Sani-White Sheet Covered Open Front and Open Back Full Saddle Seat—No Cover

For extended lip bowl, with No. 47 extra heavy nickel plated cast brass check hinge and white cushion bar bumpers

Continued on next page

Church Sani-Black Seats

Description—Church Sani-Black Seats are a composition hard rubber product, created for public buildings, factories, schools, or wherever unusual abuse may be expected. They are produced through the combined processes of hydraulic pressure and veneering.



The surface is thick composition hard rubber, vulcanized in a mould under 108 tons of hydraulic heat pressure. This produces a hard, smooth, indestructible finish.

The core consists of a solid compact unit made entirely from hydraulically pressed wood fibres. The fibres are in their natural wood state, thereby retaining the lignins (nature's resinous cohesive binder). The core thus formed has all the elements of natural wood, plus the advantage of having no grain or cross grain. This is a distinct advantage in a toilet seat as it removes the possibility of cracking or splitting. The core is laminated, 3-ply.

In combining the core and rubber covering we have produced a seat that has no joints or seams; a seat where core and covering are of uniform resiliency, shock absorbent, flexible to torsion, tough, hygienic and indestructible.

Church Sani-Black Seats are acid resisting, moistureproof, and attractive in appearance.

Where Used—Church Sani-Black Seats are recommended for factories, office buildings, public buildings, department stores, steamships—in fact, any place where abuse must be expected.

Important Hinge Feature—An important hinge feature of Church Sani-Black seats is the solid steel insert which is moulded into the core under 108 tons hydraulic pressure. The hinge is attached to the seat by means of heavy machine screws which are gripped by these threaded inserts, as shown, making it impossible for the hinge to loosen or the screws to pull out.

Guarantee—The C. F. Church Manufacturing Co. guarantees Church Sani-Black seats and covers and will furnish new seats and covers free of charge, in exchange for any that might break, split, crack, chip, scale, or craze.

Plate 56

Church Sani-Black Full Saddle Seat and Cover

Semi-extended lip pattern with extra heavy nickel plated brass hinge. Cushion bar bumpers. This seat, because of its semi-extended lip length, can be used on either an extended lip or regular bowl

A Few of the Notable Buildings Equipped with Church Sani-White and Sani-Black Toilet Seats

Equitable Life Insurance Building, New York, N. Y.
New Yorker Hotel, New York, N. Y.
Beverly-Wilshire Apartment Hotel, Beverly Hills, Cal.
Hotel Shelton, New York, N. Y.
Chrysler Building, New York, N. Y.
Miami-Biltmore Hotel, Coral Gables, Fla.
Benjamin Franklin Hotel, Philadelphia, Pa.
Fisher Building, Detroit, Mich.
Willoughby Tower Office Building, Chicago, Ill.
Royal York Hotel, Toronto, Can.
Ritz Tower Apartment Hotel, New York, N. Y.
Book-Cadillac Hotel, Detroit, Mich.
Roosevelt Hotel, St. Louis, Mo.
Breakers Hotel, Long Beach, Cal.
New Washington Hotel, Seattle, Wash.
Vincent Astor Apartments, New York, N. Y.
Commodore Hotel, New York, N. Y.
Hotel Biltmore, New York, N. Y.
Shoreland Hotel, Chicago, Ill.
Roney Plaza Hotel, Miami Beach, Fla.
Seneca Hotel, Chicago, Ill.
Hotel Ambassador, New York, N. Y.
McCormick Hotel, Chicago, Ill.
Chateau Frontenac, Quebec, Can.
Banff Springs Hotel, Banff, Can.
N. W. Ayer Building, Philadelphia, Pa.
New York Central Lines Office Building, New York, N. Y.
Greater Penobscot Building, Detroit, Mich.

Continued on next page

Plate 14

Church Sani-Black Full Saddle Seat and Cover

For regular bowl, with all-black moulded hinge. No exposed metal anywhere on either seat or cover. Cushion bar bumpers.

The hinges are moulded of a hard composition over brass and perfectly match the seat and cover; they cannot corrode or tarnish, there is no surface finish or plating to wear off. No exposed metal when installed

Plate 20

Church Sani-Black Open Front Full Saddle Seat and Cover

All-black moulded hinge. No exposed metal anywhere on either seat or cover. Cushion bar bumpers. Can be used on either a regular or extended lip bowl.

The hinges are moulded of a hard composition over brass and perfectly match the seat and cover; they cannot corrode or tarnish, there is no surface finish or plating to wear off. No exposed metal when installed

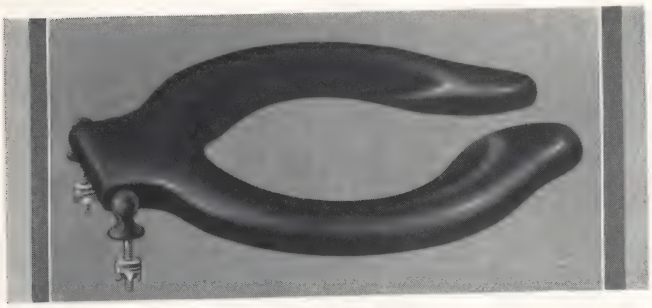


Plate 19

Church Sani-Black Open Front Full Saddle Seat with Sanitary Cut-out Back—No Cover

Moulded black hinge. No exposed metal. Standard dimensions and fits all extended lip bowls.

The hinges are moulded of a hard composition over brass and perfectly match the seat; they cannot corrode or tarnish; there is no surface finish or plating to wear off. No exposed metal when installed.

No. 19C. As above except with check hinge

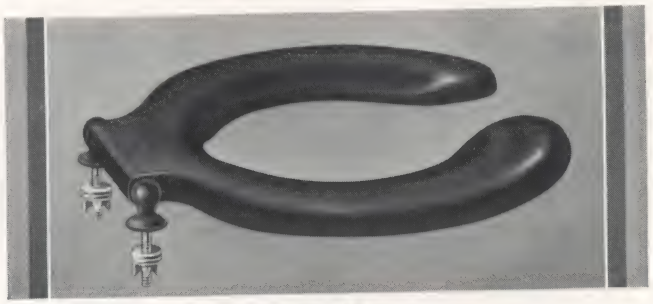


Plate 17

Church Sani-Black Open Front Full Saddle Seat with Sanitary Cut-out Back—No Cover

Moulded black hinge. No exposed metal. Standard dimensions and fits all regular bowls.

The hinges are moulded of a hard composition over brass and perfectly match the seat; they cannot corrode or tarnish; there is no surface finish or plating to wear off. No exposed metal when intsalled.

No. 17C. As above except with check hinge

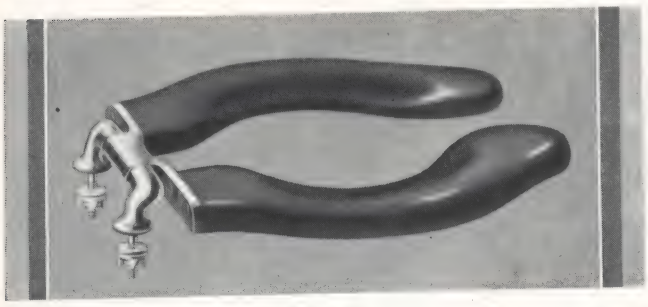


Plate 53

Church Sani-Black Open Front and Open Back Full Saddle Seat—No Cover

With extra heavy concealed check hinge. Cushion bar bumpers. Standard dimensions and fits all extended lip bowls.

The extra heavy hinge used on these seats has a patented concealed checking feature. The stop or check operates on the inside of posts and is so designed that it allows seat to stand in vertical position when raised without striking against wall, tank or flush valve

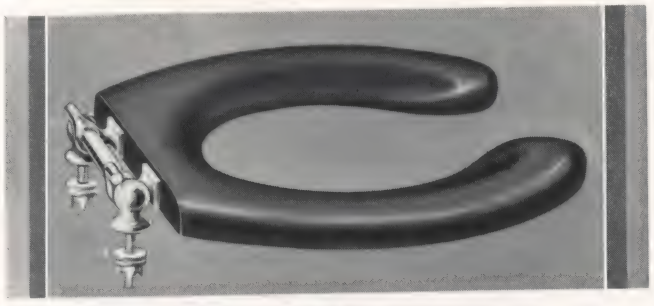


Plate 57

Church Sani-Black Open Front Full Saddle Seat—No Cover

Semi-extended lip pattern with extra heavy nickel plated brass check hinge. Cushion bar bumpers.

This seat, because of the semi-extended lip length, can be used on either an extended lip or regular bowl

A. F. CURTIN VALVE CO.

Manufacturers of Noiseless Water Closet Tank Fittings

MEDFORD, MASS.

All Leading Plumbing Supply Houses Will Now Equip Tanks with Curtin Fittings

Products

CURTIN NOISELESS TANK FITTINGS for low down water closet tanks include the "CURTIN-VICTORY" VALVE, the "CURTIN-LEVER," the CURTIN ALL-WHITE LEVER and the "CURTIN-ROTARY" BALL COCK.

Why the Closet Tank Is Used

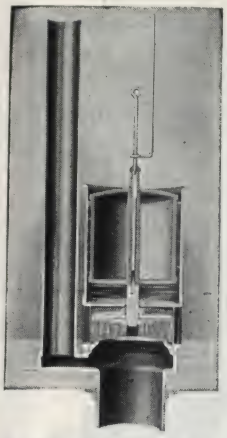
Water closets flushed from tanks equipped with Curtin Fittings will give a strong and perfect flush with only 4 gal. of water—a great saving. Economical to install, as the ordinary ⅝-in. service pipe from street gives ample water supply to any residence. With water closets flushed by direct pressure flush valves, however, a 1-in. or larger service is required, and in flushing directly from service pipe there is danger of contaminating the water supply. The Curtin Fittings require no attention or repairs. They operate quietly under all conditions. This is a most desirable feature, particularly in homes, apartments and hotels, where people should not be disturbed by noisy water closets.

A Curtin Equipped Water Closet Tank

"Curtin-Victory" Valve

This valve has a full, unrestricted waterway, and starts the siphon action immediately. It will operate even the largest closet with a minimum amount of water. It takes out all the water and the tank fills with clean water. Refills any closet. No refill tube is required. Has a flat seat washer which will not leak. Easily operated; a slight touch of the lever lifts the valve. It always finds its seat; there are no close fitting parts. Quiet in operation, it falls silently on its seat.

This valve, including the large overflow tube, is made of cast bronze and copper with no soldered parts. It will last many years in any water.



Sectional View "Curtin-Victory" Valve

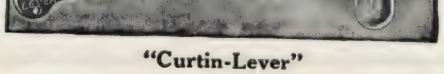
Float slowly falling as water leaves float chamber; valve but partly closed, yet tank already emptied

"Curtin-Lever" and Curtin All-White Lever

This "Curtin-Lever" is made of cast bronze. It is very strong and always in alignment. There are no stamped parts. An oversize nickel plated flange covers lever opening in any tank without addition of plates or washers.

This double action lever exerts a powerful lift in either direction with a slight touch of handle. Once attached to the tank, it will neither work loose, nor shift position.

The Curtin All-White Lever, shown in the tank fittings illustration, has a neat all-china handle which adds much to the appearance of any tank where an all-white bathroom is desired.

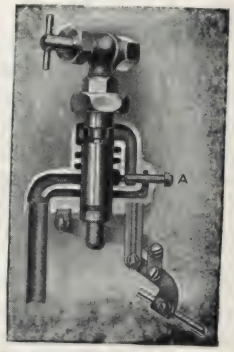


"Curtin-Lever"

"Curtin-Rotary" Ball Cock

We are the originators of the rotary ball cock, which was the first silent ball cock. Time has shown that revolving the stream of water, as in the "Curtin-Rotary" Ball Cock, is the only practical method of eliminating the noise.

On very low pressure, opening the by-pass screw "A" permits free passage of water through ball cock and insures quick filling of tank. With its powerful compound leverage, ball cock will operate satisfactorily under any pressure. Made of cast bronze and copper, it is non-corrosive.

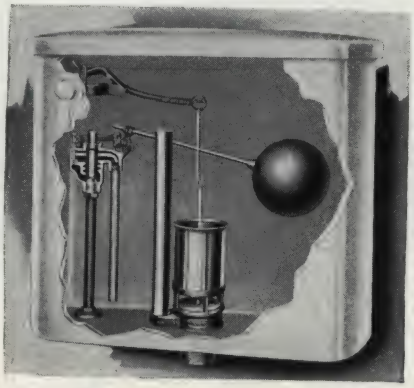


Sectional View "Curtin-Rotary" Back Supply Ball Cock or Float Valve

Back supply type furnished for *all-white* bathroom with no exposed metal. Rotary ball cocks can also be supplied adapted for high tanks in the bathroom or expansion tanks in the attic.

Curtin Noiseless Fittings Installed in Low Tank

They will fit and operate in any low tank for any style of water closet and are often used on replacements. These fittings afford a most silent, sanitary and satisfactory method for the flushing of water closets.



Curtin Fittings Installed

Specifications

The words "Curtin Fittings including Lever" with plate number of any low closet tank insure the installation of these noiseless tank fittings on your work.

THE BRUNSWICK-BALKE-COLLENDER CO.

TELEPHONE
WABASH 4020

623-633 South Wabash Avenue
CHICAGO, ILL.

SOLD BY ALL LEADING PLUMBERS, PLUMBING JOBBERS AND WATER CLOSET MAKERS

For our pages on Billiard Tables and Bowling Alleys, see Manufacturers' Index

Products

WHALE-BONE-ITE CLOSET SEATS.
WHITE PYROXLINE CLOSET SEATS.
SEA PEARL COLORED CLOSET SEATS.

The Company

THE BRUNSWICK-BALKE-COLLENDER CO. have been continuously in business since 1858 as manufacturers of special products requiring the highest type of cabinet work. The Company, over this seventy-three (73) year period, has established an enviable reputation for business integrity and its products are recognized standard for quality. For the past twenty (20) years the Company has manufactured and marketed Whale-Bone-Ite Closet Seats—the first moisture-proof, composition-sheathed seat. Today the sales of the Seat Division run well over a million dollars annually. All Whale-Bone-Ite closet seats carry a lifetime guarantee.

Partial Recent Installation List

GOVERNMENT BUILDINGS
Standard for all Post Offices and Veterans' Hospitals.
Department of Commerce Building, Washington, D. C.
Old Soldiers' Home, Sawtelle, Calif.

HOSPITALS
Orangeburg Asylum, Orangeburg, N. Y.
Battle Creek Sanitarium, Battle Creek, Mich.
Manteno State Hospitals, Manteno, Ill.
Lying In Hospital, Chicago, Ill.

HOTELS
The Arizona Biltmore, Phoenix, Ariz.
Barbazon Hotel, New York, N. Y.
The Harrisburger, Harrisburg, Pa.
The Kirkwood, Des Moines, Iowa
Phillips Hotel, Kansas City, Mo.
Piedmont Hotel, Atlanta, Ga.

INDUSTRIAL BUILDINGS
Standard with the following companies:
Quaker Oats Co., Campbell Soup Co., International-Harvester Co., Illinois Bell Telephone Co., National Biscuit Co., General Motors Co. (Delaware), Western Electric Co. (Baltimore), General Electric Co. (Philadelphia), Grigsby-Grunow Co., American Can Co.

OFFICE BUILDINGS
Chanin Building, New York, N. Y.
No. 1 North LaSalle Building, Chicago, Ill.
Board of Trade Building, Chicago, Ill.
Civic Opera Building, Chicago, Ill.
Palmolive Building, Chicago, Ill.
Chicago Daily News Building, Chicago, Ill.

PUBLIC BUILDINGS
Cook County Court House, Chicago, Ill.
Racine County Court House, Racine, Wis.
Jefferson County Court House, Birmingham, Ala.

STADIUMS
Soldiers' Field, Chicago, Ill.
Dyche Stadium, Evanston, Ill.
Stagg Field, Chicago, Ill.
Yost Stadium, Ann Arbor, Mich.
University of Illinois Stadium, Champaign, Ill.

SCHOOLS
Standard for Public Schools in the following cities:
Chicago, Kansas City, Milwaukee, Philadelphia, Cleveland, Detroit, Los Angeles.

NATIONAL BUILDINGS
Standard for the following:
Sears, Roebuck and Co., Montgomery Ward & Co., S. S. Kresge Co., F. W. Woolworth Co.

WHALE-BONE-ITE CLOSET SEATS

Description

General—Closet seats are constantly subject to moisture either by actual contact or close proximity. Therefore, it is obvious that not only must the wood core (selected for its lightness) be of special construction, but the composition covering must be permanently moisture resistive and sufficiently tough and resilient to withstand hard use and even abuse without denting, checking, cracking or deterioration in appearance.

The Core—Whale-Bone-Ite cores are made of thin layers of crossed grain laminated wood which materially increases the strength and is assurance against warping, contraction and expansion. Cores are hermetically sealed with Whale-Bone-Ite.

The Whale-Bone-Ite Covering—Whale-Bone-Ite is a polished, jet-black, tough, resilient composition vulcanized under hydraulic pressure over the wood core in a continuous, homogeneous covering approximately $\frac{3}{16}$ in. thick. Due to the concealed hinge plate which forms an integral part of the core, neither the core nor the Whale-Bone-Ite covering are punctured when the hinge is attached. The joint between covering and wood cannot be broken apart.

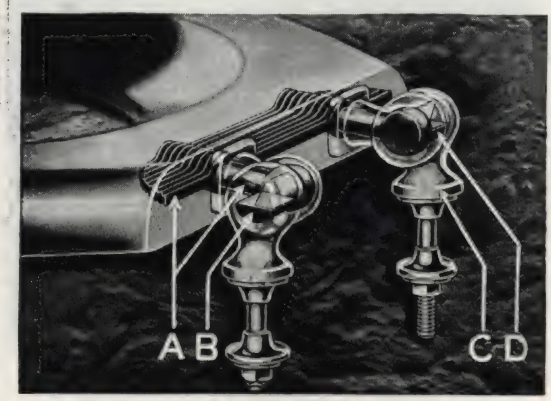
CONSTRUCTION OF WHALE-BONE-ITE SEATS

Continued on next page

WHALE-BONE-ITE BLACK MOULDED HINGES

Whale-Bone-Ite is now moulded over metal forming an ebony finish to match the Whale-Bone-Ite seats. This finish is not only particularly pleasing and harmonious in appearance, but it is unbelievably durable and permanently non-corrosive.

Ebony-finish hinges are standard on all hinge construction.



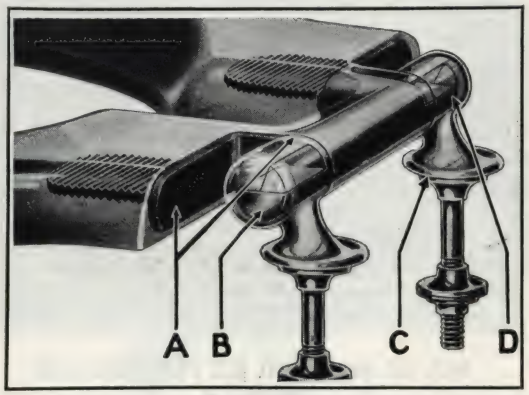
Phantom View—Detail of Construction Closed Back Seat and Hinge in One Unit

(A) Heavy metal die cast corrugated hinge plate and post lugs in one piece embedded in laminated core.

(B) Metal post bearing, an integral part of hinge plate.

(C) Heavy metal die cast post insert and check lug.

(D) Covering of Whale-Bone-Ite over hinge plate, posts, inserts and seat, one solidified unit.



Phantom View—Detail of Construction Open Back Seat and Hinge in One Unit

(A) Heavy metal die cast corrugated hinge plate and post lugs in one piece embedded in laminated core.

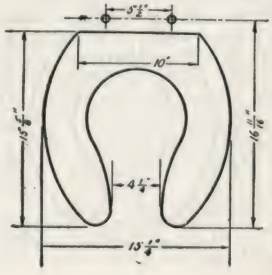
(B) Metal post bearing, an integral part of hinge plate.

(C) Heavy metal die cast post insert and check lug.

(D) Covering of Whale-Bone-Ite over hinge plate, posts, inserts and seat, one solidified unit.

WHALE-BONE-ITE SEATS

NO. 23-81 FOR REGULAR BOWLS



No. 23-81—Seat with cover.

No. 23-8—Seat without cover.

No. 23-86—Seat without cover, with seat check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

NO. 24-81 FOR REGULAR BOWLS

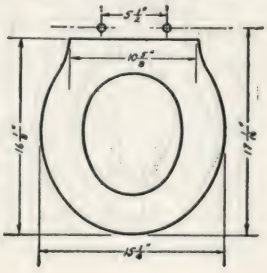
No. 24-81—Seat with cover.

No. 24-8—Seat without cover.

No. 24-86—Seat without cover, with seat check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*



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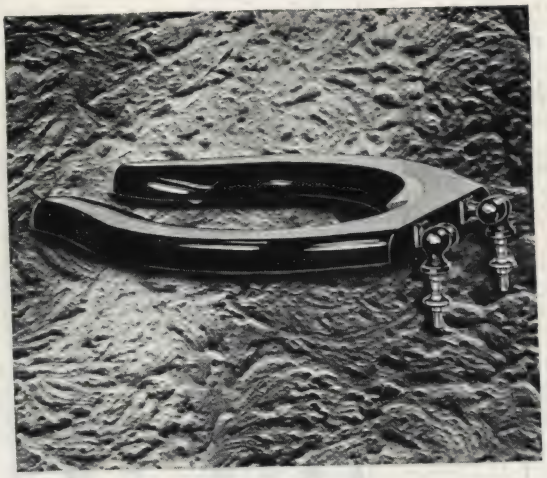
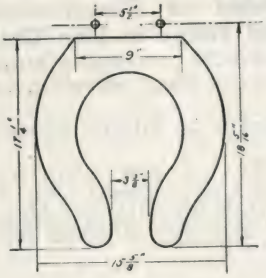
WHALE-BONE-ITE SEATS—Continued



NO. 21-968 FOR EXTENDED LIP BOWLS

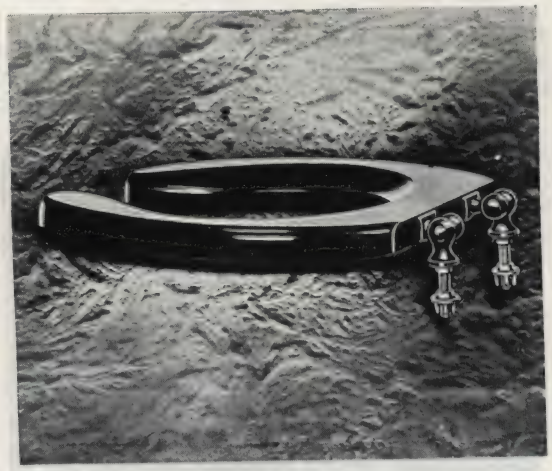


No. 21-968—Seat without cover, with check.

No. 21-98—Seat without cover, without check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*



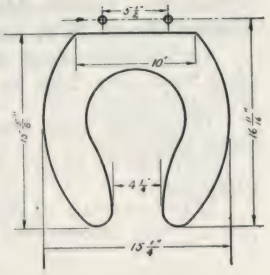
NO. 23-968 FOR EXTENDED LIP BOWLS

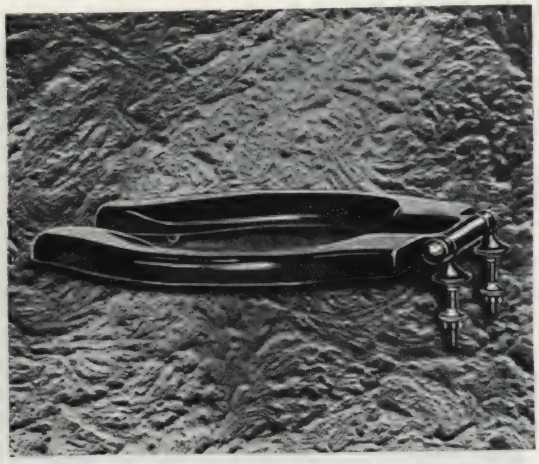
No. 23-968—Seat without cover, with check.

No. 23-96—Seat without cover, without check.

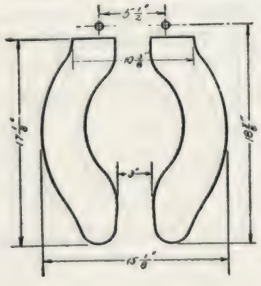
Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*





NO. 18-568 FOR EXTENDED LIP BOWLS



No. 18-568—Seat without cover, with check.

No. 18-581—Seat with cover.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

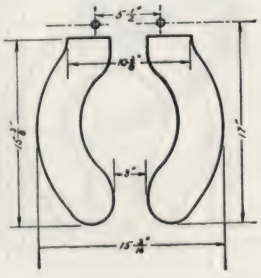
NO. 18½-568 FOR REGULAR BOWLS

No. 18½-568—Seat without cover, with check.

No. 18½-581 — Seat with cover.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*



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WHITE AND PEARL CLOSET SEATS

Brunswick Sheet Covered White Seats with Reinforced Cushion Edge

The shining white surface of the new Brunswick is not paint or enamel. It is a covering, a sheathing, of white pyralin. The same handsome ivory-like pyralin used for the backs and handles of ladies' boudoir sets. It is permanently beautiful, will not wear off, crack, split or discolor. It is easy to keep clean and is perfectly sanitary. There are no cracks or joints to gather dirt or harbor germs.

The illustration at the lower right shows a section of the Brunswick cut away. See how the sheathing of pyralin is moulded in one piece, seamless, round the hardwood core.

Exclusive Feature—At the edges of the seat, the pyralin is thicker. The "Two Little White Squares" on the cut surface show this extra thickness—9 times thicker and 800% stronger. It extends all around the edges of the seat, since the edges are the critical points of construction—as they last, so the whole seat will last.

Guarantee—This extra thickness is a feature exclusive with Brunswick. It is patented. It enables every Brunswick to carry a guarantee against separation of the sheets at this point.

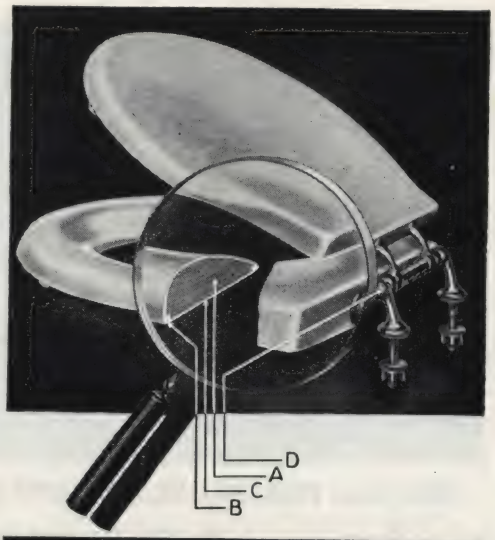
Other Features of Construction—As illustrated at right, the features of construction are as follows:

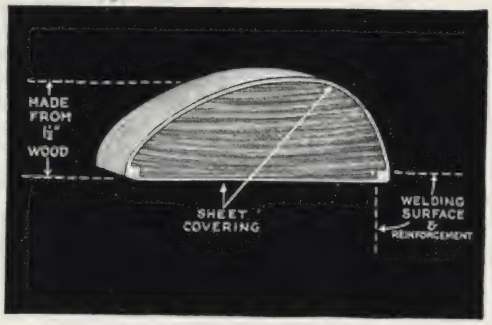
(A) Constructed of straight grain hardwood core, with reinforced dowels, an insurance against warping and splitting.

(B) Pyroxline reinforced insert provides ample welding surface for the pyroxline sheets, and a cushion against impacts. This degree of durability is found only in the Brunswick reinforced cushion edge.

(C) The surface is easy to keep clean and will not crack, craze or discolor. It is literally one piece and cannot be broken or pulled apart where the upper and lower sheets meet—this is an exclusive Brunswick feature.

(D) The sturdy non-fouling hinge is attached in a manner that does not expose metal to the surface of the seat—guaranteeing beauty and durability.



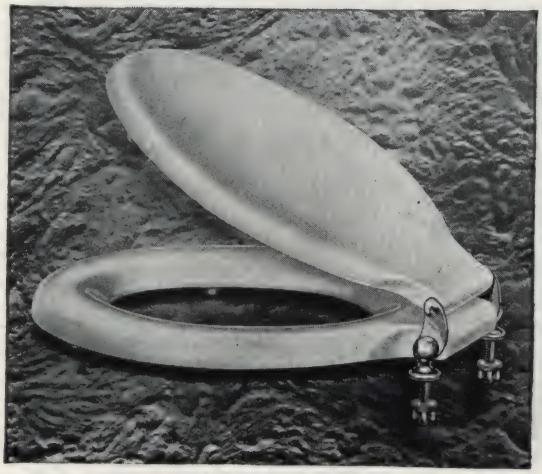


THE NEW PEARL COLORED SEATS

Any of the White Seat designs illustrated on pages 4, 5 and 6 may be obtained in the new Sea Pearl Colors. The construction and covering materials are identical with that described above for the Brunswick White Seats, except that the pyralin is a beautiful iridescent sea pearl closely approximating natural sea pearl in appearance.

The colors are Black Pearl, Green Pearl, Blue Pearl, Fawn Pearl, Lavender Pearl, White Pearl.

The new chromium plated hexagon hinge illustrated above can be furnished, when specified, on any White or Pearl Extended Back Seat.



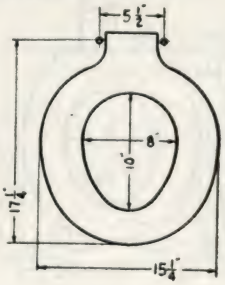
NO. 300 FOR REGULAR BOWL

No. 300—Seat with cover.
No. 301—Seat without cover, without check.
No. 302—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*

Note: *Hinge, chromium white or Whale-Bone-Ite.*



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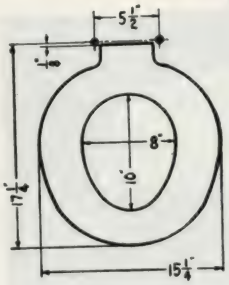
WHITE AND PEARL SEATS—Continued

NO. 303 FOR REGULAR BOWLS

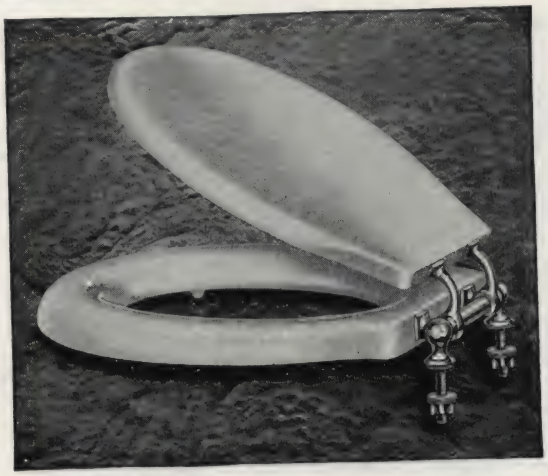


No. 303—Seat with cover.
No. 304—Seat without cover, without check.
No. 305—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

Note: *For close roughing.*

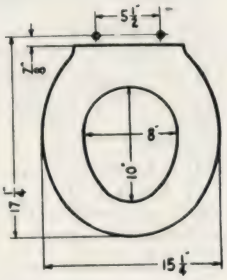


NO. 309 FOR REGULAR BOWLS

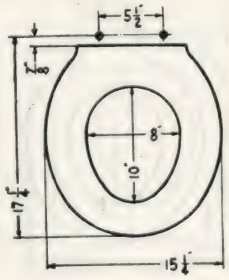
No. 309—Seat with cover.
No. 310—Seat without cover, without check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*



NO. 312 FOR REGULAR BOWLS



No. 312—Seat with cover.
No. 313—Seat without cover, without check.
No. 314—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

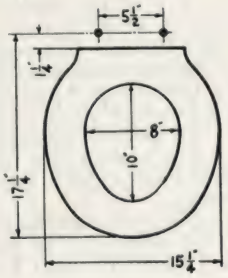
Note: *Particularly adapted to hotels.*

NO. 315 FOR REGULAR BOWLS

No. 315—Seat with cover.
No. 316—Seat without cover, without check.
No. 317—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*



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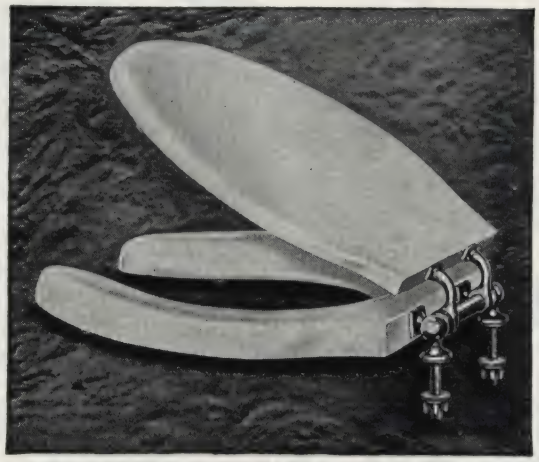
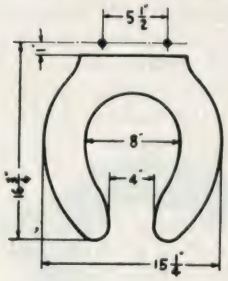
WHITE AND PEARL SEATS—Continued



NO. 356 FOR REGULAR BOWLS



No. 356—Seat with cover.
No. 357—Seat without cover, without check.
No. 358—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

Note: *Particularly adapted to hotels.*

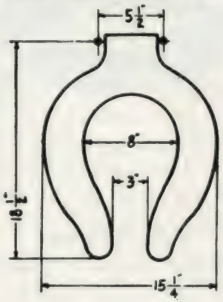
NO. 375 FOR EXTENDED LIP BOWLS

No. 375—Seat with cover.
No. 376—Seat without cover, without check.
No. 377—Seat without cover, with check.

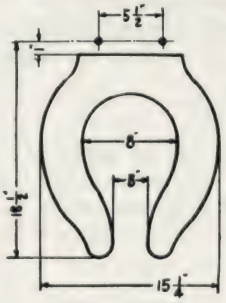
Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*

Note: *Hinge, chromium white or Whale-Bone-Ite.*



NO. 378 FOR EXTENDED LIP BOWLS



No. 378—Seat with cover.
No. 379—Seat without cover, without check.
No. 380—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at left shows accurate shape and dimensions.*

Note: *Particularly adapted to hotels.*

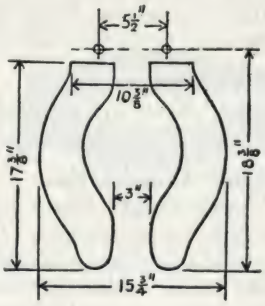
NO. 381 FOR EXTENDED LIP BOWLS

No. 381—Seat with cover.
No. 382—Seat without cover, without check.
No. 383—Seat without cover, with check.

Note: *Check limits the extreme lift of seat.*

Note: *Diagram at right shows accurate shape and dimensions.*

Note: *Open front and back.*



NEVER SPLIT SEAT COMPANY

Manufacturers of Hard Rubber and Wood Closet Seats in All Finishes, Constructions and Models

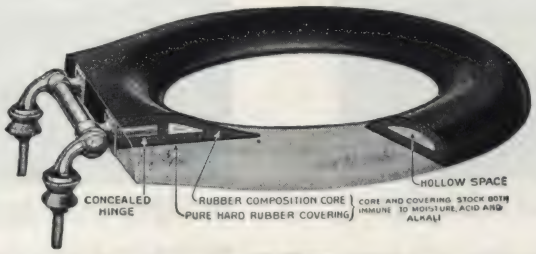
EVANSVILLE, IND., U. S. A.

Products

(1) "Evernu" Hard Rubber Seats. (Patented.)
(2) "Never-Split" Wood Seats. (Patented.)
  (a) White and Colored Sheet "Pyralin" Covered Seats.
  (b) White and Colored Sprayed "Duco" Seats.
  (c) Varnished Seats. (All finishes and woods.)
  (d) Special Seats of any description.

"Evernu" Construction

"Evernu" Seats are made of pure hard rubber. They are hollow, except across the back where they are made solid and into which solid portion the hinges are attached. The interior wall, made of a special rubber composition, and the exterior wall of pure ebony or mahogany hard rubber are vulcanized together under tremendous hydraulic pressure into one indestructible unit. The hollow center provides lightness and strength. There are no joints to open, no cracks or crevices in the surface.



"Evernu" Cross Section

"Never-Split" Hidden Screw Construction

"Evernu" Installations

"Evernu" Seats are approved by leading architects and builders. They are installed in many prominent buildings. Every "Evernu" Seat sold has given perfect service. It is an ideal seat for any installation. Write for list of installations.

"Evernu" Finishes

"Evernu" Seats are made either ebony or mahogany in color. There is no finish to wear off or become unsightly, as the finish is simply the hard rubber surface buffed to a lasting luster. The surface can be sterilized and kept sanitary without injuring it in any way. It is impervious to moisture, heat, cold or any destroying elements.

"Evernu" Hinges

"Evernu" Seats can be equipped with nickel plated brass, white metal, chromium plated, or black moulded hinges, with or without check. As durable and lasting as the seat itself, they can never pull loose from it; in fact, they become more firmly embedded with age.

"Evernu" Seats for U. S. Government

"Evernu" Seats comply with all U. S. Government Specifications covering Hard Rubber Seats including Master Specifications No. 448.

"Evernu" Guarantee

"Evernu" Seats are unconditionally guaranteed not to split, break, crack or craze.

"Never-Split" Construction

All "Never-Split" Seats are made by our patented hidden screw construction. (See construction cut.) They are held together by heavily threaded steel screws within the wood. The screws absolutely prevent the woodwork from ever splitting or coming apart at the joints. The screws have right and left-hand threads and are embedded into the wood by means of hydraulic pressure. The screws are entirely invisible and there are no mortise holes, plugs or fillings in any surface of the woodwork or any outward indication of this unique hidden steel reinforcement.

"Never-Split" Finishes

(A) Sheet Covered—Extra heavy sheet pyralin of the finest quality is used on all "Never-Split" sheet covered seats. Sheeting is applied by a scientific process that completely envelops woodwork in a seamless, lustrous and durable sheathing. Surface can be easily cleaned and will not chip, crack, craze, or discolor. "Never-Split" sheet covered seats are made in pure white, sea pearl colors and plain colors.

(B) Sprayed Seats—"Never-Split" sprayed "Duco" finish is a high grade white or colored sprayed celluloid buffed to a high luster. "Never-Split" "Imaculoid" sprayed finish is the same as "Duco," except that it has more coats and is given special treatment between coats. The surface of both "Duco" and "Imaculoid" finishes are buffed to a high luster.

(C) Varnished—"Never-Split" oak, mahogany, cherry and walnut finishes are made by carefully filling, staining and shellacking the wood, over which ground coats are applied several coats of highest grade varnish. Final coat can be furnished in gloss finish, dull rub, or high polish.

"Never-Split" Hinges

The hinges on all "Never-Split" Seats are made from pure new brass. They are scientifically designed for strength and beauty. They are offered in many designs and finishes including nickel plated brass, chromium plate, white metal and black hard rubber.

"Never-Split" Guarantee

"Never-Split" hidden screw woodwork is guaranteed unconditionally not to split or come apart at the joints. The sheet "pyralin" finish is guaranteed for five years. The sprayed and varnished finishes are guaranteed for three years.

Catalogue

Only a few "Evernu" and "Never-Split" models are shown on these pages. A complete catalogue will be mailed on request.

Special Seats

In addition to our regular line of seats, we make special seats and hinges of any design or finish. Prices will be furnished on receipt of information as to what is required.

Construction Sections

Construction sections of "Evernu" and "Never-Split" Seats will be furnished without charge on request.

Continued on next page

No. 500 "Evernu" Ebony or Mahogany Finish Seat with Cover for Regular Bowl

No. 500-W. Same as No. 500 without cover. Check hinge.

No. 510. Same as No. 500 except full saddle shape and greater diamensions to fit bowls with oversize rims. Also fits regular size rims.

No. 510-W. Same as No. 510 except without cover.

No. 501. Same as No. 500 except special open front for raised lip bowl.

No. 501-W. Same as No. 500-W except special open front for raised lip bowl

No. 630 "Evernu"

No. 630. Ebony or Mahogany "Evernu" Hard Rubber Seat, open front for regular bowl. Equipped with patented concealed and removable type of hinge as illustrated elsewhere on this page. Hinge can be furnished made from any metal or hard rubber

No. 635 "Evernu"

No. 635. Ebony or Mahogany "Evernu" Hard Rubber Seat, open front for extended lip or elongated oval rim bowl. Equipped with patented concealed and removable type of hinge as illustrated elsewhere on this page. Hinge can be furnished made from any metal or hard rubber

U. S. Government Specifications

"Evernu" Hard Rubber Seats can be furnished to comply in every respect with the specifications of all United States Government Purchasing Departments, including Standard Master Specifications No. 448.

Hinges for "Evernu" Seats

All "Evernu" models are regularly equipped with nickel plated brass hinges. "Chromium" plated or black hard rubber, or white metal hinges can be furnished when specified. A check device is regularly furnished on all seats without cover.

No. 510-W "Evernu" Full Saddle Seat without Cover

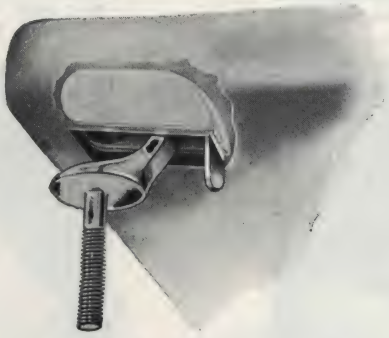
For regular bowl. Ebony or mahogany.

No. 510. Same as No. 510-W except with cover for regular bowl

No. 525-W "Evernu" Semi-saddle Seat Cover

Ebony or mahogany. For regular bowl.

No. 525. Same as No. 525-W except with cover for regular bowl



Hinge Construction of the No. 630 (Patented) Series of "Evernu" Seats

The hinges are inserted into the underside of the seat. No metal parts whatever are visible on the top, sides or back of the seat. These hinges are regularly furnished with a patented device to remove the seat from the bowl without unloosening or detaching the hinge posts, making it possible to thoroughly clean and sterilize the seat and the rear of the bowl. Seats can be easily re-attached to the bowl. Non-removable hinges of this type can be furnished if desired. This type of seat and hinge are furnished in four styles, as follows:

No. 630. Open front and closed back for regular bowl.

No. 635. Open front and closed back for extended lip bowl.

No. 640. Open front and open back for regular bowl.

No. 645. Open front and open back for extended lip bowl

No. 550-W "Evernu" Seat without Cover

Ebony or mahogany. Without cover. Saddle shape. For large extended lip bowl. Check hinge.

Above seat regularly furnished to hinge 19 in. Can also be furnished to hinge 18, 18½ or 19¼ in.

No. 550. Same as No. 550-W except with cover.

No. 525 and No. 525-W. Same as No. 550 and No. 550-W except for regular bowls and hinges 16¼, 17¼ or 17½ in. long

No. 580 "Evernu" Seat without Cover

Ebony or mahogany open front and open back. For regular or short extended lip bowl. Extra heavy check hinge.

No. 590. Same as No. 580 except for large extended lip bowl.

No. 580 and No. 590 can also be furnished with cover

No. 645 "Evernu"

No. 645. Ebony or Mahogany "Evernu" Hard Rubber Seat, open front and back for extended lip or elongated oval rim bowl. Equipped with patented concealed and removable type of hinge as illustrated elsewhere on this page. Hinge can be made from any metal or hard rubber

No. 640 "Evernu"

No. 640. Ebony or Mahogany "Evernu" Hard Rubber Seat, open front and back for regular bowl. Equipped with patented concealed and removable type of hinge as illustrated elsewhere on this page. Hinge can be furnished made from any metal or hard rubber

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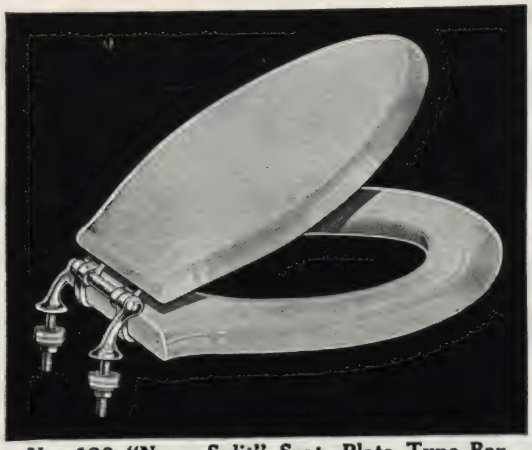


No. 120 "Never-Split" Seat, Plate Type Bar Hinge with Offset Posts

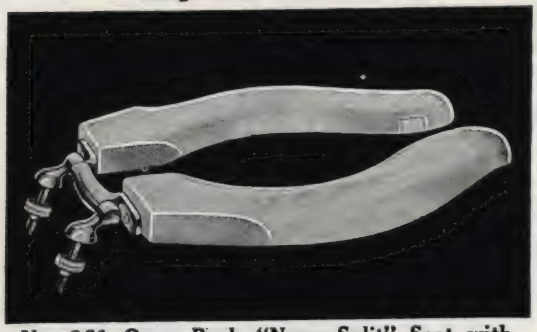
No. 135 "Never-Split" Seat, Concealed Hinge with Offset Posts
No metal on top or bottom of seat or cover

No. 296 "Never-Split" Seat, Concealed Hinge
No metal on top or bottom of seat or cover

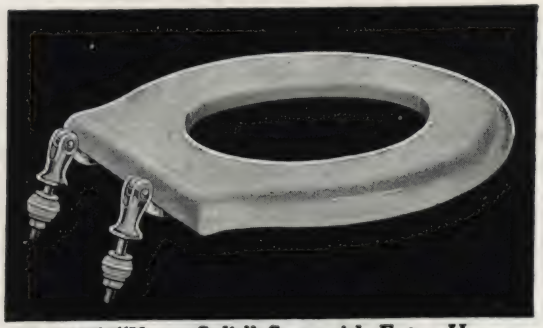
No. 295 "Never-Split" Seat, Heavy Plate Type Bar Hinge with Offset Posts

No. 122 "Never-Split" Seat, Plate Type Bar Hinge with Offset Posts

No. 297½ "Never-Split" Seat, Concealed Hinge
No metal on top or bottom of seat or cover



No. 261 Open Back "Never-Split" Seat with Extra Heavy Plate Type Hinge



No. 175 "Never-Split" Seat with Extra Heavy Plate Type Hinge

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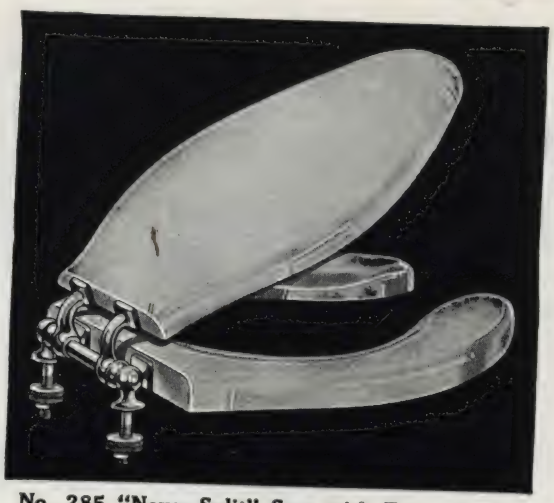


No. 285 "Never-Split" Seat with Extra Heavy Concealed Hinge
No metal on top or bottom of seat or cover

No. 300 Full Saddle "Never-Split" Seat with Extra Heavy Plate Type Bar Hinge

Detailed Specifications—"Never-Split" Seats

(1) Any "Never-Split" model above and on preceding page can be finished as follows:
(a) White or colored sheet "pyralin" finish.
(b) White or colored sprayed "Duco" or "Imaculoid" finish.
(c) Varnished finish (oak, mahogany, cherry, walnut, etc.).

(2) All models can be furnished either open or closed front.

(3) All models can be furnished to fit any type bowl, i.e., regular rim bowls, extended lip bowls, elliptical rim bowls and raised lip bowls.

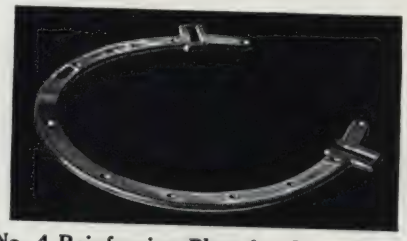
(4) Nickel-plated brass hinges are regularly furnished on all models.

Chromium plate, white metal, white or colored lacquer and black moulded hinges can be furnished when specified.

(5) All models can be furnished either with or without cover.

(6) "Never-Split" and "Evernu" Seats can be furnished to comply with all U. S. Government Specifications.

(7) "Never-Split" and "Evernu" Seats can be furnished to fit bowls with concave rims.



No. 4 Reinforcing Plate for Open Front Seats
No. 6. Reinforcing Plate for closed front seat.
No. 3. Lifting Plate. Can be attached to front of any type seat

No. 100 "Never-Split"

Juvenile Rings
Made to fit seats of any make. Open front style is for use on saddle seats; closed front style is for use on plain shaped seats. They are small and compact, have no pegs or protrusions, but fit the large seats securely

No. 21 "Never-Split"

No. 1 Extra Heavy Nickelplated Brass Ball Weight Self-raising Hinge

Close Roughing Hinge with Friction Spring in Posts
Can be attached to No. 120 seat only. Seat and cover equipped with this hinge will stand in any position when raised

Emory Self-raising Double Cylinder Spring Hinge

CRANE CO.

Plumbing Fixtures, Valves, Fittings and Heating Supplies

CRANE CO. GENERAL OFFICES

836 South Michigan Avenue, CHICAGO, ILL.

NATIONAL EXHIBIT ROOMS: ATLANTIC CITY

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For our pages on Water Heaters, Water Softeners, Water Systems and Gas Fired Boilers, see Manufacturers' Index

THE CRANE LINE

Completeness

The completeness of the Crane line is the result of 75 years' experience. The background shared by all Crane products is one of three-quarters of a century's pioneering in the development of materials that bring sanitation and comfort to the home. This development has been logical. Starting with valves, fittings, and piping materials—the foundation of any efficient plumbing system—it brought these to a high state of perfection before it started to make fixtures.

Its entrance into the field of fixture making, several years ago, was the starting point of a revolutionary advance in this art. Today, the complete line of appointments manufactured by CRANE CO. mirrors every sound advance. Several of these are explained in the next column, the fixtures themselves being described in the pages which follow.

Acid Resisting Enamel

An improvement in enamel that enables it to withstand the discoloration of fruit juices and ordinary acids —that insures the fixture's permanently glistening beauty.

Color

CRANE CO. pioneered in the cause of color for the bathroom. Today its line offers personal taste the widest latitude in the choice of color and decorative schemes.

Chromium Plate

This is an assurance that exposed metal parts will need no burnishing or cleaning. Very superior to nickel, this new finish is unaffected by climate, and is resistant to tarnish.

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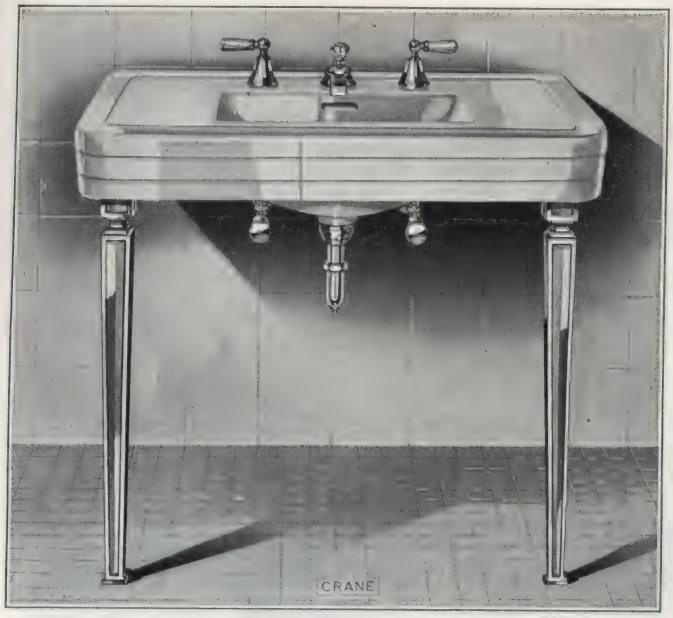

C 139 (Patented)

Lavatory: Crane *Corwith* twice-fired vitreous china lavatory with rectangular basin and splash lip, supported on chromium plated, square paneled, metal legs and brackets.

Trimming: Design 50, crystal chromium plated *Securo* metal spout compression supply and quick draining direct lift waste fixture with renewable seats; crystal handles and crystal waste knob.

Supplies: ⅜-in. chromium plated angle supplies with stops.

Trap: 1¼-in. chromium plated brass P trap.

Size of lavatory.....in.	30	x24	33	x24	36	x24	42 x24
Size of basin.....in.	18½x13		18½x13		18½x13		18½x13

C 210-C1

Lavatory: Crane *Elegia* twice-fired vitreous china pedestal lavatory with splash lip and enameled brackets.

Trimming: C1 *Securo* integral spout compression supply and quick draining direct lift waste fixture with renewable seats.

Supplies: ⅜-in. angle supplies with stops.

Trap: 1¼-in. brass P trap.

Finish: Nickel plated or chromium plated.

Size of lavatory.....in.	32x25
Size of basin.....in.	18x13

C 220-C1 (Patented)

Lavatory: Crane *Corwith* twice-fired vitreous china pedestal lavatory with rectangular basin, splash lip, and enameled brackets.

Trimming: C1 *Securo* integral spout compression supply and direct quick draining lift waste fixture with renewable seats.

Supplies: ⅜-in. angle supplies with stops.

Trap: 1¼-in. brass P trap.

Finish: Nickel plated or chromium plated.

Size of lavatory.in.	24x21	27x22	30	x24	33	x24	36 x24
Size of basin....in.	16x11	17x12	18½x13		18½x13		18½x13

C 255-M3

Lavatory: Crane *Norwich* twice-fired vitreous china pedestal lavatory with rectangular basin, splash lip, and enameled brackets.

Trimming: M3 *Securo* metal spout compression supply and quick draining direct lift waste fixture with renewable seats.

Supplies: ⅜-in. angle supplies with stops.

Trap: 1¼-in. brass P trap.

Finish: Nickel plated or chromium plated.

Size of lavatory.....in.	24x21	27x22	30	x24
Size of basin.....in.	16x11	17x11½	18½x12½	

If wanted with oval basin, specify C 256-M3 *Ipswich.*

Note: Where colored lavatories are specified Crane Co. recommends all-metal trimmings and brackets in chromium plated finish.

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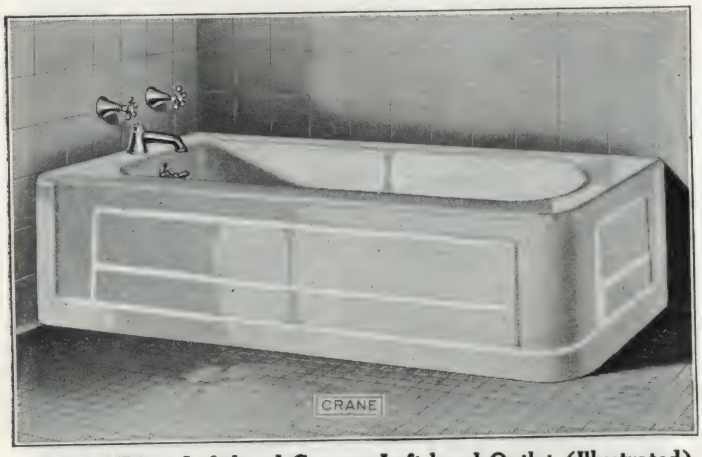


C 3205-LF51—Left-hand Corner, Left-hand Outlet (Illustrated)
C 3205-RF51—Right-hand Corner, Right-hand Outlet

Marshall, Corwith, and *Tarnia* baths are furnished in regular or acid-resisting white or colored enamel. Where colored baths are specified CRANE Co. recommends all-metal trimmings in chromium plated finish.

C 3205-LF51
C 3205-RF51

Bath: Crane *Marshall* enameled corner bath with slope end.

Fixture: F51, ¾-in. concealed compression supply fixture with through-rim spout and renewable seats; 2-in. *Accesso* concealed pop-up waste and overflow.

Finish: Nickel plated or chromium plated.

Dimensions:

Nominal size	ft.	5½
Length over all	in.	68
Width over all	in.	36¼
Depth inside	in.	17

C 3308-LD71—Left-hand Outlet (Illustrated)
C 3308-RD71—Right-hand Outlet

C 3308-LD71
C 3308-RD71

Bath: **Crane *Corwith* enameled recess bath with slope end.**

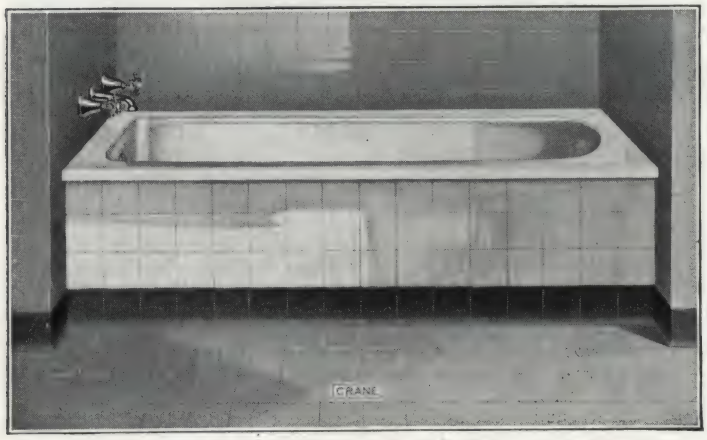
Fixture: **D71, ½-in. concealed mixing valve shower and compression overrim supply fixture with 6-in. spout and renewable seats; shower head with removable face, integral volume regulator and adjustable ball joint; 1½-in. *Accesso* concealed pop-up waste and overflow.**

Curtain: 8-oz. white duck curtain; 1-in. O.D. brass straight curtain rod with snap and hold back hooks.

Finish: Nickel plated or chromium plated.

Dimensions:

Nominal sizes	ft.	4½	5	5½	6
Length over all	in.	54	60	66	72
Width over all	in.	30½	30½	30½	30½
Depth inside	in.	17	17	17	17



C 3336-F30—Left-hand Outlet (Illustrated)

C 3336-F30

Bath: Crane *Tarnia* enameled reversible bath with slope end.

Fixture: F30, ½-in. concealed compression overrim supply fixture with renewable seats; 1½-in. concealed connected waste and overflow with beaded chain and solid rubber stopper.

Finish: Nickel plated or chromium plated.

Dimensions:

Nominal sizes	ft.	5	5½	5½	6
Length over all	in.	60¾	67	67½	73½
Width over all	in.	32	32	36¼	32
Depth inside	in.	17	17	17	17

Note: Tarnia **bath is illustrated with tile but no tile is furnished.**

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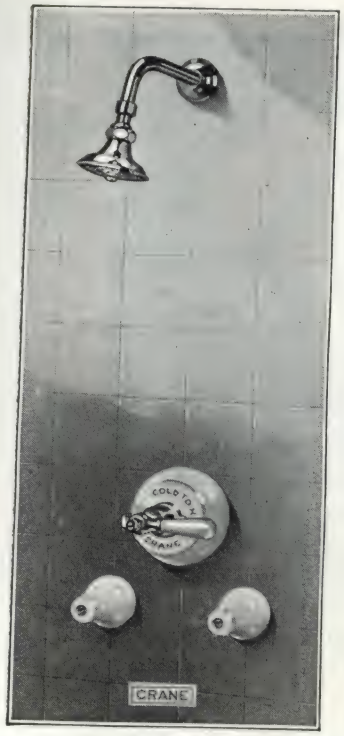


C 4360-B

C 4360-B

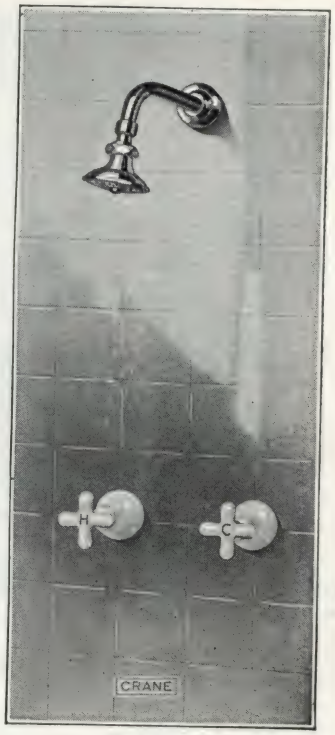
Shower: Crane concealed mixing valve shower with ½-in. mixing valve with renewable seats; ½-in. screw driver stops with renewable seats; 4-in. brass shower head with removable face, adjustable ball joint and ½-in. bent shower arm to wall.

Finish: Nickel plated or chromium plated.

C 4400-B

Shower: Crane concealed compression shower with ½-in. by-pass pattern supply valves with renewable seats; 4-in. brass shower head with removable face, adjustable ball joint and ½-in. bent shower arm to wall.

Finish: Nickel plated or chromium plated.



C 4400-B

C 9026-A

Fountain: Crane *Tyrone* twice-fired vitreous china pedestal drinking fountain with raised integral angle stream, non-squirting bubbler.

Supply: Cast brass supply and waste connection; cast brass Crane *automatic stream regulator*; metal covering plate; *Triumph* ball-bearing self-closing valve with renewable seat; lock-shield loose key stop; ¼-in. galvanized supply to floor with union.

Waste: China strainer: 1-in. galvanized waste to floor.

Screws: Steel floor screws with expansion shields, cap nuts and washers.

Bolt Caps: China bolt caps.

Finish: Nickel plated or chromium plated.

Dimensions:

Height, floor to rim	in.	30	36
Diameter of receptor, outside	in.	14	14
Depth of receptor, inside	in.	4½	4½

The new *Tyrone* drinking fountain with raised integral angle stream bubbler conforms with the requirements of the American Public Health Association and is approved by the Chicago Board of Health. The features are:

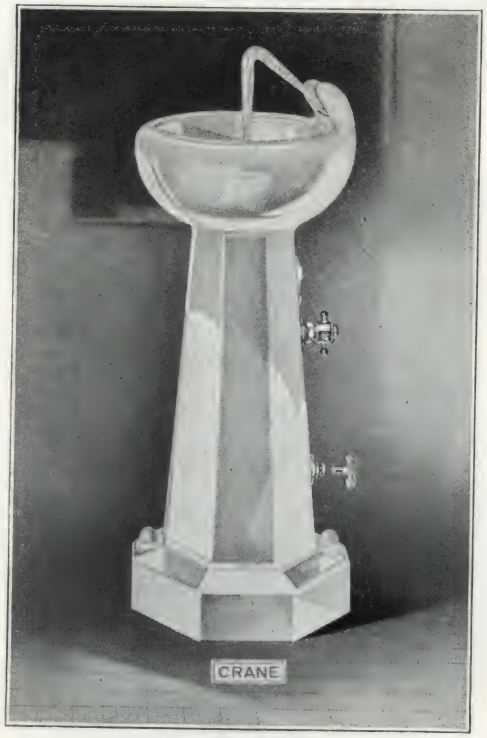
Construction: Twice-fired vitreous china, an impervious ware of unquestioned sanitary advantages.

Raised Integral Angle Stream Bubbler: The location of the bubbler above the rim of the receptor prevents contamination of the water supply even when the outlet is clogged and the receptor overflows.

Lip Guard: The lip guard is constructed to prevent the lips touching the china spout.

Protecting Hood: The spout is protected by a hood which prevents saliva or other foreign matter from falling back into it.

Non-squirting Spout: The china spout is arranged with a non-squirting feature; so constructed that fingers cannot be placed directly on the supply spout.



C 9026-A

Crane Automatic Stream Regulator

The Crane *automatic stream regulator* used on the above fountain is especially recommended for factories, schools, railway stations, public buildings, and other places where maximum demands on the supply line at intervals result in material variations in the water pressure in the line.

Construction: The Crane *automatic stream regulator,* of heavy brass construction throughout, is of the balanced valve diaphragm type, designed so that the bronze spring does not come in contact with water. All parts are accessible—whether exposed or concealed in the fountain—and all parts can easily be replaced. It is available in straight or angle patterns for concealed or exposed installations.

Automatic Stream Regulator: The diaphragm construction automatically maintains a drinking stream of constant height under varying water pressures.

No Waste of Water: The balanced valve delivers all of the water that enters the Crane *automatic stream regulator* to the bubbler without affecting the height of the drinking stream, regardless of the variation in pressure under which the water is supplied. No water is discharged into the waste line to maintain this constant height drinking stream.

This stream regulator should be installed between the controlling stop and bubbler rather than in pressure side of line.

Furnished in ¼ or ⅜-in. sizes, rough brass for concealed installation and nickel plated or chromium plated for exposed installations.

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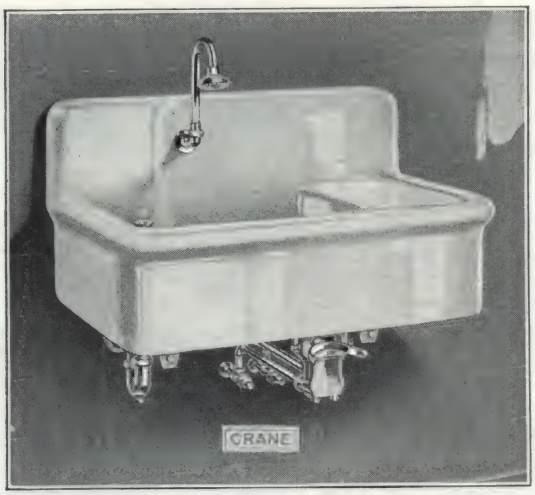


C 5616

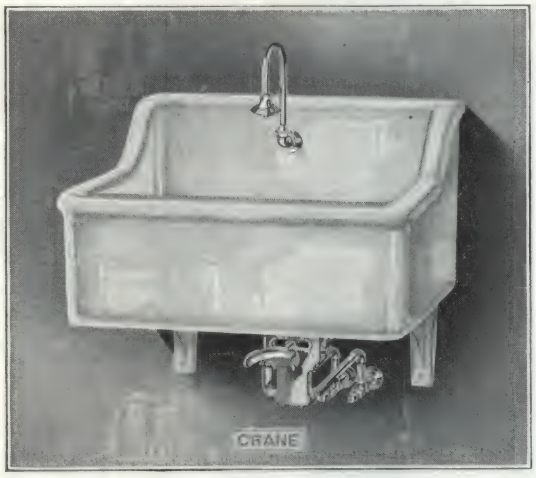
Sink: Crane regular selection porcelain (all clay) or vitreous china all service sink; integral back; drainboard; painted semi-concealed brackets.

Supply: C 7631 knee action supply valve with renewable seats; C 7535 gooseneck spout with 3-in. spray; piping from valve to spout; ½-in. I.P.S.&W. supplies to wall with stops.

Waste: C 33852-P standing waste and overflow; 1½-in. cast brass P traps.

Size: 36x24 in. with 17½x21½x9½ in. deep inside sink compartment and 30x22 in. with 15½x17½x9½ in. deep inside sink compartment.

Finish: Nickel plated or chromium plated.



C 5661

Sink: Crane *Barnert* regular selection porcelain (all clay) or vitreous china surgeon's wash-up sink with painted, semi-concealed brackets.

Supply: C 7631 knee action supply valve with renewable seats; C 7535 gooseneck spout with 3-in. spray; piping from valve to spout; ½-in. I.P.S.&W. supplies to wall with stops.

Waste: Open waste strainer; 1½-in. cast brass P trap.

Sizes: 37x23x10½ in. and 30x20x10½ in. deep inside.

Finish: Nickel plated or chromium plated.

C 7092-B

Sink: Crane twice-fired vitreous china flushing rim clinic syphon jet slop sink.

Supply: C 32810-B2 ½-in. compression supply fixture with pail hook, brace, renewable seats and stops.

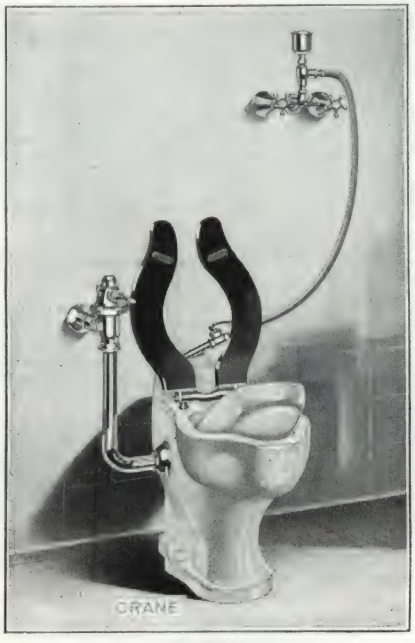
Valve: C 13022-VB "Water Controlled Vacuum Breaker" flushing valve with 1-in. angle stop, and C 13146-L 1½-in. O.D. offset flush connection.

Rim guard: C 21500 3-bar spring clamp rim guard.

Screws: Floor screws and china bolt caps.

Size: 21x21 in.; height floor to top of rim 21 in.

Finish: Nickel plated or chromium plated.



C 7212

Closet: Crane *Welling* twice-fired vitreous china syphon-jet extended lip closet with integral bed-pan lugs and drain cup.

Valve: C 13010-VB "Water Controlled Vacuum Breaker" flushing valve with 1-in. straightway stop and C 13142 1½-in. O.D. flush connection.

Seat: Ebony finish hard rubber open front and back serpentine seat with check hinge.

Bed pan cleanser: C 7450 ½-in. concealed compression bed pan cleanser with vacuum breaker and receiver; ⅜-in. red extra strong reinforced rubber hose; self-closing stop, 1½-in. red rubber bound spray and spray hook.

Bolt caps: China bolt caps.

Finish: Nickel plated or chromium plated.

Continued on next page

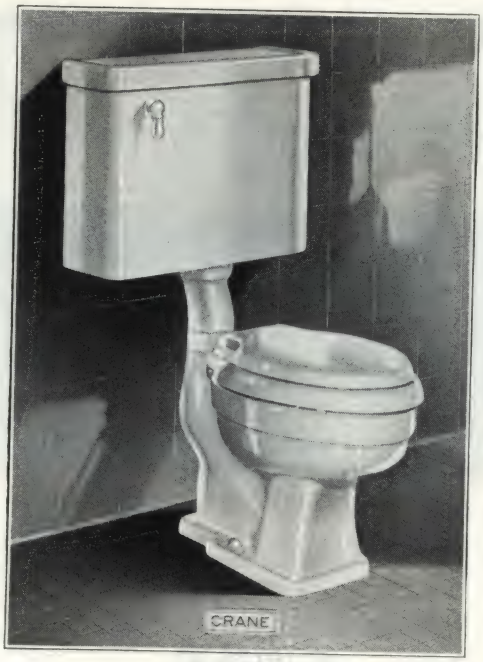
C 10380

Closet: Crane *Corwith* twice-fired vitreous china, quiet-acting, syphon jet closet with 11x16-in. elliptical rim opening.

Tank: *Corwith* twice-fired vitreous china extra large back supply tank with shelf cover, quiet-acting flush and float valves with stop and china flush connection.

Seat: All white closed front elliptical seat and cover with concealed hinge.

Bolt caps: Square china bolt caps.



C 10554

Closet: Crane *Santon* twice-fired vitreous china syphon jet closet with 10x15-in. elongated rim opening.

Tank: *Ipswich* 8-gal. twice-fired vitreous china back supply tank with shelf cover, stop and offset china flush connection.

Seat: All white closed front elongated seat and cover with concealed hinge.

Bolt caps: China bolt caps.

C 10570

Closet: Crane *Santon* twice-fired vitreous china syphon jet closet with 10x15-in. elongated rim opening.

Valve: "Water Controlled" flushing valve with 1-in. straightway stop.

Seat: Ebony finish hard rubber open front elongated seat with moulded rubber check hinge.

Bolt caps: China bolt caps.

Finish: Nickel plated or chromium plated.

C 10605-A

Closet: Crane *Saneto* twice-fired vitreous china syphon jet plain rim closet with extended inlet.

Tank: *Ipswich* 8-gal. twice-fired vitreous china back supply tank with shelf cover, stop and straight china flush connection.

Seat: All white ring seat and cover with concealed hinge.

Bolt caps: China bolt caps.

Finish: Nickel plated or chromium plated.

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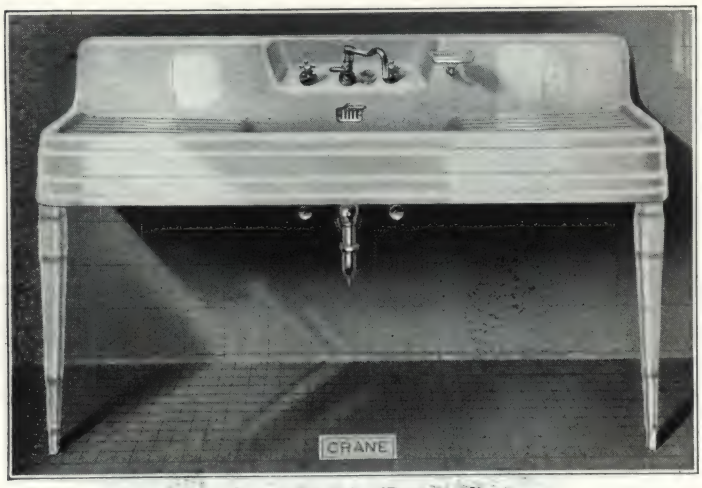


C 19168-PA (Patented)

C 19168-PA

Sink: Crane *Corwith* enameled double drainboard apron sink with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers and enameled legs.

Fixture: ½-in. chromium plated concealed compression double supply fixture with swinging spout, transfer valve, concealed hose with 1½-in. rubber bound spray, and renewable seats.

Waste: Chromium plated pop-up waste and overflow with large removable cup strainer.

Soap Dish: Removable china soap dish with chromium plated brackets.

Supplies: ½-in. chromium plated angle supplies with stops.

Trap: 1½-in. chromium plated brass P trap.

Dimensions:

Nominal over-all sizes	in.	74x25	60x24
Length over all	in.	74¾	60¾
Width over all	in.	24¼	24¼
Size of sink (inside)	in.	26x18	22x18

C 19176-SD

Sink: Crane *Corland* enameled double drainboard apron sink with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers and enameled legs.

Faucet: ½-in. *Agilis* quick compression double faucet with swinging spout, china soap dish, transfer valve, hose with spray, renewable seats, and china hose rest.

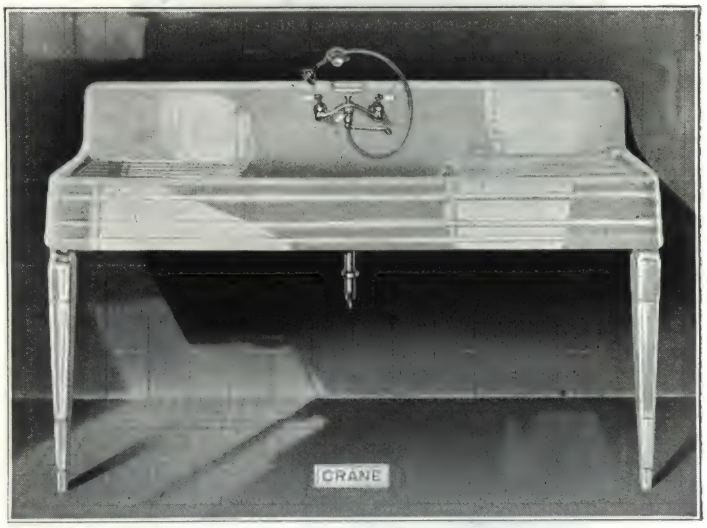
Waste: Chromium plated *Dual* hand operated waste with large removable cup strainer.

Trap: 1½-in. brass P trap.

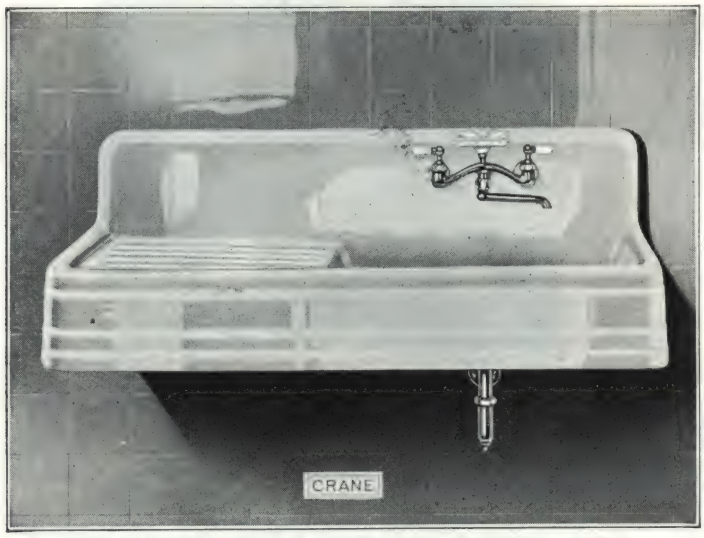
Finish: Nickel plated or chromium plated.

Dimensions:

Nominal over-all sizes	in.	74x24	60x24
Length over all	in.	74⅝	60⅝
Width over all	in.	24¼	24¼
Size of sink (inside)	in.	26x18	22x18



C 19176-SD



C 19179-LJD—Left-hand Drainboard (Illustrated)
C 19179-RJD—Right-hand Drainboard

C 19179-LJD
C 19179-RJD

Sink: Crane *Corland* enameled single drainboard apron sink with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers.

Faucet: ½-in. *Agilis* quick compression double faucet with swinging spout, china soap dish, and renewable seats.

Waste: Chromium plated *Dual* hand operated waste with large removable cup strainer.

Trap: 1½-in. brass P trap.

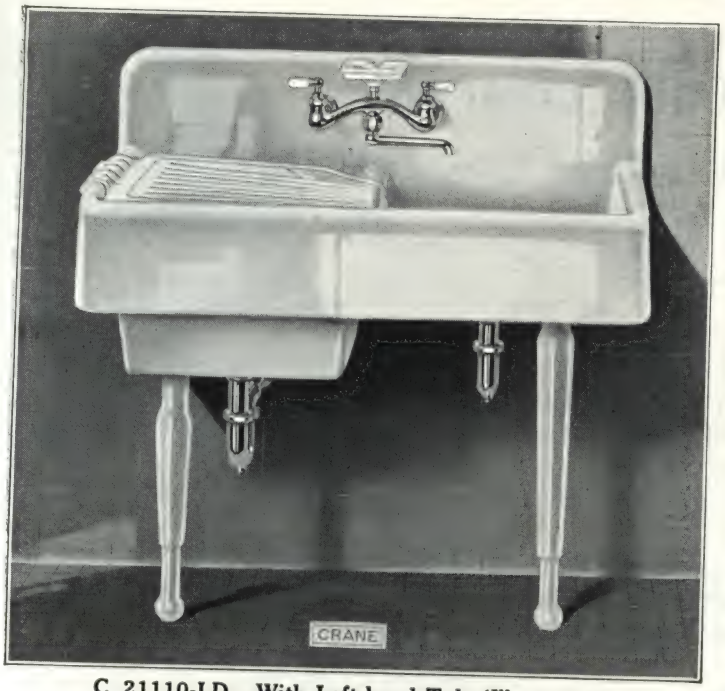
Finish: Nickel plated or chromium plated.

Dimensions:

Nominal over-all sizes	in.	52x24	42x22
Length over all	in.	52¾	42⅝
Width over all	in.	24¼	22 5/16
Size of sink (inside)	in.	26x18	20x16

Corwith and *Corland* sinks are furnished in regular or acid resisting white or colored enamel. Where colored sinks are specified, CRANE Co. recommends all metal trimmings in chromium plated finish.

Continued on next page



C 21110-LD—With Left-hand Tub (Illustrated)
C 21110-RD—With Right-hand Tub

C 21110-LD
C 21110-RD

Sink and Tub: Crane regular enameled combination sink and laundry tub with 8-in. back, 8-in. apron and 8-in. deep sink; concealed hangers and painted legs.

Faucet: ½-in. *Agilis* quick compression double faucet with swinging spout, soap dish, and renewable seats.

Waste: Dual hand operated waste with large removable cup strainer in sink; waste plug with stopper in tub.

Traps: 1½-in. brass P traps.

Drainboard: Reversible enameled steel drainboard.

Finish: Nickel plated or chromium plated.

Furnished in regular or acid resisting enamel.

Dimensions:

Nominal size....in.	32x22	42x22	50x22
Length over all....in.	36½	42½	50½
Width over all....in.	22¼	22¼	22¾
Depth of tub....in.	14	14	14

C 21191

Tub: Crane enameled two-compartment laundry tub with painted legs and concealed hangers.

Faucet: ½-in. *Agilis* quick compression double faucet with swinging spout, china soap dish, and renewable seats.

Waste: Brass waste plugs with stoppers; 1½-in. brass continuous waste.

Trap: 1½-in. P trap.

Wringer Base: Hardwood wringer base.

Finish: Nickel plated or chromium plated.

Furnished in regular or acid resisting enamel.

Dimensions:

Nominal size....in.	52x26
Length over all....in.	52½
Width over all....in.	26¼
Height of back....in.	8
Height of apron....in.	5½
Depth inside....in.	14
Size of tubs, (inside)....in.	23x22

C 21191

196 Branches and Sales Offices to Serve You

The fixtures shown on these pages give only a small idea of the comprehensiveness of the Crane line, for this contains complete groups of appointments especially designed for the requirements of institutions, public buildings, hotels, clubs, homes, trains, and ships.

The completeness of this line, the high degree of engineering skill that has been developed by CRANE Co., and its vast manufacturing resources have been made available throughout the world by the maintenance of 196 branches, sales offices, and exhibit rooms.

No matter what your plumbing problem may be, at the nearest Crane Branch you will find the materials and the knowledge to solve it. If it is inconvenient for you to visit a branch, you are urged to write CRANE Co.

JOSEPH A. VOGEL COMPANY

School and Factory Closets, Frost-proof Closets and Hydrants

WILMINGTON, DEL. ST. LOUIS, MO.

The Company

For more than 23 years the JOSEPH A. VOGEL COMPANY has been manufacturing seat-action closets, frost-proof and non-frost-proof. Vogel closets are installed and operating satisfactorily in all parts of the country, many of them for as long as twenty years.

Number Ten-A Seat-Action Closet

The newest addition to the Vogel line, the Number Ten-A Seat-Action Closet, is the result of these years

Vogel Number Ten-A Seat-Action Closet Combination

of experience and research in the plumbing field. It is a high grade sanitary closet, designed especially for use in schools, plants, factories, institutions, theatres, waiting rooms, comfort stations, office buildings, hospitals, residence basements, or any semi-public or public places, where durable closets are required.

In this era of sanitation, seat-action closets have proved themselves highly satisfactory for installations of this kind, because of their positive operation, and the fact that they flush every time.

Newspaper Test

A piece of newspaper, 12 in. square, was dropped into the bowl which was then given a 4-gallon flush. The paper was carried completely through the trap by this one flush.

Ball Test

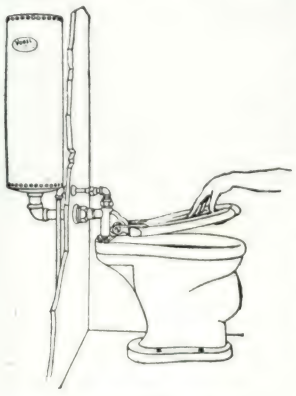
A ball, 2⅜ in. in diameter was dropped into the bowl and passed through the trap with one 3½-gallon flush. These tests are conclusive proof of the dependability of the Number Ten and Ten-A Selflush Water Closets under any conditions of service.

Endurance Test

On July 16, 1929, a Vogel Number Ten Closet was taken from stock. By means of an automatic device it flushed continually night and day. On Oct. 10, 1930, it had flushed 220,000 times, equivalent to 80 years' wear, and not even a washer had been renewed. The test continues indefinitely.

With a service pressure of 60 lb. the following tank pressures are reached:

Twenty-pound tank pressure is reached in twenty seconds, giving a 3-gallon flush. This flush is completely effective.



It Operates Easily

Thirty-pound tank pressure is reached in twenty-five seconds, giving a 3½-gallon flush.

Forty-pound tank pressure is reached in thirty seconds, giving a 4-gallon flush.

More than 4 gallons of water is never used at a flush, although the tank is of 5-gallon capacity.

From the above, it is obvious that a completely effective flush will be given under any normal service conditions, but bear in mind that at least 20 lb. pressure is required at the closet for proper flush.

Materials

Every part of the Vogel Number Ten-A closet is of the highest quality obtainable. The valve has few moving parts, and these are of high tension bronze. The seat is air-seasoned hardwood, reinforced with steel dowels and finished in three coats of granite varnish. Either open or closed front seats can be supplied, and, where desired, an indestructible hard rubber composition seat can be furnished. In the latter case the closet can be washed down with live steam without injury.

Continued on next page

Vogel Number Ten Closet Combination

Bowl

The bowl of the Vogel Number Ten-A is highest grade two-fired vitreous china, finished in a high hard glaze. The bowl is equipped with a shelf to which the valve is attached, so that no leaks can occur at the joint, even under the most severe operating conditions. Juvenile height bowl can be furnished at no additional cost.

Tank

Tanks are heavily galvanized, cylindrically riveted, and designed to withstand a pressure of 100 lb. to the square inch. Each tank is tested before being shipped.

Vogel Number Ten Closets are exactly the same as the Ten-A Closets, except with the Number Ten the tank is exposed, whereas, with the Number Ten-A, it is concealed behind the wall.

Operation of Vogel Number Ten and Ten-A Closets

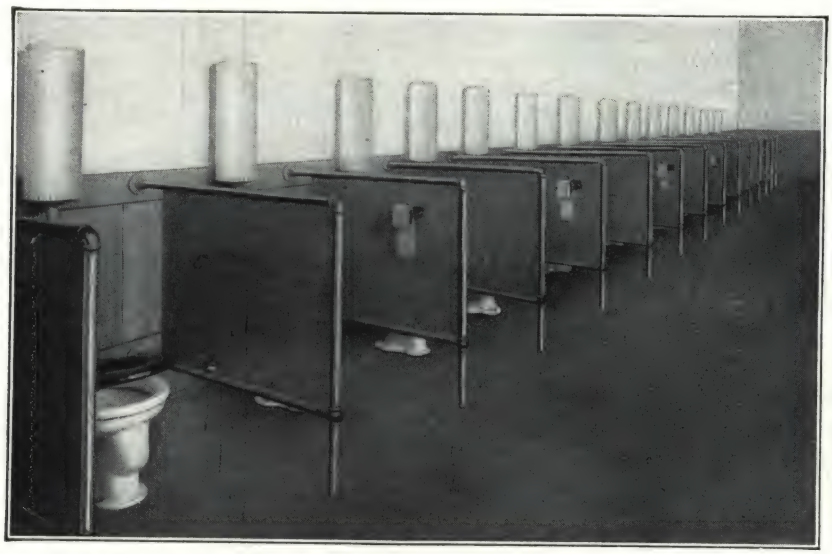
When the fixture is not in use the seat remains at an angle to the bowl. The weight of the body (any weight over 15 lb.), placed upon the seat, lowers it to the horizontal position, causing the supply valve to open. Water enters the tank until the pressure within the tank equals the water service pressure, then the supply is automatically stopped. When the weight of the body is removed from the seat, the seat is released, closing the supply valve, opening the flush valve, and admitting a strong flush to the bowl.

Frost-proof Feature

Vogel Number Ten and Ten-A Seat-Action Closets, while not frost-proof, do have a valuable frost-proof feature. Naturally no bowl which has a trap can be frost-proof, but in Vogel Number Ten and Ten-A closets all the water is used in flushing, so that no water remains in the tank or valve below the supply washer after flushing.

This eliminates the possibility of water freezing within the valve or tank. This feature is valuable in buildings, such as schools, where heat may be turned off for the week-end or during winter vacation periods.

Vogel Number Ten and Ten-A Closets are supplied with either syphon action or syphon jet bowls. The roughing-in dimensions given in the next page apply to the syphon action bowl. Write for roughing-in for syphon jet and juvenile height bowls.



A Typical Installation of Vogel Number Tens, in the Plant of Pusey & Jones, Wilmington, Del.

Continued on next page

Specifications

Vogel Number Ten and Ten-A Selflush Water Closets. Furnish and install in.....
as shown on the drawings.....
Vogel Number Ten (or Ten-A) Selflush Water Closets, complete with vitreous china syphon-action bowl, reinforced hardwood seat with nickel-plated brass seat hinge and brace; Vogel Number Ten nickel-plated valve with all moving parts made of high tension bronze; heavily galvanized cylindrical pressure tank with wrought iron flush pipe and all necessary fittings.

Give location and number of fixtures required....
.....

If juvenile height bowl is desired so state here....
.....

If syphon jet bowl is desired so state here.....
.....

If open front seat is desired so state here.....
.....

State if substitute for hardwood (hard rubber or composition seat) is desired.

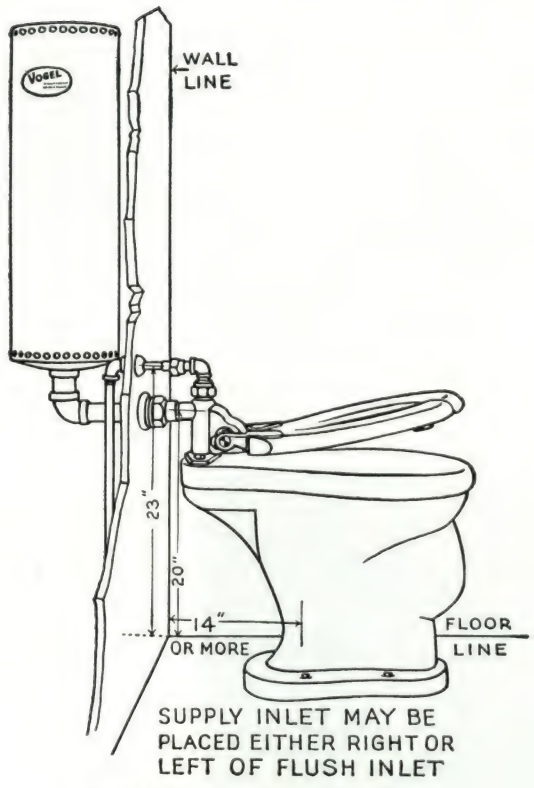
If polished nickel or chromium plating is desired, change this paragraph accordingly.

If tank is to be concealed, or baked enamel tank is desired, change this paragraph accordingly.

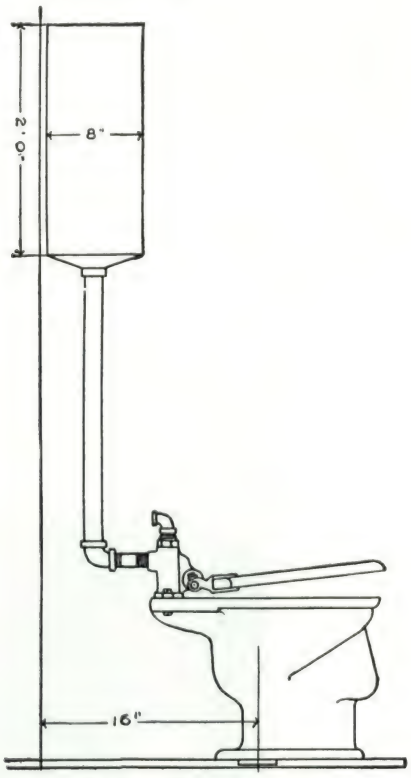
If tank is to be concealed, thickness of wall must be given here.

List Prices

Number Ten Selflush Water Closet complete, consisting of vitreous china bowl, reinforced hardwood seat, Number Ten nickel-plated valve, heavily galvanized pressure tank, and galvanized flush pipe. List price.$45.00
Number Ten-A, with tank concealed..... 48.00
Juvenile height bowl furnished at no extra cost.
For hard rubber or composition seat, add list.... 6.00
For chromium-plated valve and fittings, add list.. 3.00
For white enameled cylindrical tank, add list.... 5.00



Roughing-in for Vogel No. Ten-A



Roughing-in for Vogel No. Ten

Continued on next page

Other Vogel Products

Vogel No. 1

Vogel No. 1 Frost-proof Closet

This closet uses but four gallons of water at a flush. Only enough water enters the tank to compress the air, and no more water is used until the seat is again operated. This air and water flush is strong and cleansing. The valve parts can be easily removed in a few moments by simply unscrewing the one flush cap back of the bowl.

Depressing the seat raises the rod, allowing the tank to fill. Releasing the seat allows a strong flush direct from tank to hopper. The water in valve casing then passes down through waste valve (below frost line) into sewer, leaving the entire fixture open.

No. 1, enameled inside, red outside, tall oval flushing rim, enameled rim hopper, reinforced hardwood seat, galvanized pressure tank, flush pipe, lead waste connection, supply and flush valves assembled with 3 ft. 3 in. valve rod casing. List price, $30. (Trap and soil pipe not included.)

Outfits with hoppers having 4-in. outlets for caulking into bell end of soil pipe at same list prices.

Valves furnished any length up to five feet, at no additional cost.

Outfits with hoppers enameled in and out, add list, $4.40.

Outfits with self-raising seats, add list, $1.32.

Vogel No. 2

Vogel No. 2 Frost-proof Closet

This outfit is different from the Vogel No. 1 outfit in that it contains but one packing and flushes while in use, after which no water remains in the fixture above the trap.

Vogel No. 2, enameled inside, red outside, enameled rim hopper with brass fan wash, hardwood seat, lead waste connection, valve assembled with 3 ft. 3 in. valve rod and casing. List price, $17.50. (Trap and soil pipe not included.)

Outfits with hoppers enameled in and out, add list, $4.40.

Outfits with self-raising seats, add list, $1.32.

Vogel No. 3

Vogel No. 3

Vogel No. 3 is a Southern outfit and is not frost-proof. It is a durable, low-priced seat-action closet combination, made to stand up under hard use.

Vogel No. 3, enameled inside, red outside, tall oval flushing rim, enameled rim hopper, reinforced hardwood seat, galvanized pressure tank, flush pipe, heavy brass flush valve. List price, $25.

Outfits with hoppers enameled in and out, add list, $4.40.

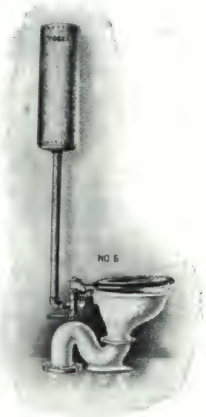
Outfits with self-raising seats, add list, $1.32.

When ordering, specify whether outfit with flanged bowl or bowl for caulking into soil pipe is desired.

Soil pipe trap not included with this outfit.

Roughs at same distance from wall as No. 1.

Vogel No. 5



Vogel No. 5

Vogel No. 5 is a factory outfit. It fills the demand for a strong and durable seat-action water-saving closet for factory use. The valve device is extremely simple, and repairs, though seldom necessary, can be easily made by removing the valve cap back of the bowl.

Vogel No. 5, enameled flushing rim hopper with S trap, enameled inside only, reinforced hardwood seat, heavy brass pressure flush valve, galvanized pressure tank, flush pipe and fitting. List price, $30.

For bowl and trap enameled outside, add list, $8.75.

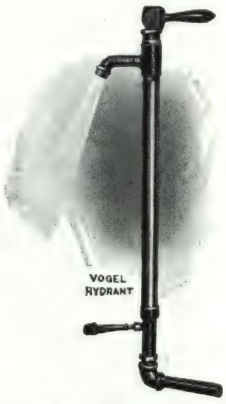
Outfits with self-raising seats, add list, $1.32.

Traps having 4-in. outlets for caulking into bell end of soil pipe at same list price.

Also furnished with full or ¾-S or P trap for caulking at same price.

This closet is intended for inside installation and has the same powerful flush and lasting quality as our frost-proof outfits.

Vogel Frost-proof Hydrants



Vogel Hydrant

The Vogel Frost-proof Hydrant has been on the market several years and many thousands are giving entire satisfaction.

It is the easiest and most convenient way of supplying water for washing cars or filling radiators in unheated garages.

It has the dependable Vogel Frost-proof Supply Valve, with bevel valve seat that will not retain pipe cuttings, sediment, etc. The by-pass is in the plunger, so that when rod is withdrawn the waterway is straight and clear with no concealed by-pass in valve body.

The pipe casing is genuine wrought iron pipe, galvanized.

The packing cap is the Vogel patent by which a uniform pressure is exerted at all times on the packing material. This hydrant has the endorsement of water departments on account of its positive open and shut operation, as it is either held entirely open or positively closed.

Made in lengths: 3 ft., 4 ft., 5 ft.

Price complete with lead waste connection, list $7.50.

Literature

A complete catalogue of Vogel products will be sent promptly upon request. Also an eight-page bulletin on Vogel Nos. 10 and 10-A Closets, designed especially for architects use. This booklet has been prepared according to specifications of the A. I. A. filing system, and is No. 1 of a series of similar booklets on Vogel products which are now being prepared.

We shall also be glad to send folders and other information which we believe will be of interest to architects. Special roughing-in measurements will be supplied promptly.

FIAT METAL MANUFACTURING CO.

Fiat Shower Bath Compartments, Brass Chrome Plated Shower Doors

FACTORY AND GENERAL SALES OFFICE
1201 Roscoe Street, CHICAGO, ILL.
NEW YORK OFFICE, 101 Park Avenue — BOSTON OFFICE, 11 Beacon Street

Products

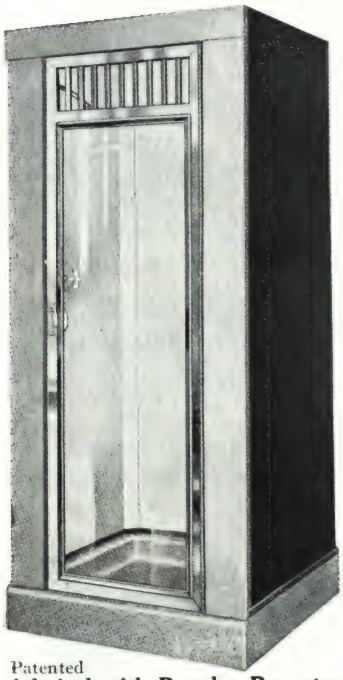
FIAT SHOWER BATH COMPARTMENTS.
FIAT SHOWER BATH RECEPTORS.

Fiat
TRADE-MARK

FIAT BRASS CHROME PLATED SHOWER DOORS.

For Fiat Toilet Partitions see Manufacturers' Index.

FIAT SHOWER BATH COMPARTMENTS PERMANENTLY LEAKPROOF



Patented
Admiral with Regular Receptor and Chromium Plated Door
Can be furnished with extended receptor

Fiat Shower Bath Compartments are complete watertight enclosures forming the room in which the shower bath is taken. The floor is of polished precast terrazzo. The walls can be furnished of vitreous enamel (the same finish as employed on ordinary bathtubs), or high grade specially prepared galvannealed steel finished in various colors of duco enamel or in prime coat of paint which can be refinished at points of installation to harmonize with prevailing decorations. Compartments are furnished with or without doors.

Fiat Compartments are of knocked-down construction —very easily handled and installed. When assembled, they provide a permanent, leakproof compartment throughout.

The precast terrazzo receptor provides a permanent, leakproof, finished, decorative flooring and can be just as easily installed on the finished floor as on the rough flooring, thus eliminating tiling, the laying of lead pan, grouting and the necessity for expensive drains.

The walls of the compartment form the balance of the finished unit and a great deal of tiling, plastering, decorating, etc., is eliminated.

Fiat Compartments can be just as easily installed in completed rooms or buildings as in those under construction, without excessive redecorating or tearing up of floors and walls.

Shipped knocked down. Accessible through any size door opening. Easily assembled at point of installation.

Fiat Admiral

The only shower compartment made having vitreous enameled walls. Every requisite and refinement that could be desired is embodied in this fixture. The dazzling white porcelain walls, the hand polished, marble inlaid surface of the receptor, give an air of ultra completeness and refinement.

Walls are made from armco iron with vitreous enamel fused on at a temperature of 1600°.

Fiat Ensign

A shower bath compartment especially designed where economy is desired without sacrifice of refinement and beauty of appearance.

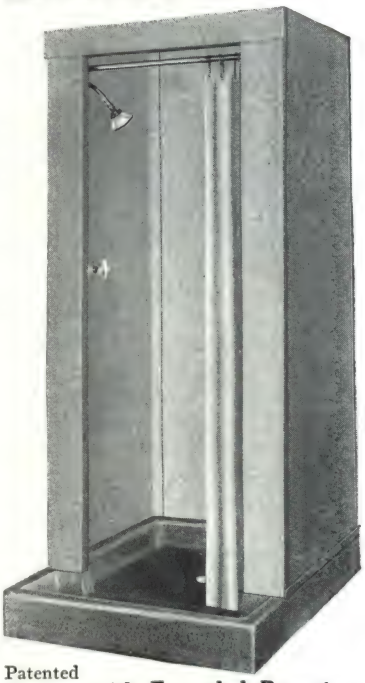
Walls are made from high grade specially prepared galvannealed steel, finished in various colors of duco enamel, or in prime coat of paint and refinished at point of installation to harmonize with prevailing decorations.

Chrome Stile

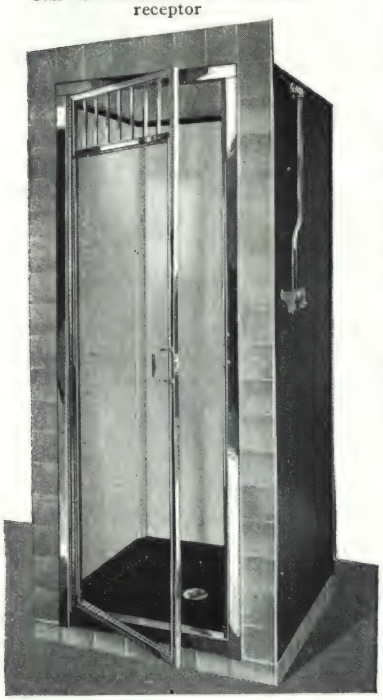
Specially designed so that tile or plaster can be applied adjoining the brass chromium plated door frame without cracks occurring. Receptor has removable chromium plated threshold. Furnished in either Ensign or Admiral Model.

MANY SIZES AND DESIGNS

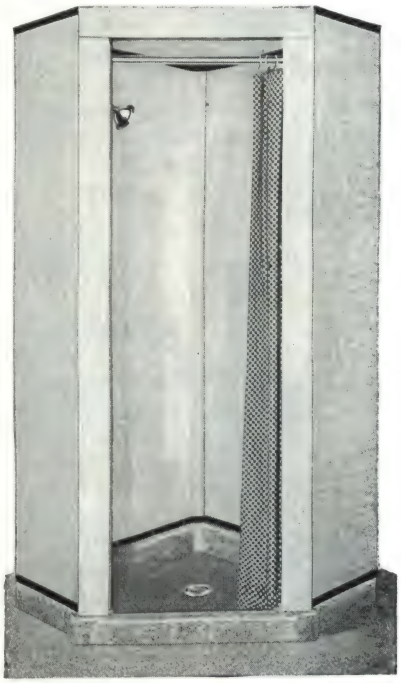
Over-all dimensions, in.			
With regular receptor		With extended receptor	
Width, in.	Depth, in.	Width, in.	Depth, in.
30	30	30	42
30	32		
32	32	32	44
34	34	34	46
30	36		
36	30	36	42
36	36	36	48
36	42		
42	36	42	48
46	36		
48	30		
48	36		
46	44		
36	36 Corner		



Patented
Ensign with Extended Receptor
Can be furnished with regular receptor



Patented
Admiral-Chromium Front Stiles Designed to Receive Tile
Can be furnished in Ensign model



Patented
Admiral Corner Compartment
Also furnished in Ensign model

Continued on next page

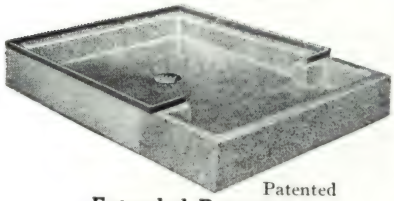
Fiat Shower Bath Receptors

A complete one-piece watertight shower floor—eliminates the use of lead pan, special drain fittings, grouting—and all expensive methods of shower floor construction. Can be installed on any kind of floor, either rough or finished.

Patented

Regular Receptor

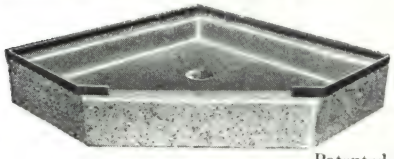
Used with Door or Curtain



Patented

Extended Receptor

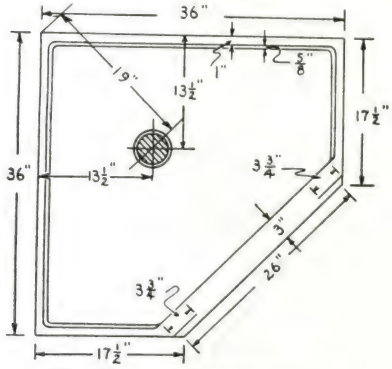
Receptor extends 12 in. in front of shower compartment. Specially designed for showers equipped with curtain so that receptor will catch spray, splashing and drippings from curtain. Keeps floor in front of shower dry. Water in extension drains back to receptor



Patented

Corner Receptor

This receptor is specially fitted where a corner of the room is the most adaptable place for the installation of a shower compartment and is designed to conserve space and give a maximum amount of bathing facilities as well as to produce distinct lines of beauty in appearance



Roughing-in Measurements

The waste openings are always in center of receptor proper, except in the corner receptor

The very finest quality of waterproof white cement and Vermont marble chips (chemically treated) are used in making the Fiat receptor. These ingredients are thoroughly tamped and puddled in a steel mould, resulting in a mass of maximum density which insures its superior watertight qualities. After this process the receptor is placed in a curing room for a period of thirty days, from which it emerges to receive a hand-polishing process which produces its attractive appearance.

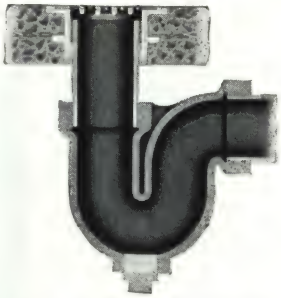
The polished black marble inlay and white background produces an extremely attractive surface which will harmonize with art marble, tile, or any bathroom floor.

The receptor has a smooth floor surface, but is so finished as to prevent slipping, whether wet or dry.

The Fiat Receptor is not "built-in" as part of the floor on which it rests, nor of the room walls which surround it. This is of the utmost importance as it prevents the future possibility of the receptor cracking, caused by settlement, vibration, shrinkage, expansion or contraction of the building walls and floors.

Height at which receptor is set with relation to finished floor can vary several inches. Installation on rough floor with finished floor laid to sides of receptor is recommended.

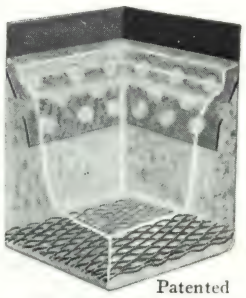
Drain fixture integral with receptor is set over 2-in. iron drainage P trap. To make waste connection to receptor remove strainer and use an ordinary lead calk joint. This insures an inexpensive and permanent leakproof connection.



Valves—Standard equipment consists of 2 individual compression valves and head. Compartments can be drilled to accommodate any kind of valves or shower head.

Corrosion—Fiat Compartments are absolutely immune to corrosion.

Leakage—Being an independent unit, Fiat Compartments are not subject to the detrimental effects of shrinkage, vibration, settling, expansion, contraction, and other potential elements so prominent in buildings, which create crevices through which leakage takes place.



Patented

Corner Section of Fiat Shower Bath Receptor

Simple—Practical—Permanent.

← The wall of shower enclosure is secured directly to 1-in. extension of galvanized steel flange.

←Perforations in flange insure bond.

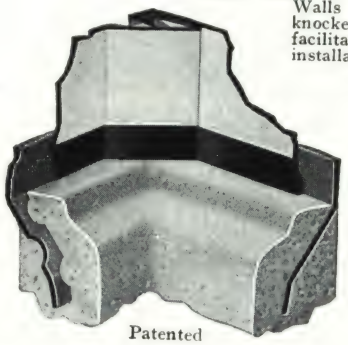
← ½-in. expanded steel mesh reinforcing extends across entire receptor.

←No sharp corners or crevices.

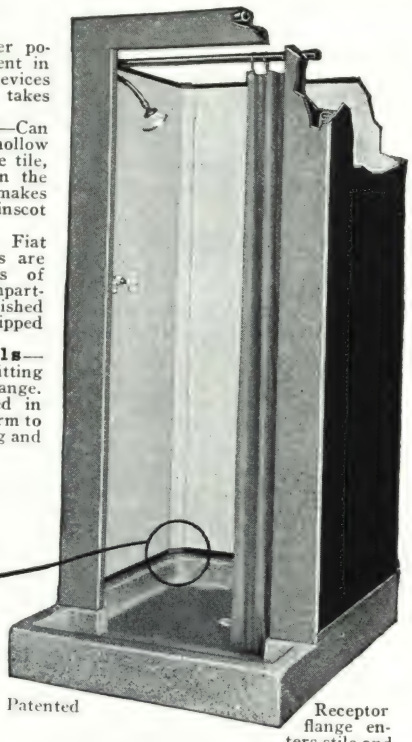
Stiles and Headrail—Can be furnished either in hollow metal or designed to receive tile, plaster or other material on the outer surface. The latter makes it possible to carry out wainscot design.

Door Openings—All Fiat Shower Bath Compartments are made with door openings of standard size, so that compartments not originally furnished with doors may be so equipped at any subsequent time.

Compartment Walls—Rest on receptor shoulder, fitting snugly inside of receptor flange. Walls are shipped in knocked down form to facilitate handling and installation

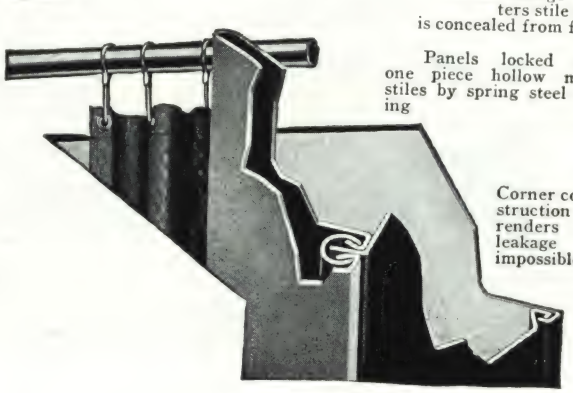


Patented



Patented

Receptor flange enters stile and is concealed from front



Panels locked into one piece hollow metal stiles by spring steel tubing

Corner construction renders leakage impossible

Details of Fiat Shower Compartments—Leakproof—Knock-down Construction

Galvanized steel flange thoroughly embedded in body of receptor encases bottom of compartment, making leakage impossible.

4½-in. flat head chromium plated metal strainer and drain with removable face, set flush with the receptor floor, allows for inside calking of 2-in. waste pipe connection or where so desired, lead connection can be used by soldering to the inside shoulder of the drain provided for that purpose.

Continued on next page

FIAT SHOWER STALL DOORS FOR ALL MODERN SHOWER ENCLOSURES

Fiat Shower Bath Compartment with Fiat Brass Chromium Plated Door

Fiat Brass Chromium Plated Shower Door

Tile Shower Enclosure with Fiat Brass Chromium Plated Shower Door

The Fiat Shower Door presents the finest appearance and contributes the maximum of cleanliness in the modern bathroom. Because of its many exclusive features of construction and finish, architects and plumbing contractors specify Fiat Shower Doors on all modern shower enclosures.

Fiat Shower Doors are pre-eminently adaptable. They create effects which are livable as well as beautiful and from the standpoint of cost are very economical.

Note exclusive feature of drain gutter on water table, eliminating water dripping on floor when door is opened after use. Water drains back into receptor and *not on floor.*

Construction Features

Frame—Heavy yellow brass tubing.

Jambs—Extruded yellow brass mouldings.

Hinge—Specially constructed, leakproof continuous piano hinge runs entire length of door, swings outward from stall. Brass chromium plated.

Corners—Reinforced by extruded heavy brass angles.

Lock—Double acting friction catch fastens into the frame and is guaranteed against door binding.

Glass—¼-in. plate set into heavy waterproofing channel.

Handles—Special offset design, on both sides of door.

Water Deflector—*Exclusive feature—drain gutter on water table* eliminating water dripping on floor when door is opened after use. Water drains back into receptor and *not on floor.* Sheet brass chromium plated.

Grill Vent—7 in. high. ⅜-in. square bars in opening.

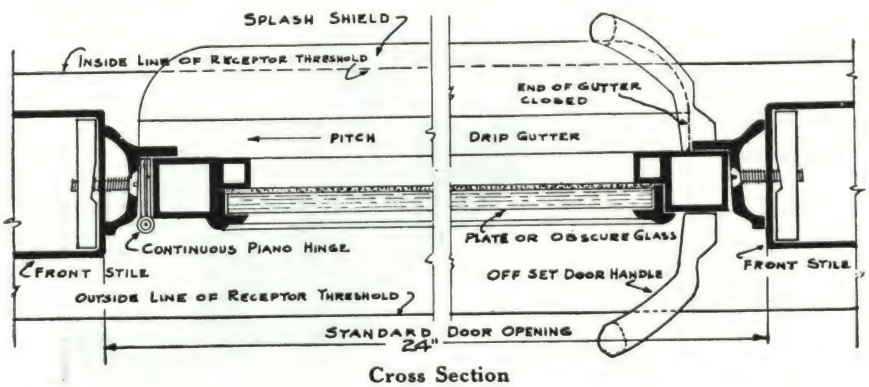
Panels—Can be furnished in either obscure or clear glass.

Finish—Heavy chromium plating.

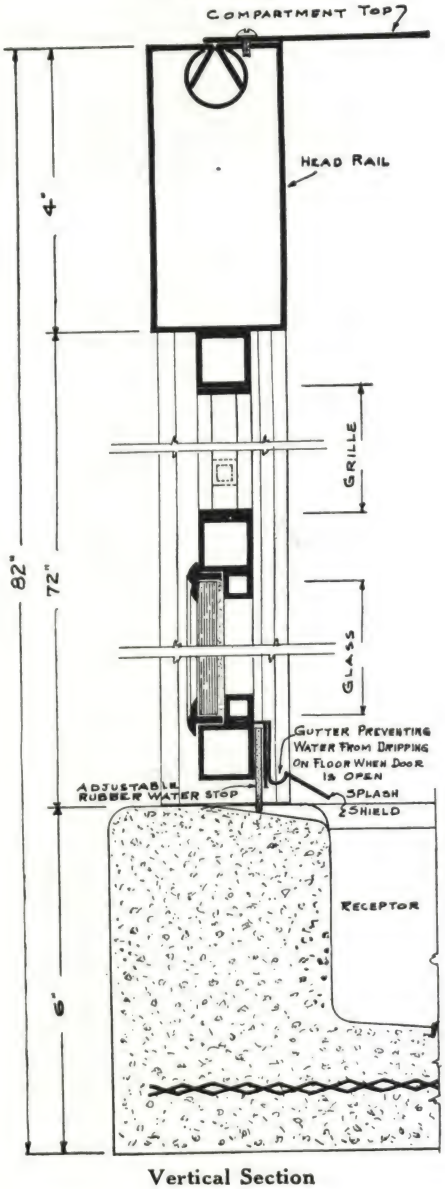
Regular Stock Sizes for Openings:

24x72 in. 25x74 in. 26x76 in. 27x78 in.

Special sizes furnished upon details and specifications.



Cross Section



Vertical Section

G. M. KETCHAM MFG. CORP.

Manufacturers of Bath Enclosures

81 Washington Street
BROOKLYN, N. Y.

NEW YORK CITY EXHIBIT: Architects' Sample Corporation, 101 Park Avenue

BRANCH OFFICES
PHILADELPHIA, PA., 2401 Chestnut Street
WASHINGTON, D. C., First and K Streets, N. E.

Products

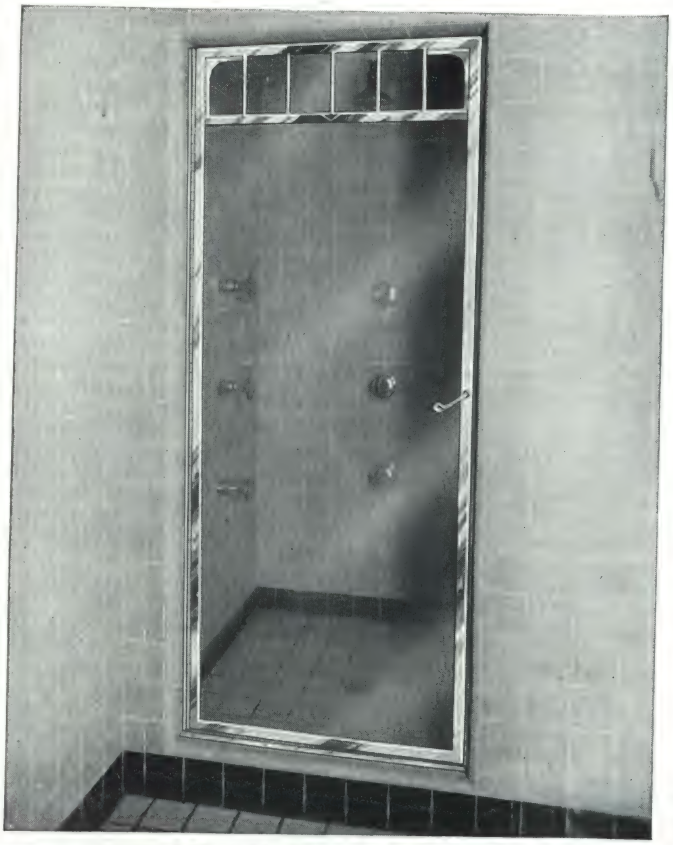
SHOWER STALL DOORS, TUB SHIELDS and SHOWER ENCLOSURES in nickel silver, chromium and gold plate.

Construction

Made in stock sizes 26 in. wide, 72, 75 and 78 in. high. Model A shower-stall door equipped with patented adjustable jamb feature takes care of inaccuracies in tile setting as well as expansion or contraction of tile. Frame and jamb are of solid nickel silver throughout. Hinge specially constructed and continuous, the entire length of door. Glass, ¼-in. polished plate, frosted or tapestry. Corners reinforced by solid nickel silver castings. Door handles of solid nickel silver, also water deflector of the same material on the inside.

Bathtub Shower Enclosure

Represents an ideal arrangement where tub is recessed between two walls. Constructed so as to consist of two partitions extending from each wall with a door in the centre or one stationary panel with door on each side. Door can be made with or without grille.



Adjustable Shower Stall Door
Pat. October 21st, 1926

Shower Enclosure

A practical enclosure affording means of saving space and obtaining an extremely light shower stall. Illustration below shows enclosure placed upon a receptor. We can also construct same to fit over a tile base.

Two-piece Hinged Shield

A practical means of converting a bathtub into a shower compartment.

The hinged shield folds back against the stationary shield when not in use, giving perfect access to the tub. Shield is supported by a bar extending from the shield to the wall. Standard size is 5 ft. high, 36 in. wide, and consists of two panels, one hinged and the other stationary, each 18 in. wide.

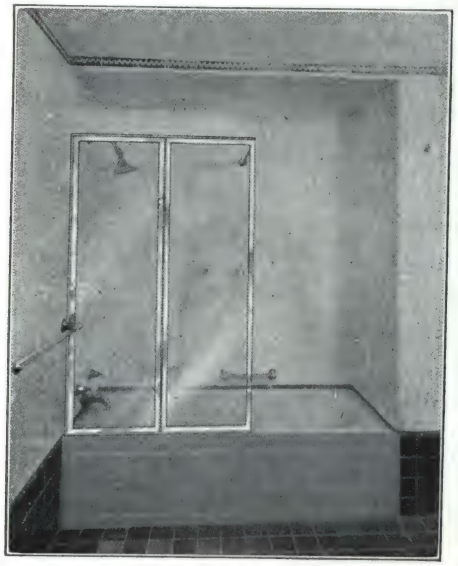


Plate VI
Two Piece Hinged Tub Shield

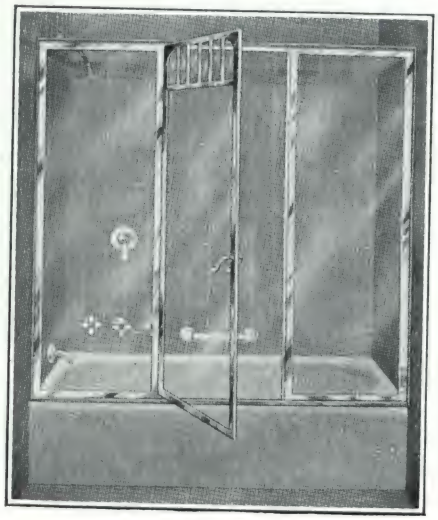


Plate II
Bathtub Shower Enclosure

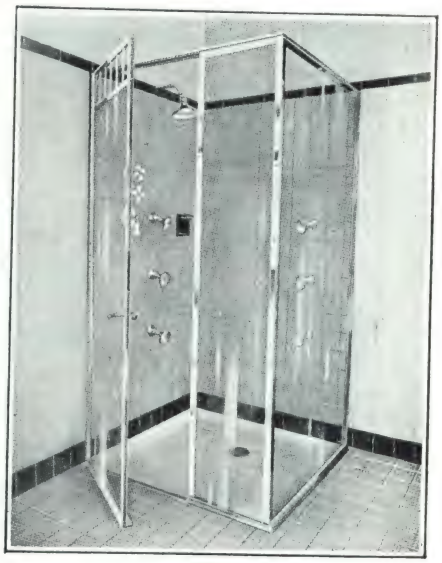


Plate VII
Shower Enclosure

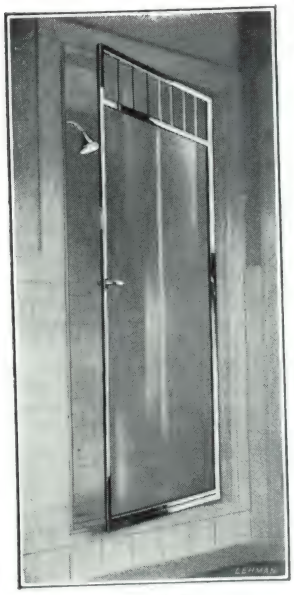
LEHMAN SPRAYSHIELD COMPANY

Patent Shower Stall Doors and Bathtub Sprayshields

2514-2518 North Broad Street, PHILADELPHIA, PA.

Custom Built Shower Bath Doors

All Lehman bath enclosures are built to measure and specification for perfect fitting, with a wide choice of ornamental designs in chromium, nickel or special finishes. Patent construction makes them easy to erect in new or old buildings after the tile or marble is set. They increase the beauty, comfort and sanitation of the modern bathroom.



Mermaid Door
Regular adjustable model shown hinged right side

Lehman Adjustable Hinge—Permits raising or lowering doors after hanging to prevent leakage or dragging. Is full length of door; machined of one piece solid brass with the frame, insuring strength and watertightness. Fits marble or tile. Reverses right or left hand. See detail below.

Solid Brass Frame—Heavy, specially fabricated bars with ¼-in. plate glass, cushion glazed. No sheet metal to sag. Nothing to wear or rust. Mitered corners with patent reinforcement. Finished inside and outside without exposed screw heads.

Easy Fitting Features—Adjustable in width, in height and in alignment for doorways out of square or off dimension. Patent expanding jambs and apron. Four types of metal or rubber threshold seals to suit all conditions.

No Special Roughing-in—Just finish doorway any size reasonably square and send us finished dimensions. We make our door to fit your marble or tile. Drain the threshold in ½ in. if possible.

Models and Sizes—When no model is specified we will ship No. 221 Mermaid door, chromium plated with grille, with tile attachments as illustrated above, 24x72 in.

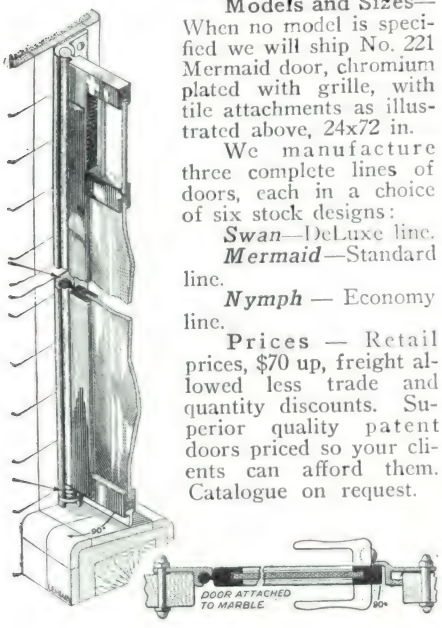
We manufacture three complete lines of doors, each in a choice of six stock designs:

Swan—DeLuxe line.

Mermaid—Standard line.

Nymph — Economy line.

Prices — Retail prices, $70 up, freight allowed less trade and quantity discounts. Superior quality patent doors priced so your clients can afford them. Catalogue on request.



Door Detail Showing Continuous Hinge
One piece of solid metal with frame. Vertical adjustment by adding or removing bearing shims

Sprayshields for Bathtubs

A Lehman patent, Sprayshield gives any built-in tub the advantages of a stall shower. A single shield will confine all splash with a properly arranged shower. Two make a complete enclosure. Solid brass frame chromium or nickel plated.

Save Space—Save Expense—Fold in over the tub with clearance for valves. Swing out giving access for bathing and cleaning. Upper bracket holds soap. Shield serves as extra towel bar. Saves curtain, curtain rod, laundry and replacement.

Fit All Built-in Bathtubs—Made any size. Attached after tile is completed. No strain on tile. No tub drilling. Bathtub supports weight. Sturdy brackets hold shield 6 in. from wall. Fits right or left. Watertight rubber strip at bottom.

Sanitary — Simple—Beautiful, easy to clean. No mildew. No wearing out. No costly construction. Nothing to get out of order. Swings out of the way in and out.

Mermaid is standard model.

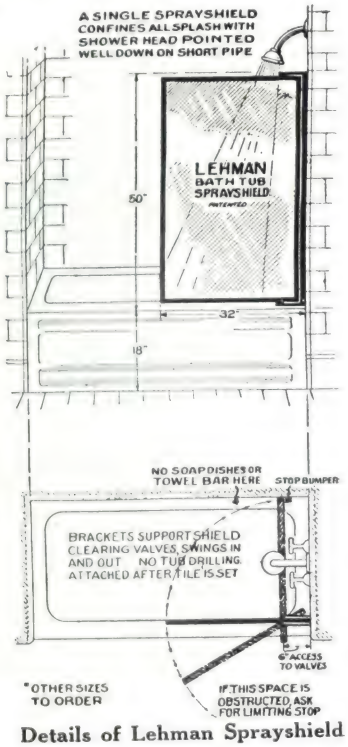
Swan is deluxe model.

Nymph is economy model.

Low Cost—Shields retail $50 up. Twin shields $105 up. Grilles extra. Freight allowed, less trade and quantity discounts.

Lehman Bathtub Sprayshield
Clears top of bathtub and drains inside of rim

Bathtub Enclosure with Grille
Patent shields swing both in and out, clearing valves. No special roughing in. No drilling of tub



Details of Lehman Sprayshield

LITTERER-MILWAUKEE SHOWER STALLS

MANUFACTURED BY

MILWAUKEE STAMPING COMPANY

GENERAL OFFICE AND FACTORY

MILWAUKEE, WIS.

CHICAGO OFFICE, 230 West Superior Street
Telephone, Superior 8927-8

NEW YORK OFFICE, 416 Broadway
Telephone, Canal 1131

REPRESENTATIVES IN ALL PRINCIPAL CITIES

For Milwaukee-Stamping Company's Metal Doors, Spring Hinges and Garment Carriers, see Manufacturers' Index

Unit Shower Bath Compartment Specifications

Ferrometal Shower Bath Compartments are complete units designed and constructed to be absolutely watertight and leakproof, and can be used in single units or in batteries.

Type B is constructed of keystone copper bearing steel sides and galvanized receptor with front, sides and back formed of one continuous sheet to give maximum strength and rigidity. Heavy beaded formation at door opening leaves no raw edges exposed. Units are given two coats of special aluminum primer before shipment. Final finishing color to be applied after installation.

Type G-T is same as Type B but has three-piece top made of galvanized steel and has terrazzo receptor.

Type K is constructed of Kupraluminum metal sides and receptor with front, sides and back formed of one continuous sheet to give maximum strength and rigidity. Heavy beaded formation at door opening leaves no raw edges exposed. Unit shipped in polished aluminum finish. No final finishing color required, but can be applied if desired.

Type K-T is same as Type K but has terrazzo receptor.

Kupraluminum metal is manufactured from a formula composed of copper alloy, aluminum and silicon. This composition has been worked out to harden or stiffen the metal and give it greater tensile strength than ordinary commercial aluminum sheets. Also to give the metal positive resistance to rust. The Kupraluminum Shower Unit will last a lifetime.

Metal receptor is made with inverted bottom construction which eliminates filling or grouting under the shower, and also gives additional strength. Bottom slopes to drain, making easy drainage. Standard drain is centered in bottom, but can be located as desired. Drain should not be placed nearer than 6 in. to side of stall.

FERRO METAL TRADE MARK

Registered in U. S. Pat. Off.

Terrazzo receptors are made of finest material and are hand polished to give an attractive finish. Construction gives superior watertight qualities and easy assembly. Drain is in exact center of receptor.

Each unit is furnished with nickel plated brass curtain rod, nickel plated brass soap dish, and nickel plated brass strainer (choice of Josam Drain or 2-in. pipe calking connection). Can furnish chromium plated finish instead of nickel, if desired.

Following equipment furnished if desired: Nickel plated mixing valve and shower head, or two individual nickel plated compression valves and shower head, heavy white duck curtain and nickel plated hooks, nickel plated metal and glass door. See illustration of door. Can furnish chromium plated finish instead of nickel if desired.

If valve and shower head are not furnished with unit, units are furnished without drilling. Can be drilled for valves and shower, but the exact location must be specified. Specify left or right hand drilling and size of holes. Shower valve and head should be near entrance to permit regulating water temperature before entering, and to direct shower spray away from opening.

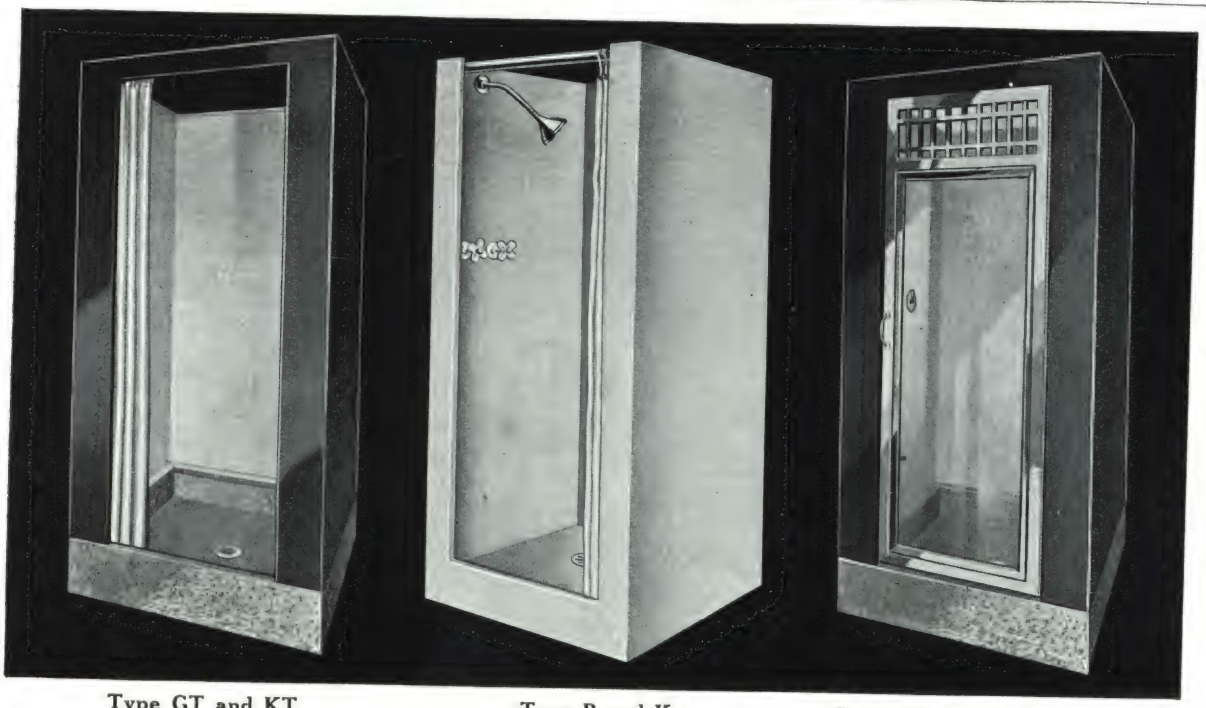
Shower head should be placed approximately 5 ft. 6 in. from floor for residences and hotels, and for use by women. For use in men's shower rooms in clubs or gymnasiums, head can be located slightly higher.

Size 28x40 in. and 40x28 in. recommended for use in buildings where door and window openings are completed. Size of shower specified must be regulated by size of openings through which shower can be taken into building.

Units are made in special sizes where required.

STANDARD SIZE IN INCHES

Metal Receptor					Terrazzo Receptor				
Width	Depth	Height	Weight, lb.		Width	Depth	Height	Weight, lb.	
			Steel	Kupraluminum				Steel	Kupraluminum
28	40	72	380	180					
32	32	72	360	160	30	32	78	450	400
36	32	72	400	200	32	32	78	460	410
40	28	72	380	180	36	36	78	500	450



Type GT and KT

Type B and K

Type GT and KT with Door

PEERLESS SHOWER DOOR CO., INC.

Manufacturers of Shower Stall Doors, Bathtub Shields and Enclosures

1725 Nostrand Avenue, BROOKLYN, N. Y.

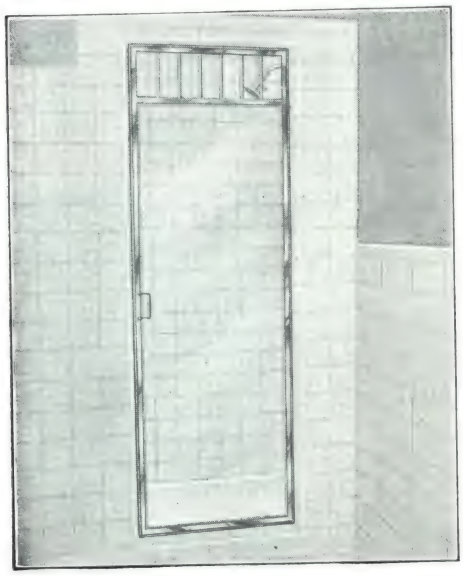
SAMPLES AND DISPLAY: ARCHITECTS' SAMPLES CORPORATION, 101 Park Avenue, NEW YORK, N. Y.

Peerless Shower Doors

Designed for use in residences, apartments and hotels, and especially adapted for distant shipments. The Peerless line consists of The Plymouth, The Niagara and The Aristocrat models.

Installation

Anywhere within a radius of 50 miles from New York. We offer our services gratis in supervising construction of shower stalls and measuring for doors in this territory.



Niagara Door
Hinged right

Seven Peerless Points of Superiority

(1) Easily removable glass, held in door by inner frame. Can be reglazed by any one.

(2) Adjustable jamb; patented feature, which compensates for any irregularities up to $\frac{5}{16}$ in.

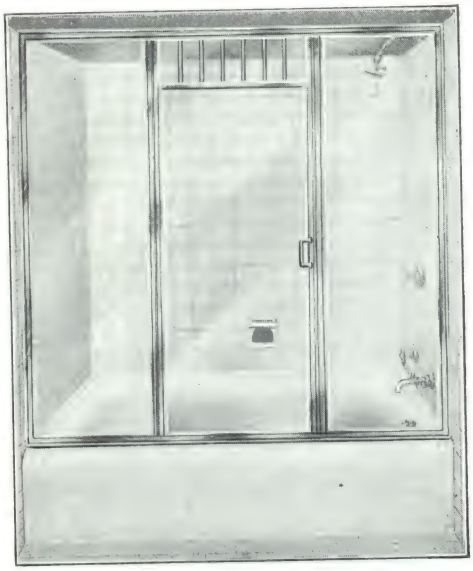
(3) Chromium plating; all parts finished with Crodon applied by licensee of the Chromium Corp. of America.

(4) Double action latch, smooth working, holding door securely yet releasing door at slight pressure on any part of door.

(5) Solid grille; integral part of door (not a separate frame). Bars are secured direct to top and middle cross members adding strength and rigidity.

(6) Newly designed drip-gutter deflector, attached on inside of door. Drip-gutter prevents water, accumulated on door from dripping on floor, when door is open.

(7) Guarantee; Peerless Shower Doors are guaranteed against any defect of any character at any time.



Niagara Bathtub Enclosure
Door Hinged left

Construction

Peerless Shower Doors are built of brass and bronze or nickel silver throughout and are unconditionally guaranteed against any defect of any character at any time. This guarantee is made possible by the knowledge that no effort has been spared to make this door a quality product.

Doors are hinged right or left (facing door), Niagara door shown is hinged right, while door shown in bathtub enclosure is hinged left. *Doors cannot sag.*

New KA-2 Chrome Nickel Door

New Plymouth Model constructed of KA-2 chrome nickel throughout displayed at Architects' Samples Corporation.

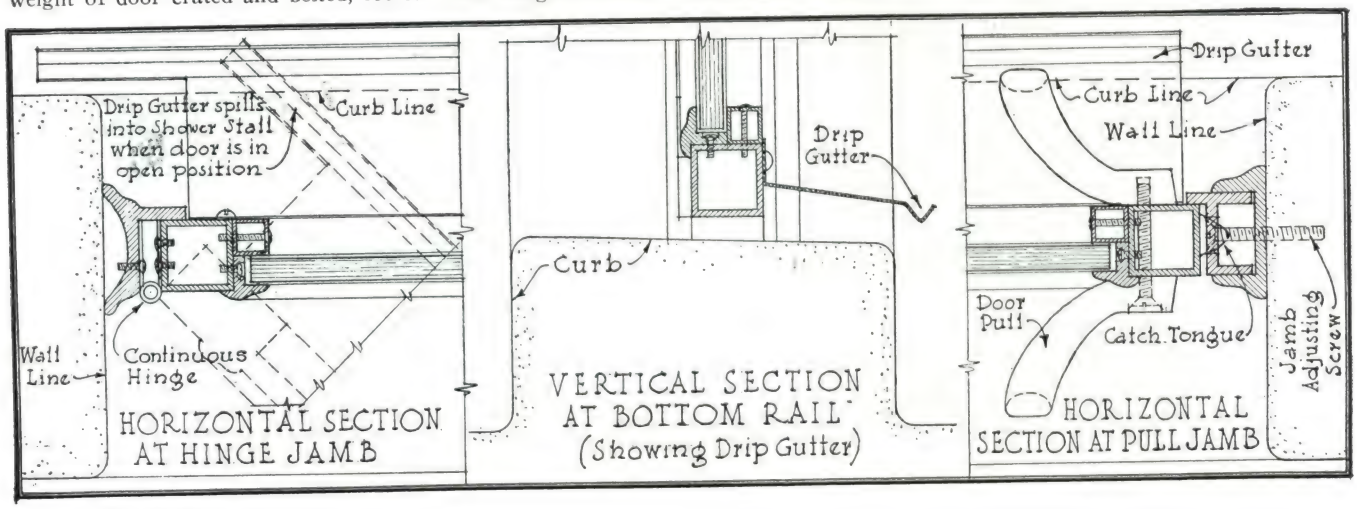
Sizes and Prices

Peerless Shower Doors are custom built to individual requirements. Maximum size, 36x78 in. Extra charge made for doors over 30 in. wide. 26x72 recommended.

Peerless Shower Doors are listed from $85.00 up. Prices include complete door, jambs, all necessary hardware, screws, lead anchors and instructions for installing. Approximate weight of door crated and boxed, 150 lb. Full freight allowed. Catalogue with roughing-in measurements, prices, trade and quantity discounts on application.

Specifications

Furnish and install .... Niagara Model Shower Door as manufactured by the PEERLESS SHOWER DOOR CO., INC., Brooklyn, N. Y., with all necessary hardware, glazed with ¼-in. glass (polished plate) (tapestry) size 26x72 in.; hinged (right) (left). Door to be constructed of architectural drawn bronze mouldings and seamless brass tubing, with easily removable inside frame to hold glass. Adjustable jamb to have $\frac{5}{16}$-in. adjustment. Hinge to be continuous entire length of door. All parts shall be finished with Crodon, the chrome plate applied by licensee of the Chromium Corp. of America. Door to be held by double action latch, constructed with phosphor bronze spring. All corners to be mitered. Ventilator grille to be 7 in. Grille bars to be secured direct to door. Water deflector on inside of door to be constructed with drip gutter so that water rolls back into stall, when door is open. Door handles shall have offset to protect hands from contact with tile and inside and outside handles are to be secured together through the frame of door.



S. M. SHOWER DOOR CO.

TELEPHONES
DAYTON 7397
INTERVALE 5477

920-928 East 173rd Street
NEW YORK, N. Y.

S. M. Nickel, Chromium and Gold Plated Shower Doors and Cabinets

Description

The S. M. Shower Door consists of the glass door, ornamental metal jambs, handles, bullet catch, 6-in. ventilating grille, water deflector and a continuous piano hinge.

Sizes

Standard size doors are either 2 ft. 2 in. wide by 6 ft. 6 in. high or 2 ft. 2 in. wide by 6 ft. 0 in. high.

We can make doors to fit any size opening.

Glass

Glass is to be ¼ in. thick clear unless tapestry, beveled, ground, or frosted glass is specified.

Metal and Finish

Our standard model is of heavily chromium plated brass, but can be furnished in nickel plate at a lower price.

Our gold plated products are guaranteed to be 14 karat.

Special Features

The S. M. Shower Door is outstanding because:

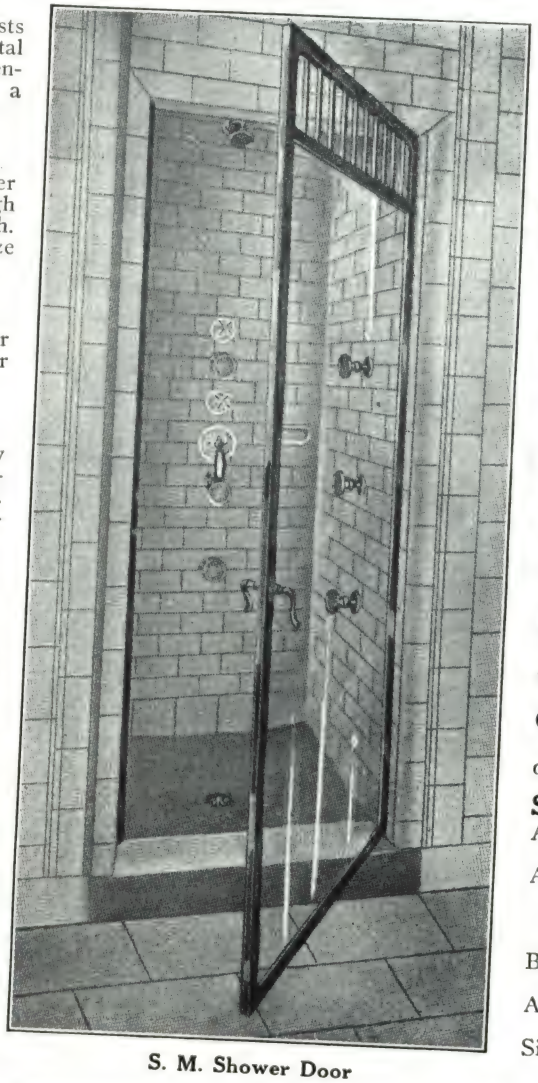
(1) Of the adjustable jamb with ornamental mouldings (takes up tile irregularities).

(2) Of the adjustable foolproof bullet catch (door will not stick or jam).

(3) All doors have either mitered or butt joint corners reinforced with solid castings.

(4) All doors have either a continuous or ball bearing hinge (S. M. installed doors are guaranteed not to sag).

(5) All doors have full length water deflector (a watertight job is guaranteed).



S. M. Shower Door

Pertinent Facts

S. M. products can be furnished in any type of finish.

All models can be hinged either right or left.

S. M. Shower Door frames are made of either oblong or square material.

Hinges can be either of the continuous type or of the ball bearing type.

All S. M. Shower Doors are adjustable.

S. M. Shower Door jambs are not angles, but extruded metal with ornamental mouldings.

All S. M. installations of Shower Doors or Cabinets are guaranteed to be watertight.

Special Orders

We can make enclosures to fit any and all requirements.

Specifications

Architects' specifications and blue prints mailed on request.

In order to insure a watertight job, all openings must be built according to our blue prints.

S. M. products can be furnished with any type of glass.

Catalogue

Complete catalogue mailed on request.

Sample Displays

Architects' Sample Corp.
101 Park Avenue, New York, N. Y.

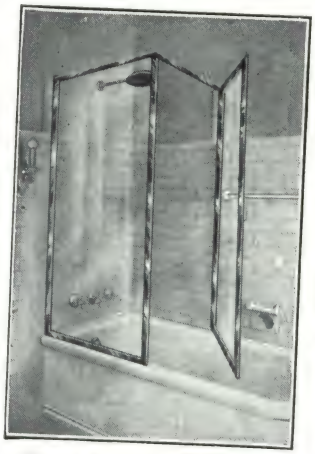
Architects and Building Samples Exhibition, Inc.
213 E. Hanover Street, Trenton, N. J.

Building Samples Exhibit
93 Court Street, Brooklyn, N. Y.

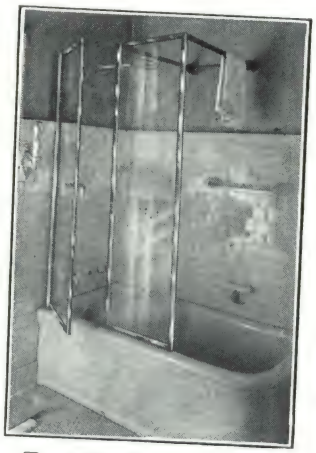
Architects Exhibition Corp.
11 Beacon Street, Boston, Mass.

Siegel Mfg. Co.
1021-27 Ridge Avenue, Philadelphia, Pa.

Type E—S. M. Shower Cabinet
Standard dimensions to fit over 36x36-in. receptor 6 ft. or 6 ft. 6 in.



Type A—S. M. Shower Cabinet
Dimensions, 5 ft. x 34 in.



Type B—S. M. Shower Cabinet
Dimensions, 5 ft. x 36 in.

Type H—S. M. Shower Cabinet

HENRY WEIS MANUFACTURING COMPANY, INC.

FACTORY AND GENERAL OFFICES
ELKHART, INDIANA

For description and details of other Weis Products, see Manufacturers' Index

INTEGRAL SHOWER CABINETS

Specifications

WEISTEEL

The sides of WEISTEEL Integral Shower Cabinets are fabricated from ⅛-in. copper bearing steel and the bottom from ⅛-in. galvanized steel, in accordance with the manufacturer's standard construction.

Each cabinet has sides 6 ft. high, made of one continuous sheet, fitted with upset bottom sloping to the drain, and welded to the sides and equipped with a standard brass outlet, including sole leather gasket and lock nut, and nickel plated strainer, for 2-in. waste pipe. The entrance is fitted with a 6-in. riser or splash plate and brass nickel plated curtain rod. Brass nickel plated soap dish is included. (Curtain and hangers are furnished as an extra.)

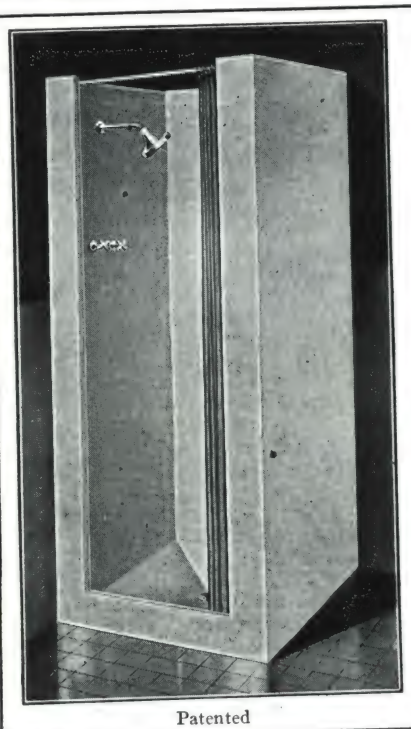
The cabinets are finished with one coat of special oxide, waterproof primer baked on at 350° F., and one additional coat of Weisteel acid-proof paint on the bottom and sides to be placed against masonry walls.

After installation is completed, the interior and exposed exterior should be finished in water-proof enamel paint.

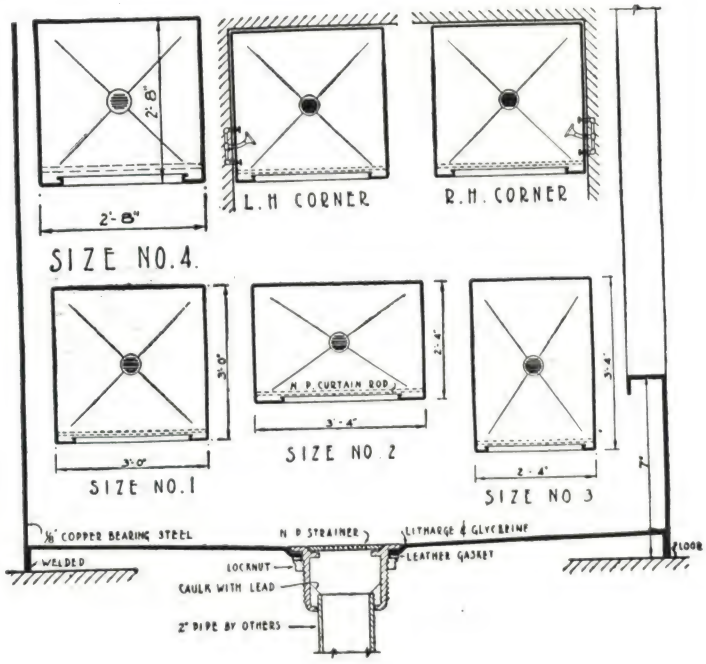
Note: Shower head and valve and trap by others.

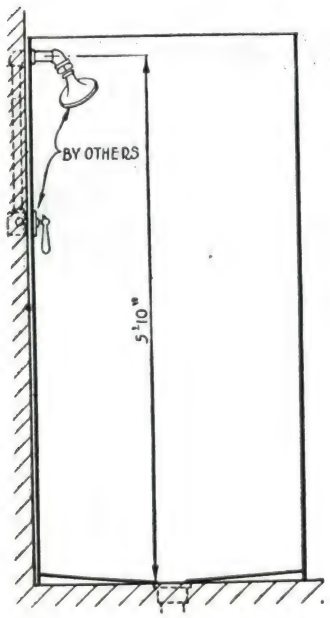
Special sizes, both smaller and larger than shown above, are shipped on order. If special sizes are required, send complete information for estimate and recommendations.

Shipping Weight—Sizes Nos. 1, 2, 3 and 4 weight approximately 380 lb. per cabinet.



Patented





DETAIL NO. 5

Important

An extra is charged for offsetting drain from center of bottom. (Drain should not be placed nearer than 6 in. to side of stall.)

Double drainage drain can be furnished at extra cost.

Location of holes must be specified either right or left hand as all holes for shower fittings are drilled at factory when guaranteed locations and sizes are given.

Sizes No. 2 or 3 are especially designed for remodeling or improving present buildings. They can be readily moved through 2-ft. 6-in. doorways or windows.

Door or window openings must be considered when selecting sizes and determining date for required delivery at the building if stalls must be moved into locations before room openings are cased.

Shower valve and head should be located, if possible, near entrance to permit regulation of water temperature before entering and to direct shower spray away from opening.

Cabinets are regularly furnished with openings 2 ft. wide, requiring curtain 2 ft. 8 in. x 5 ft. 8 in. *The Weisteel Cabinet is also manufactured from aluminum.*

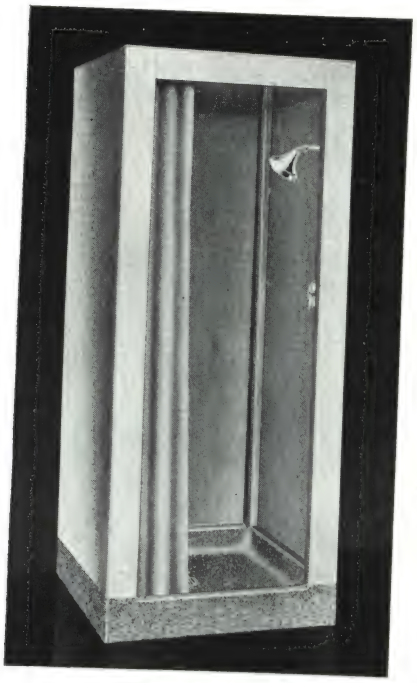
Location of Shower Head

Detail No. 5 shows the shower supply placed 5 ft. 10 in. with shower head approximately 5 ft. 6 in. from the floor. This height is preferred for residence and hotel use. It permits the bather to take a shower without wetting the head. This height is also desirable for women. Most women prefer a shower to the tub bath when the chance of wet hair or the bother of a bathing cap is eliminated by a convenient location and height of shower head.

For men's gymnasium installations, the shower head should be placed slightly higher, while for women's gymnasium installations, the shower head should not be over 5 ft. from the floor. Where supply pipes are more than 5 ft. 10 in. high, they should be installed above the shower stall.

The shower head, if possible, should always be placed on the side and near the front of the stall, to enable the bather to adjust water temperature before entering and to assure the direction of the spray to the rear, away from the entrance.

Continued on next page



Patent Pending

NEW—

A WEIS SHOWER CABINET WITH ARTMARBLE BASE RECEPTOR AND SIDEWALLS OF METAL (STEEL ALUMINUM ALLOY OR ALLEGHENY)

The precast, polished but non-slippery Artmarble receptor is suitable for use with the finest marble, tile or terrazzo floors.

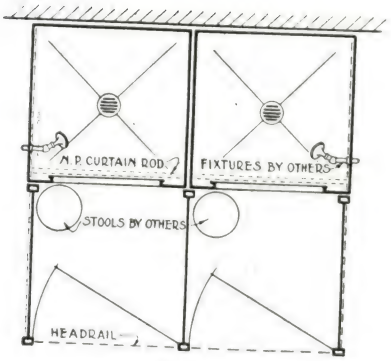
All metal parts are shipped with baked prime coat (a special oxide primer baked at 350°). Final finish of waterproof enamel to be applied after installation.

The cabinet is easily installed in old or new buildings. The base can be set on rough or finished floor and is leakproof; hence, no grouting, lead pan or special preparation necessary.

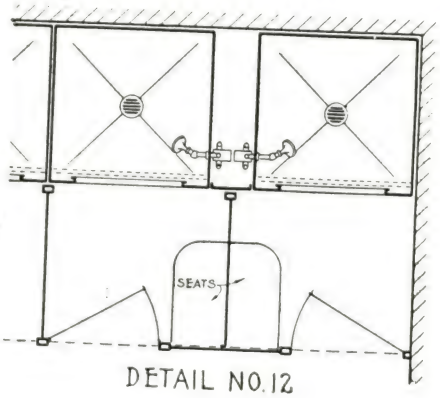
The sidewalls are shipped knocked down for assembly with the base at time of installation. Due to unique construction, any average workman with only a mallet can step into the receptor after it is set and assemble sidewalls around him, integral with the base without bolts or screws into a guaranteed, leakproof shower enclosure.

Complete information, details, prices, etc., furnished upon request.

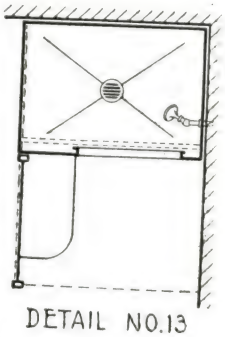
DETAILS WEISTEEL INTEGRAL SHOWER CABINETS IN COMBINATION WITH WEISTEEL DRESSING ROOMS



DETAIL NO.11



DETAIL NO.12

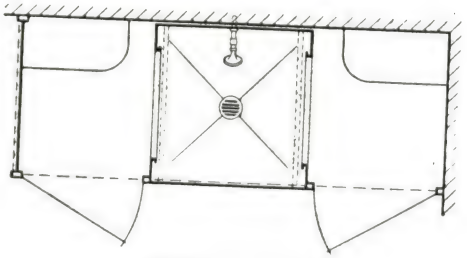


DETAIL NO.13

Detail No. 11—Integral Shower Cabinets in batteries with attached dressing rooms of standard Weisteel partitions and doors. Shower cabinets in batteries are frequently used with dressing rooms in detached batteries at opposite side of the room or in separate room. Overhead supply pipes are frequently used for the type of layout as shown by Detail No. 11.

Detail No. 12—Similar to No. 11, except that a filler plate is placed between the two shower cabinets and supply pipes are concealed in the intervening space. Standard Weisteel metal seats are also shown for dressing room compartments in illustration. This arrangement can be provided with two or more cabinets in battery formation.

Detail No. 13—The offset entrance shower cabinet placed in a corner of a room. One standard Weisteel partition, seat and curtain or Weisteel door are used to complete an attached dressing compartment.



DETAIL NO.14

Detail No. 14—A special Weisteel Integral Shower Cabinet with openings on two sides, providing one shower to serve two dressing rooms.

Note: Cabinets as illustrated by Nos. 13 and 14 are not carried in stock. Slight extra charges for these.

ZAHNER MANUFACTURING CO.

Manufacturers of Shower Bath Doors

1213-1215 Walnut Street, KANSAS CITY, MO.

DISTRIBUTED THROUGH PLUMBING SUPPLY HOUSES

Product

SHOWER BATH DOORS with patented concealed buck (Patented July 13, 1926).

For our pages on All-metal Sinks, see Manufacturers' Index.

Advantages

The reduced labor cost of erection, due to the patented concealed buck (an exclusive feature), makes the cost of the door completely installed exceedingly reasonable.

Special Features

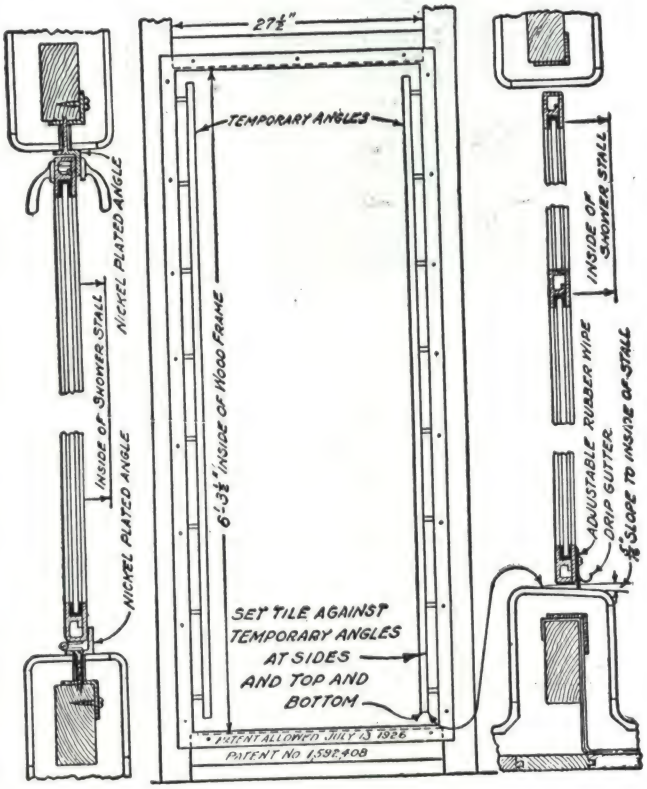
Concealed Buck—A rigid, rectangular steel angle buck is furnished with each door. The buck is punched for attachment to wood, hollow tile or metal partition studs, and is set back from and covered by the finished tile door opening jambs, sill and head. Attached to each steel buck at intervals on the hinge and jamb sides of door are temporary angles which are exact duplicates in size and shape of the finished door jambs. These angles are attached to the buck with machine screws passing through brass ferrules. After the tile work has been finished, the temporary angles used as a guide are removed and the finished door jambs are rigidly attached through the brass ferrules, to the steel buck with nickel-plated machine screws. No drilling of tile for insertion of expansion bolts or screws is necessary, thus eliminating time and expense in erection and the hazard of damage to completed tile work and a jamb attachment which will not be permanently rigid. The tile opening always fits accurately the finished door jambs. The buck reinforces the opening, buck can be set and door hung by any mechanic in less than an hour.

Concealed Buck Showing Simplicity of Construction

Nos. 1 and 5—Welded angle iron frame or buck.
Nos. 2 and 6—Wood studding to which buck is nailed.
No. 3—Nails to secure steel buck to studs.
No. 4—Ferrules that are welded to buck and which protrude to face of tile, and through which nickel-plated brass bolts go that screw into angle iron buck for hanging door

Metal Drip Gutter—Attached, permanently, to the bottom rail of each door is a drip gutter which prevents water that may be on door from dripping on floor when door is open. Gutter empties into stall basin.

Door and Door Jambs—Door stiles and rails, grille and angle jambs are of extruded bronze, heavily plated. Stiles and rails of door are mitered at all corners and are rigidly welded at all joints which makes it a one piece door. Door is hinged to hinge-jamb with a continuous plated bronze hinge (piano type). Drip gutter is of monel metal. Door handles are of plated cast bronze, lever type (no springs or latches) fitted with a cam that holds the door closed. Door panel is of ¼-in. polished plate glass. Glass is set in a continuous rubber channel gasket. Bottom of door is furnished with an adjustable rubber flap. A high class highly finished product. Standard doors are 2 ft. wide by 6 ft. high. They may hinge to either jamb and swing in or out, as desired (swing out preferred).



Note: Finished doors may be obtained in chromium, gold or nickel plate; glass panel may be of any special plate glass, plain or decorated. Grille may be omitted.

Specifications

Furnish and install in each shower stall, one Zahner Shower Bath Door, Type No. 230, with concealed steel buck as made by ZAHNER MANUFACTURING CO., Kansas City, Mo.

Note: If of standard size (2x6 ft.), so note. If of special size, give door sizes. Give door swing (in or out, right or left).

Note: Specify whether with or without grilles.

Glass shall be [polished clear plate] [other plate glass] [mirror].

Note: Specify whether clear or special plate or mirror.

All exposed metal work (except drip gutter) shall be heavy [nickel] [chromium] [gold] plated.

Note: Specify whether nickel, chromium, or gold plating.

Installation shall be in accordance with the manufacturer's directions.

Literature and Service

Complete new catalogue showing other styles, glass enclosures, decorated glass panels, etc., will be sent on request. Further information or details from our Service Department are yours without obligation.

THE ZOURI COMPANY

Manufacturers of "Sturdiweld" Shower Stall Doors

FACTORIES AND GENERAL OFFICES
CHICAGO HEIGHTS, ILL.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA

Products

ZOURI "STURDIWELD" SHOWER STALL DOORS.

For Zouri Safety Key-set Copper Store Front Construction, see Manufacturers' Index.

For Extruded and Ornamental Bronze for store and shop windows, see Modern Bronze Store Front Co., in Manufacturers' Index.

Zouri "Sturdiweld" Shower Stall Doors

Narrow, trim lines and rigid construction make this door particularly desirable for the modern bathroom.

The solid bronze members, designed to give maximum strength, are firmly *welded* at corners to avoid sagging and bending.

Specifications

Material—All-bronze (no steel or wood).

Frame—Special design (No. 14 B&S) gauge seamless tube.

Glass Moulding—Heavy extruded.

Jambs—New design extruded members with rounded corners. Felt caulking strip 1/8 in. thick to take up inequalities in tile between jambs and tile.

Hinges—Continuous piano type.

Handles—Offset type.

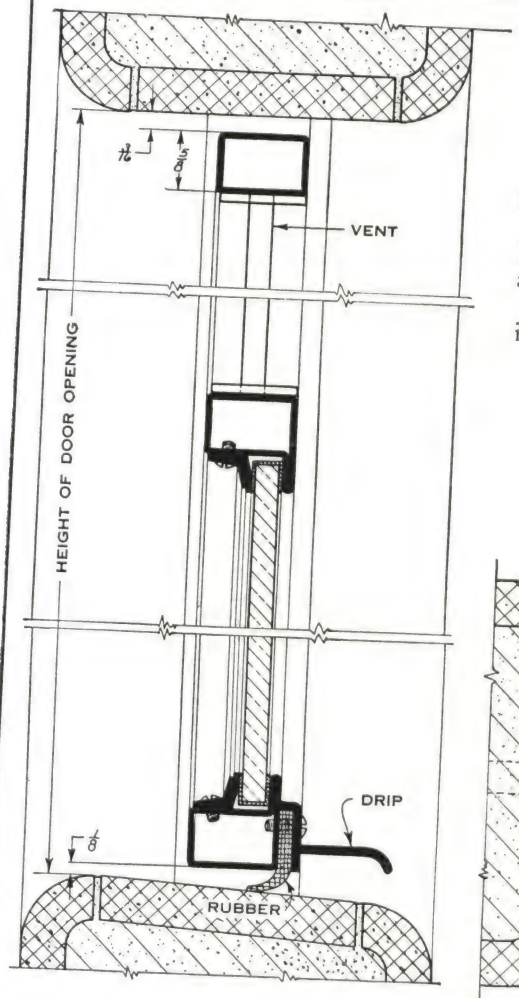
Splash Shield—Rounded extruded member.

Catch—Improved double-acting spring catch.

Rubber Strip—Held in place by splash shield at bottom of door; has featheredge and can be easily adjusted to height.

Glass—Polished plate; ribbon mitered as shown, edges bound in 3/4-in. rubber tape.

Finishes—(1) Duplex nickel plate. (2) Chromium plate (all chromium plate doors are first copper plated, then duplex nickel plated before undergoing the chromium plating process). All doors are welded before plating.

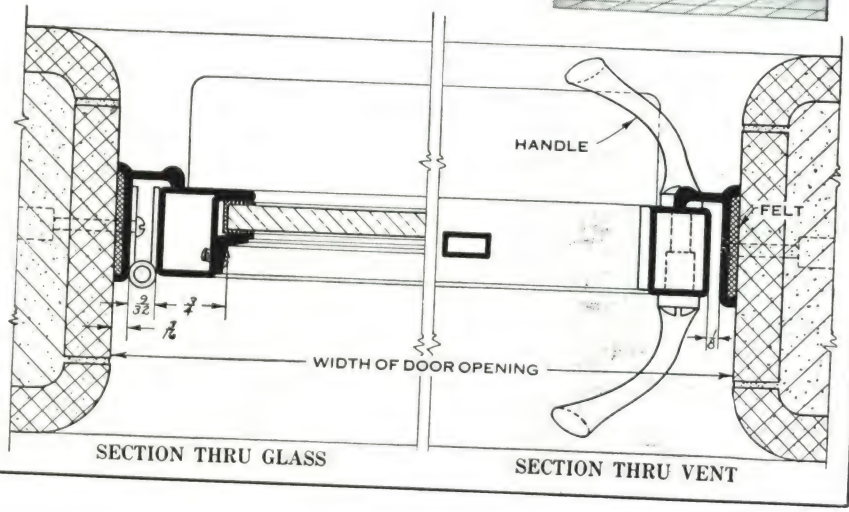


Standard Sizes

24x72 in., 27x72 in., 27x78 in. These are tile opening sizes. We make all necessary allowances.

Standard sizes carried in stock for immediate shipment.

Special sizes made to order.



SECTION THRU GLASS

SECTION THRU VENT

HOFFMANN & BILLINGS MFG. CO.

ESTABLISHED 1855

Manufacturers of Shower Baths and Plumbing Fixtures

MILWAUKEE, WIS.

Products

NIEDECKEN SHOWERS, for residences, hotels, industrial plants, etc.; NIEDECKEN SHOWER STALLS for residences, hotels, etc.

Also High Grade Plumbers' Brass Goods.

Used Exclusively by Prominent Hotels

Over 5000 Niedecken Showers installed in the Statler Hotels.

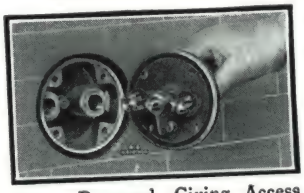
Write for Bulletin S.S. 220-N.

N.C. 1100 Type
Niedecken Shower

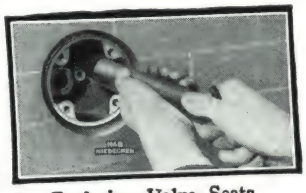
½-in. concealed Niedecken Mixer, flow control and Niedecken Shower Head with ball joint.

Price $21.35

Dial Removed. The Only Tool Required to Take the Mixer Apart Is a Screwdriver

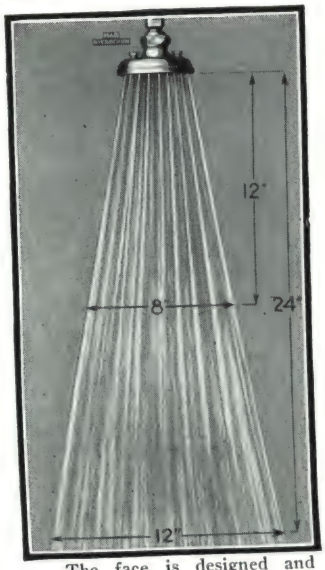


Cover Removed, Giving Access to Valve Discs and Seats



Replacing Valve Seats
Niedecken Mixer

The three illustrations show accessibility; all parts subject to wear are easily replaced



The face is designed and drilled to distribute the water over a large area resulting in the saving of water

Illustrating the easy removal of the shower head face for cleaning.

Showers are frequently condemned on account of clogging of the spray holes

Niedecken Shower Head

Niedecken Shower Stall

The Niedecken Shower Stall

Is sanitary, occupies least space and is absolutely leakproof.

The walls of the stall are made of a continuous sheet of ⅛-inch copper bearing steel which with the riser are welded to a dished bottom with drain outlet in center.

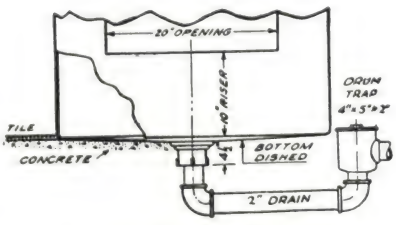
Equipment—Consists of a special concealed type Niedecken Shower, with Niedecken ball joint shower head, flow control, curtain rail, duck curtain and nickel-plated strainer arranged for 2-in. drain outlet, for either lead or iron pipe.

After installation, the interior and exposed exterior of stalls must be finished with waterproof enamel paint.

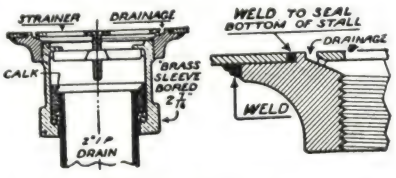
PRICES AND DIMENSIONS OF NIEDECKEN SHOWER STALLS

Stalls are 6 ft. high

Width, in.	Depth, in.	Weight, lb.	Price
30	32	350	$ 97.00
32	32	375	97.00
36	36	425	100.00



Construction of Niedecken Shower Stall



Leak Proof Drain Construction

INCORPORATED 1913

LEONARD-ROOKE COMPANY

Manufacturers of Leonard Thermostatic Water Mixing Valves

(PATENTED)

PROVIDENCE, R. I.

Leonard Thermostatic Water Mixing Valves

Description—The Leonard Valve mixes hot and cold water and delivers blended water at any temperature desired within its range. Model B valves for ordinary uses have a scale from 80° to 120°; for bakeries and other commercial uses, scale from 40° to 120° or 120° to 180°. Special scales can be furnished on request.

Type L-9 valves have word scale only: Cold, Tepid, Warm, Hot.

Leonard Valves maintain constant temperatures regardless of extreme pressure fluctuations. They are anti-scalding and anti-chilling, shutting off automatically if either the hot or cold water fails.

Castings and interior parts are of bronze and phosphor bronze.

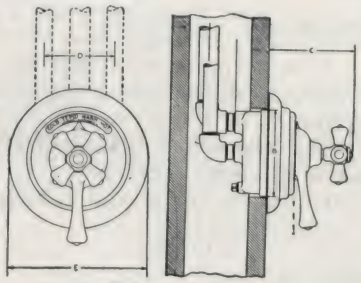
Combination check valves and strainers are furnished with all Model B valves with the exception of Model B-120, which is furnished with strainers only.

Finishes—Nickel, chromium, gold or silver plate, or in colors to match bathrooms.

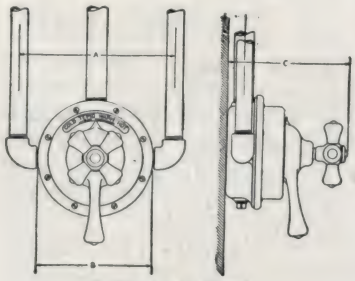
Type L-9-C can be furnished in octagon design. Illustrations and information furnished on request.

Uses—On bathtubs, hammock baths, shower baths, washfountains and lavatories, in clubs, schools, hotels, sanitariums, hospitals, turkish baths, gymnasiums, residences, garages, railroad stations, factories, and office buildings. Also in bakeries, laundries, X-ray developing tanks, laboratories, darkrooms where moving pictures and colored films are developed, tanneries, and many other industrial plants where a predetermined and accurate temperature of water is to be maintained.

Type L-9 Valve

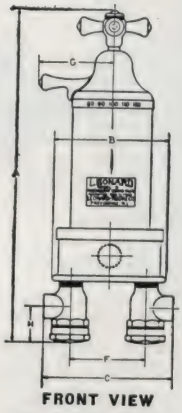


Type L-9-C
For concealed piping

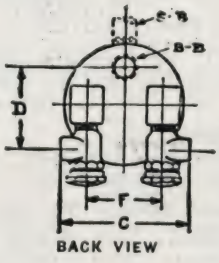


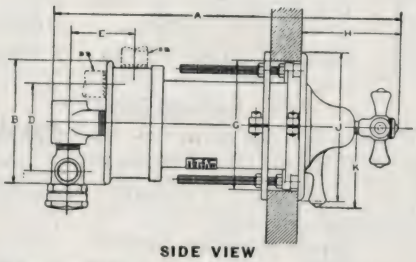
Type L-9-E
For exposed piping

Model B Valve

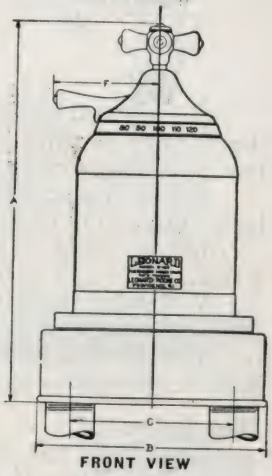


Model B Valve
For exposed piping

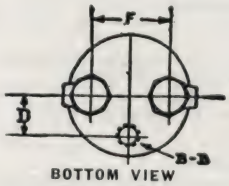


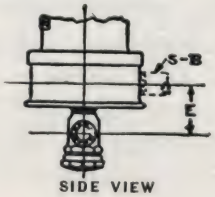


Model B Valve
For concealed piping



Model B-120
For exposed piping





ROUGHING-IN DIMENSIONS LEONARD THERMOSTATIC WATER MIXING VALVES

	For exposed piping							For concealed piping				
Models	B-5	B-10	B-20	B-40	B-60	B-120	L-9-E	B-10	B-20	B-40	B-60	L-9-C
Cap., gal. per minute, 45 lb. pressure	5	15	25	40	55	120	7	15	25	40	55	7
Inlet, inches	½	½	¾	1	1¼	1½	½	½	¾	1	1¼	½
Outlet, inches	¾	¾	1	1¼	1½	2	½	¾	1	1¼	1½	½
A	14⅜	14⅜	14⅝	18¼	18¼	16 11/16	7¾	14⅛	14⅛	17⅞	17⅞	3½
B	5	5	5	6⅞	6⅞	9⅛	5¾	5	5	6⅞	6⅞	4⅞
C	5 11/16	5 11/16	5 13/16	7¾	8¾	6½	6¼	5 11/16	5 13/16	7¾	8¾	4¾
D	1 9/16	1 9/16	1 9/16	2⅛	2⅛	3	⅞	3 9/16	3 9/16	4¾	4¾	3½
E	2¼	2¼	2¼	2¾	2¾	1⅝	.....	2⅝	2⅝	3½	3½	6⅞
F	3 5/16	3 5/16	3 5/16	4¾	4¾	4 5/16	.....	3 5/16	3 5/16	4¾	4¾	.....
G	3¼	3¼	3¼	4 5/16	4 5/16	.....	.....	5¼	5¼	5⅝	5⅝	.....
H	1 9/16	1 9/16	1 9/16	2	2	.....	.....	4	4	3 13/16	3 13/16	.....
J	.....	.....	.....	.....	.....	.....	.....	6	6	7¼	7¼	.....
K	.....	.....	.....	.....	.....	.....	.....	3¼	3¼	4 3/16	4 3/16	.....

THE POWERS REGULATOR CO.

Thermostatic Water Controllers and Shower Bath Mixing Valves

GENERAL OFFICES AND FACTORY
2720 Greenview Avenue, CHICAGO, ILL.
TELEPHONE, BUCKINGHAM 7100

GENERAL EASTERN OFFICES
137 East 46th Street, NEW YORK, N. Y.
TELEPHONE, MURRAY HILL 3250

BRANCHES AND SERVICE STATIONS
(See Telephone Directory for Local Addresses)

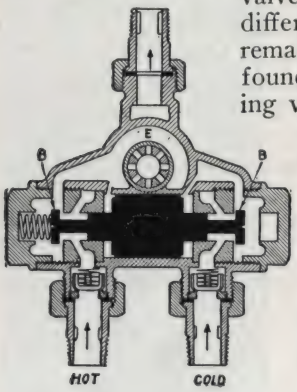
ATLANTA, GA.	CHARLOTTE, N. C.	EL PASO, TEX.	LOUISVILLE, KY.	PITTSBURGH, PA.
BALTIMORE, MD.	CHATTANOOGA, TENN.	GREENVILLE, S. C.	MILWAUKEE, WIS.	ROCHESTER, N. Y.
BIRMINGHAM, ALA.	CINCINNATI, OHIO	HOUSTON, TEX.	MINNEAPOLIS, MINN.	SALT LAKE CITY, UTAH
BOSTON, MASS.	CLEVELAND, OHIO	INDIANAPOLIS, IND.	NASHVILLE, TENN.	SAN FRANCISCO, CAL.
BUFFALO, N. Y.	DENVER, COLO.	KANSAS CITY, MO.	NEW ORLEANS, LA.	SEATTLE, WASH.
BUTTE, MONT.	DETROIT, MICH.	LOS ANGELES, CAL.	PHILADELPHIA, PA.	ST. LOUIS, MO.

For our pages on Automatic Temperature Controlling Apparatus, see Manufacturers' Index

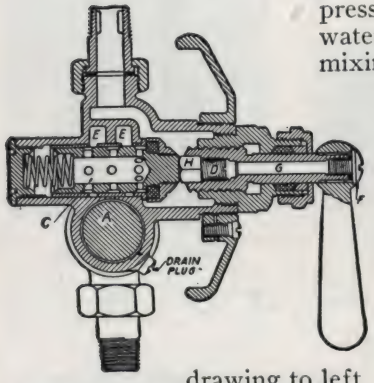
Powers Shower Bath Mixing Valve

Two Remarkable Features

Do not confuse the Powers Mixer with any of the so-called "anti-scald" mixing valves. It is entirely different. It has two remarkable features found in no other mixing valve.



(1) Pressure Equalizing Valve — Shown at B, B, in drawing to left—without this important feature a Powers Mixer would simply be another shower mixer. This valve is a floating piston which controls and equalizes the pressures of hot and cold water before they enter the mixing chamber. It safeguards the bather from the annoying temperature fluctuations caused by pressure changes in supply lines due to use of nearby showers, faucets, flush valves, etc.

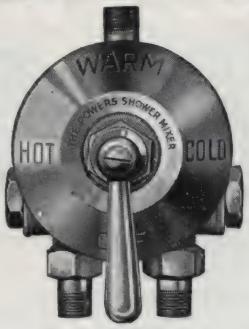


(2) Safety Stop —Shown at D in drawing to left. This can be set to limit the delivery temperature of the shower. Two important advantages are gained through its use:

(1) It protects the bather from scalding caused by a "dead end" in the hot water supply line.

(2) It saves fuel by eliminating waste of hot water.

Write for this Book—Get our 20-page book which completely describes this mixing valve. It gives an impartial analysis of the various types of mixers, test data, testimonials and other interesting information.



Style A Mixer

Description

Style A is for exposed piping. Has nickelplated dial and handle. If wall flange is required, distance from center of inlets to wall should be specified.

Style B is for concealed piping, accessible from the rear. The neck of the mixer is provided with a 1½-in. extension to accommodate thickness of marble slab, tile or panel on which dial and handle are mounted. Has nickelplated dial and handle.

Style C is for concealed piping, accessible only from the front. For this is provided a metal box to be inserted in wall flush with surface, to receive pipe connections and mixer. The large dial is afterwards placed against the wall, and when removed makes the instrument accessible. Has nickelplated dial and handle. We can furnish shells 3 in. deep for thin partitions.

Note: Porcelain dials and handles can be furnished for styles B and C. No extra cost.

Powers Mixers are now provided with built-in check valves as standard equipment.

Unless otherwise specified, all mixers are provided with standard straight union connections. Distance between pipe centers is $2\frac{5}{16}$ in.

Elbow connections will be substituted if desired. Horizontal dimension from end to end of elbows is 6¾ in.

For chromium plated dials, handles and exposed parts—additional cost 10%.

Octagonal dials and handles can be furnished at an additional cost.

Capacity

The Powers ½-in. Mixer has a capacity of 6 gal. per minute under a pressure of 40 lb.

When a larger quantity of water is required for kidney baths, needle baths, douche baths, etc., we can furnish the Powers Mixer in a special ¾-in. size with a capacity of 18 gal. per minute under a pressure of 40 lb. Write for further details if interested.

Specifications

Note: All notes are explanatory only and should not be included in the specifications. Portions of text in bracketed italics are selective or require specific data inserted.

(A) **Shower Mixers**—(A1) *General*—In shower compartment[*s*] [*locate*], furnish and install [*a*] Powers Shower Mixer[*s*] as made by THE POWERS REGULATOR CO., Chicago, Ill.

(A2) *Description*—Mixer[*s*] shall be ½ in., style [*A*], [*B*], [*C*] with [*nickelplated*] [*chromium plated*] [*porcelain*] *dial*[*s*] and handle[*s*].

Note: Specify—

Style A for exposed piping.

Style B for concealed piping, accessible from rear of wall or partition where working space is available.

Style C for concealed piping, accessible only from the front of wall or partition.

(B) **Supplies**—(B1) Both hot and cold water supply mains shall be provided with Powers [*specify sizes*] Self-cleaning Strainers.

Note: Strainers are made ½ in. to 3 in. in size.

(B2) Cold water line to each mixer shall be provided with loose key stop valve [*with porcelain escutcheon*].

(B3) Hot water line to each mixer shall be provided with a hand valve marked "Volume" [*with porcelain escutcheon*].

Note: This valve is to be used as a combination volume control and stop valve.

(B4) All exposed portions of piping, valves, etc. shall be [*nickelplated*] [*chromium plated*].

(C) **Shower Heads**—(C1) Furnish and install brass discharge pipe[*s*] with [*goose neck*[*s*]] [*straight wall turn down*[*s*]] and 4-in. diameter cast brass, adjustable, ball joint shower head[*s*] with tightly fitting removable face[*s*] and without gasket[*s*].

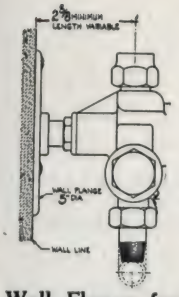
(C2) There shall be no valve or throttling device installed in the discharge line from mixer to shower head.

(C3) All exposed portions of piping, shower head[*s*], etc., shall be [*nickelplated*] [*chromium plated*].

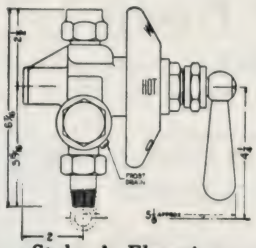
(C4) Discharge line from mixer to shower head when exposed shall be securely anchored to wall or partition.

Continued on next page

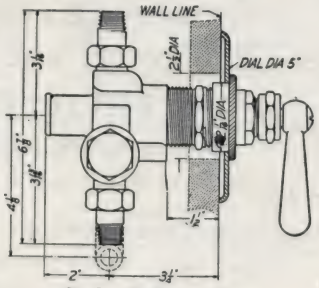
Principal Dimensions of the Powers Shower Mixers



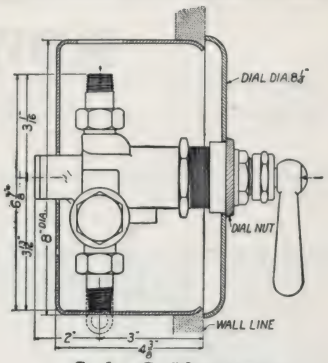
Wall Flange for Style A Mixer



Style A Elevation

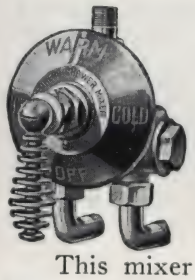


Style B Elevation



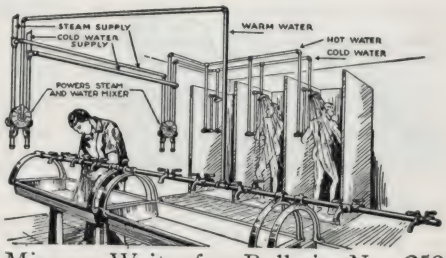
Style C Elevation

Powers (Style D) Steam and Water Mixer



Steam at 10 to 100 lb. pressure and cold water at any pressure, piped to this mixer will give you cold—warm—or hot water instantly for individual showers, or under proper conditions will supply warm water to group or gang showers and wash sinks. These conditions are that the steam must have a minimum of 15 lb. and must not exceed the cold water pressure by more than 15 lb. If necessary, a Powers Style A Reducing valve may be used—see our Bulletin No. 256.

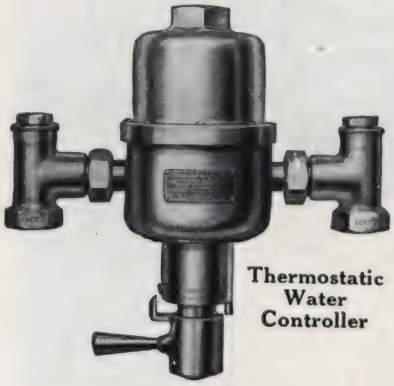
This mixer is constructed with the same safety features and has the same dimensions as the Powers Style A Shower Mixer. Write for Bulletin No. 258 giving complete details.



Powers Thermostatic Water Controller

Description

For shower baths, singly or in gangs, continuous flowing baths, baby baths, hot water lines, lavatories, factory washrooms, garages, laundries, and various industrial processes where warm water at a constant temperature is required.



Thermostatic Water Controller

This controller is accurate, dependable and reasonably priced. Mixes hot and cold water, and delivers warm water at any desired temperature between 70° and 135° F. Entirely automatic in operation, positively scaldproof. Failure of cold water supply cuts off delivery. Can be provided with variable or locked adjustment.

Write or telephone for booklet giving full details and showing applications.

Unless otherwise specified, controller will be furnished with a maximum temperature of 110° F. Hot water line controllers should be so specified and will be set to deliver at a maximum of 135° F. For continuous flowing baths, specify downward discharge if wanted, otherwise upward discharge will be supplied.

Controllers Nos. 1 to 4, inclusive, are made of brass, in either plain finish or full nickelplate. Nos. 1 to 4 only can be furnished chromium plated for 10% additional cost. Made in special metals if desired—prices on application. Standard controllers Nos. 5 and 6 have iron bodies, aluminum paint finish, with bronze inner parts. They can be furnished in all brass construction at additional cost. Controllers have inlet check valves and removable filter screens. Hot and cold water should always come from the same original source, or at least be under substantially the same pressure, which for best results should not exceed 100 lb. Use a pressure reducing valve if necessary.

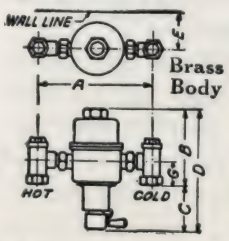
In ordering, state fully the purpose for which controller is to be used, with temperature required, and range of adjustment desired.

Specification

In supply to groups of showers [fixtures] in [shower room] [toilet] [bathroom], furnish and install Powers Thermostatic Water Controller No. .., placing it as close to fixtures as possible.

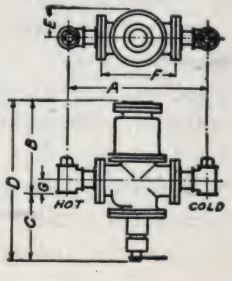
Applied to Group Showers

Note: Provide that plumber include stop valves in hot and cold water supplies.



CAPACITIES AND PRINCIPAL DIMENSIONS
Capacities are based upon 40 lb. water pressure, both hot and cold

No.	Capacities		Connections, in.		Dimensions, in.							Shipping weight, lb.
	Number of shower heads	G. p. m.	Inlet	Outlet	A	B	C	D	E	F	G	
1	1	15	½	¾	9	6⅝	6⅝	13¼	4¼	.....	1⅞	35
3	4	25	¾	1	10½	6 13/16	6⅞	13¼	4¼	.....	1⅝	35
4	8	50	1	1¼	12¼	8⅞	5¾	14⅝	4¼	.....	2	50
5	15	80	1¼	1½	16	13½	9¼	22¾	4¼	9	1¾	85
6	20	100	1½	2	16¾	13 11/16	9 1/16	22¾	4¼	9	1 15/16	90



SCOVILL MANUFACTURING COMPANY

PLUMBERS' BRASS GOODS DIVISION

Scovill Showers and Bath Fixtures

WATERVILLE, CONN.

BRANCH OFFICES

NEW YORK, N. Y., 280 Broadway
BOSTON, MASS., 80 Federal Street
CHICAGO, ILL., 1229 West Washington Boulevard
SAN FRANCISCO, CAL., 651 Folsom Street
ATLANTA, GA., 95 Fairlie Street

For Scovill Flush Valves, see Manufacturers' Index

Scovill Fixtures

Modern fixtures, backed by an experience of 128 years in brass craftsmanship, are certain to embody all that is practical—simplicity of installation, beauty of design and long trouble-free service.

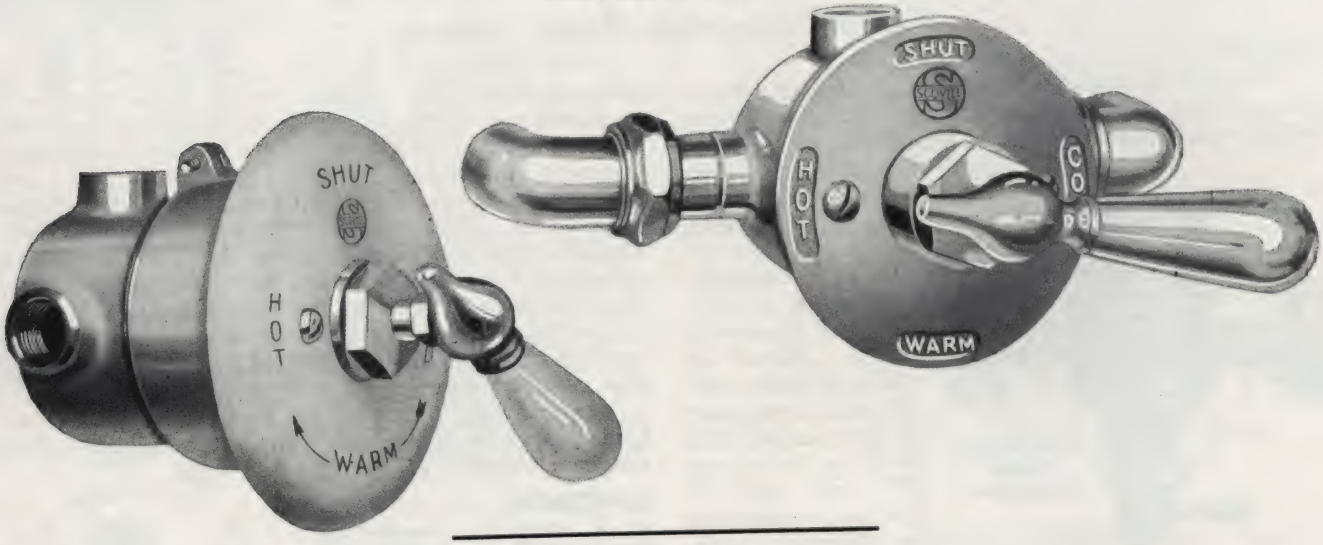
Scovill service is as valuable as Scovill products to all interested in sanitary plumbing for modern buildings. The architect and sanitary engineer will find the Scovill representative equipped to render intelligent co-operation on plumbing questions.

Owners in many States have come to know the in-built qualities of Scovill products and to recognize in them a sound investment. Long experience has taught us how to serve users of plumbers' brass goods and render that intangible but necessary element of every successful sale—satisfaction.

Literature

Illustrated literature, showing the complete line of Scoville showers, bath fixtures, flush valves and accessories, also detail drawings and roughing-in sketches with dimensions, will be furnished on request.

SCOVILL MIXER



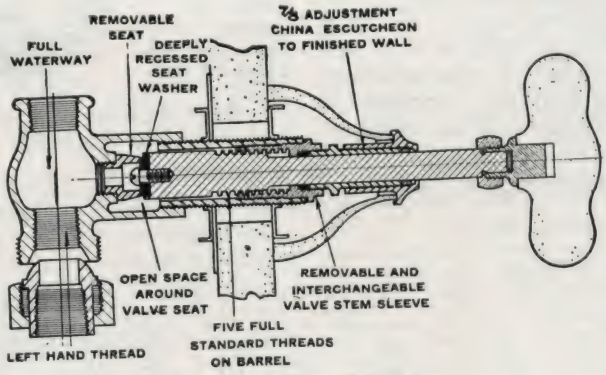
SCOVILL VALVE

For Built-in Tub Installations and Valve Controlled Showers

This valve is used in all the Scoville two-valve showers and bath fixtures. It is characterized by features that are designed to assure a uniform and lasting service of every fixture.

The full waterway in the body permits the free passage of water to the shower valves; the ground joint union coupling will make a watertight connection; a removable seat has a decided advantage over a permanent seat; the seat washer can not spread out and be forced out of shape due to its deeply recessed assembly; new packing can be inserted around the stem without shutting off the supplies; a full 7/8-in. adjustment is provided in the escutcheon bushing to offset any variation in the tile; the handle is retained on the stem by a lock nut rather than a setscrew.

All threads are standard iron pipe size in order that the plumber may use standard iron pipe size caps and plugs when testing fixtures.



Detail of "Scovill" Valve
May be rewashered from face of wall

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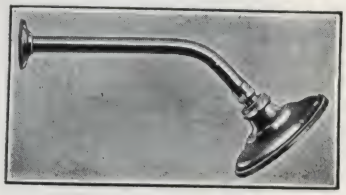
SCOVILL SHOWER HEAD COMBINATIONS

The Scovill Shower head combinations offer a variety of types of heads as well as in cost. The wrought brass heads cost less than the cast brass, but each can be had in either chromium or polished and nickeled finish. For good work and where the shower will have considerable use the cast brass head is preferable. For residence work the ball joint head should be used, especially over tubs.

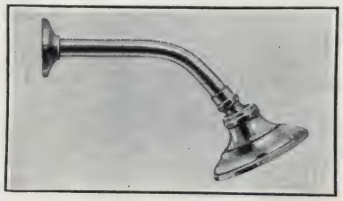
Note: If a shower head combination other than that usually furnished with any particular fixture is desired, any of the following combinations may be specified:

Combination "A"
12-in. bent arm, flange, 4-in. brass head, integral ball joint and removable face

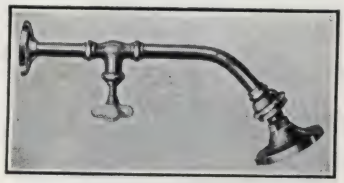


Combination "D"
12-in. bent arm, flange, 4-in. wrought brass head, integral ball joint and removable face

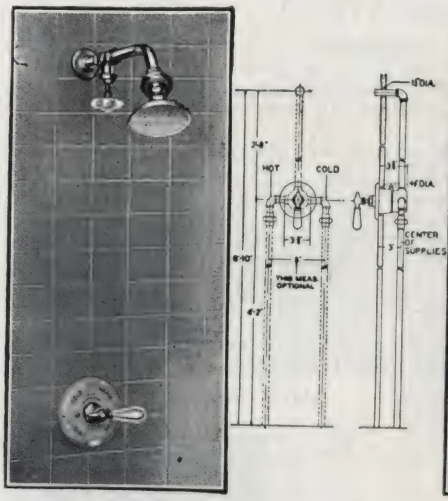
Combination "C"
8-in. bent arm, flange, 4½-in. wrought brass head, integral ball joint and removable face



Combination "G"
5-in. bent arm, volume valve and 4-in. nipple, flange, 4-in. cast brass head, ball joint and removable face



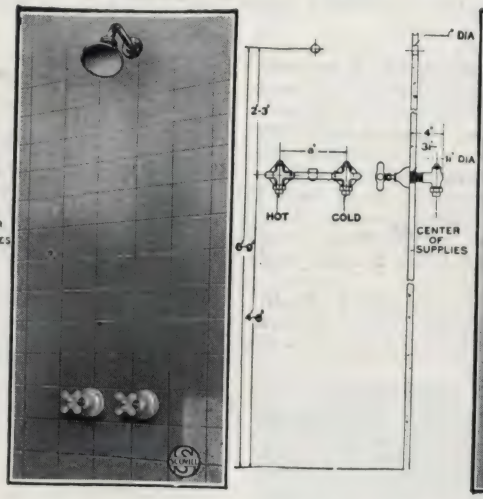
SCOVILL SHOWERS



No. G100-1 Concealed Mixer Shower with Shower Head Combination "G"

No. G100-1—Illustrated. Mixer ½ in. size, equipped with china handle and indexed china dial. In the event of a leak through gasket or packing any drip inside of wall is prevented. All parts are accessible from the face of the wall. Exposed metal parts polished and nickeled or chromium plated as specified.

No. G100-3—Equipped with brass handles and brass escutcheons. Otherwise same as No. G100-1 (illustrated).



No. D13022-1 Concealed Two-valve Shower with Shower Head Combination "D"

No. D13022-1—Illustrated. Valves on 8-in. centers, equipped with ground joint union couplings; cast brass valve bodies connected by cast brass tee, ½ in. high removable seat, joints soldered, adjustment of ⅞ in. on escutcheons. Solid china indexed cross arm handles, escutcheons to match.

No. D13022-2—Same as illustrated, except with "B" china handles.

No. D13022-3—Same as illustrated, except with brass handles and brass escutcheons.

No. D13055-1—Valves on 11-in. centers, otherwise same as No. D13022-1 (Illustrated).

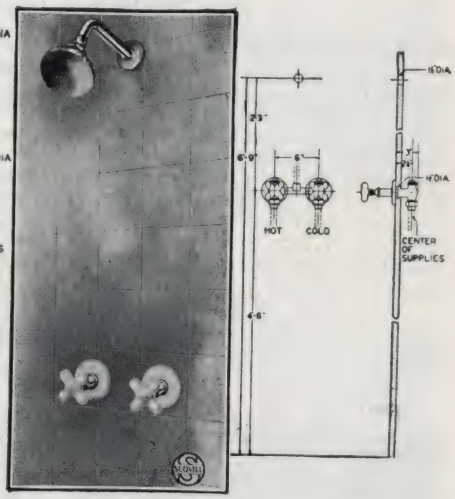
No. D13055-2—Same as above, except with "B" china handles.

No. D13055-3—Same as above, except with brass handles and brass escutcheons.

No. D14207-1—Valves on 6 in. centers, otherwise same as No. D13022-1 (illustrated).

No. D14207-2—Same as above, except with "B" china handles.

No. D14207-3—Same as above, except with brass handles and brass escutcheons.



No. A14233 Concealed Two-valve Shower with Shower Head Combination "A"

No. A14233-1—Illustrated. Valves are sliding sleeve type on 6-in. centers, equipped with ground joint union couplings; cast brass valve bodies connected by cast brass tee, ½-in. high removable seat, joints soldered, full adjustment for length of sleeve on escutcheons. Solid china indexed cross arm handles, escutcheons to match. Exposed parts are polished and nickeled or chromium plated as specified.

No. A14234-1—Valves on 8 in. centers, otherwise same as No. A14233-1 (illustrated).

Note: If fixture is wanted without shower head combination omit letter. Other shower head combinations may be substituted by specifying letter designating combination desired.

Continued on next page

SCOVILL BATH SUPPLIES

Concealed Overrim Tub Fillers—*13008-1 B. S.*—Illustrated. Valves on 8-in. centers, equipped with ground joint union couplings. Solid china indexed cross arm handles, escutcheons to match. Heavy cast brass spout with adjustable flange. Cast brass valve bodies connected by cast brass tee, have ½ in. high removable seats, accessible from face of wall; joints soldered. Exposed metal parts polished and nickeled or chromium plated as specified.

13008-2 B. S.—Same as illustrated, except valve equipped with "B" china handles.

13008-3 B. S.—Same as illustrated, except valve equipped with brass handles and brass escutcheons.

Concealed Bath Supply—*13014-1 B. N.*—Illustrated. Cast valve bodies and waste action yoke connected by full iron pipe size and weight brass pipe nipples, all joints soldered. Fixture has a 2-in. waste barrel and adjustable waste action. Direct supply from valve yoke to top nozzle supply. Ball joint on nozzle arm allows adjustment to pitch of tub. Heavy cast brass one piece bottom strainer. Bottom outlet of tee is threaded 1½ in. iron pipe size, reamed, and tapped for slip or screw-in tail piece. Tail piece 4½ in. long furnished. Valves are ½ in. with high removable seats and are accessible from face of wall. Solid china indexed cross arm handles, escutcheons to match. Brass nozzle. Exposed metal parts polished and nickeled or chromium plated as specified.

13014-2 B. N.—Same as illustrated, except equipped with "B" china handles.

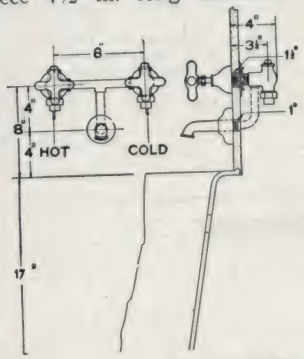
13014-3 B. N.—Same as illustrated, except equipped with brass handles and brass escutcheons.

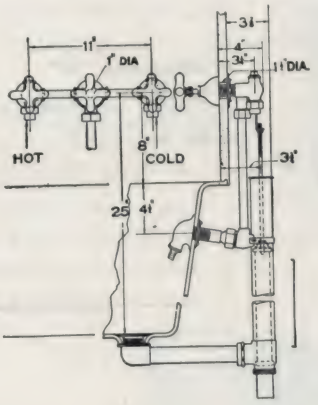
Concealed Overrim Bath Supply—*14245—1 B. S.*—Same as 13014-1 B. N., illustrated, except equipped with brass spout for overrim bath supply.

14245-2—B. S.—Same as above, except equipped with "B" china handles.

14245-3 B. S.—Same as above, except equipped with brass handles and brass escutcheons.

Note: If china spout is required, change letters to C. S. For china nozzle change letters to C. N.





SCOVILL BATH SUPPLY AND SHOWER COMBINATIONS

A New Scovill Unit

Concealed Bath Supply and Shower with Two-way Valve—*A14258-1 B. S.*—One pair of valves for shower and bath. Concealed bath supply and shower with two-way valve—one pair of valves operates either shower or bath. A half turn of the lever handle diverts the water to the shower after it has been mixed to the proper temperature through the bath nozzle. Solid china indexed cross arm handles, escutcheons to match. Exposed parts polished and nickeled or chromium plated as specified. Waste equipment same as other Scovill units. Also available with "B" type china handles or brass handles and escutcheons.

Concealed Bath Supply and Shower—*A13066-1 B. N.* (illustrated)—Bath fixture connected to shower valves by full iron pipe size and weight brass pipe, all joints soldered to make rigid frame. Combination "A" shower head. Bath supply and shower valves both on 11 in. centers. Solid china indexed cross arm handles, escutcheons to match, brass nozzle. Exposed metal parts polished and nickeled or chromium plated as specified.

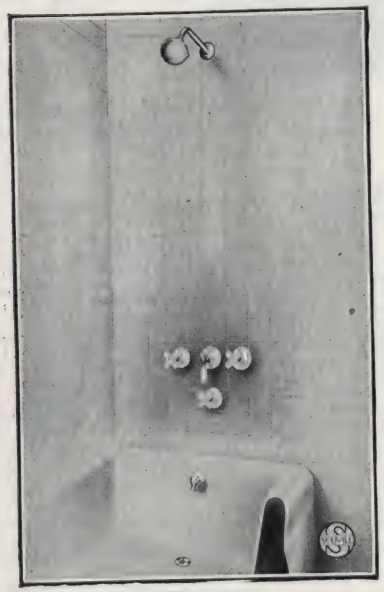
A13066-2 B. N.—Same as illustrated, except valves equipped with "B" china handles.

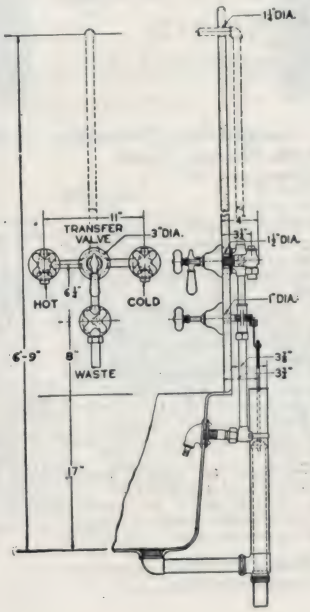
A13066-3 B. N.—Same as illustrated, except valves equipped with brass handles and brass escutcheons.

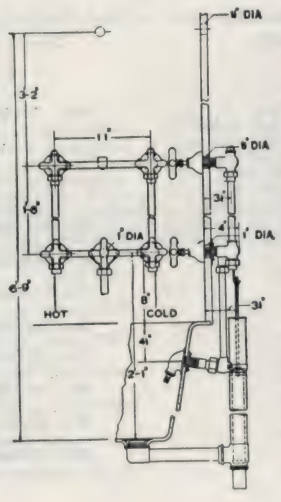
A13262-1 B. N.—Same as illustrated, except that bath supply valves are on 11 in. centers while the shower valves are on 8-in. centers.

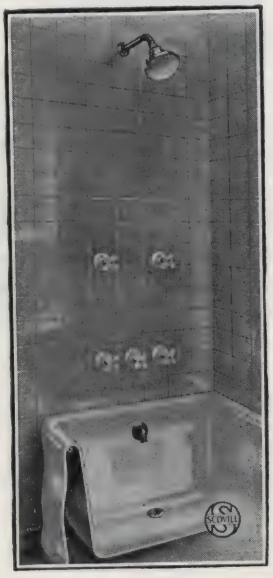
A13262-2 B. N.—Same as above, except valves equipped with "B" china handles.

A13262-3 B. N.—Same as above, except valves equipped with brass handles and brass escutcheons.









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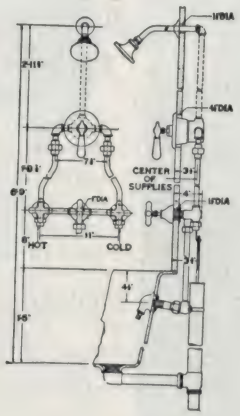
Concealed Bath Supply, Mixer Shower—*No. G13263-1 B. N.*—Illustrated. Bath fixture connected to temperator by full iron pipe size and weight brass pipes. Ground joint union couplings furnished. Type "G" shower head combination. Solid china indexed cross-arm handles on valves and waste action, escutcheons to match. China lever handle and indexed china escutcheon on mixer. Brass nozzle. Exposed metal parts polished and nickeled or chromium plated as specified.

No. G13263-2 B. N.—Same as illustrated, except with "B" china handles on valves and waste action.

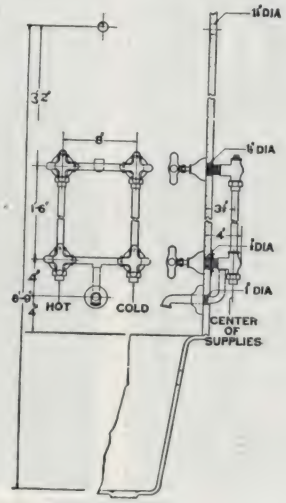
No. G12363-3 B. N.—Same as illustration, except with brass handles on valves, waste action and temperator with brass escutcheons to match.

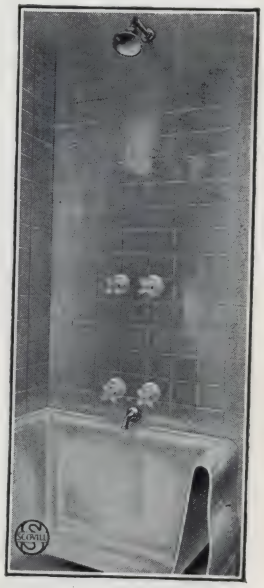


Concealed Overrim Tub Filler and Shower—*No. D13053-1 B. S.*—Illustrated. Shower and bath valves connected by full iron pipe size and weight brass pipe, all joints soldered. Type "D" shower head combination. Solid china indexed cross-arm handles, escutcheons to match. Exposed metal parts polished and nickeled or chromium plated as specified.

D13053-2 B. S.—Same as illustrated, except with "B" china handles.

D13053-3 B. S.—Same as illustrated, except with brass handles and brass escutcheons.

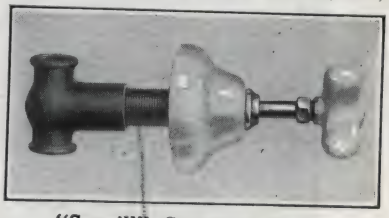




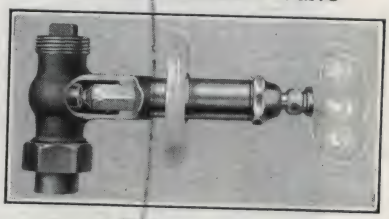
FEATURES OF SCOVILL FIXTURES

Metal Parts of Brass—Metal parts of all fixtures illustrated and described on these pages are of highest quality brass. Exposed metal parts are polished and nickeled; but, in every case, may also be had chromium plated if desired.

China Parts in Colors—China parts for Scovill showers, bath and lavatory fixtures may be obtained in many beautiful shades of color as well as in white. Stock tints are: nile green, sea green, spring green, West Point gray, horizon blue, french blue, cocoa brown, tan, autumn brown, old ivory, dark ivory, canary yellow, orchid pink, lavender, steel gray and black.



"Scovill" Standard Valve

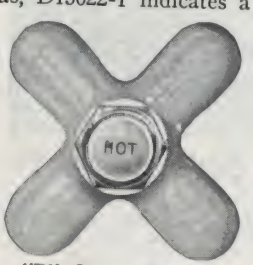


Sliding Valve

Valves—The standard Scovill valve has a ½-in. high removable seat, easily accessible, and a full ⅞-in. adjustment between escutcheon and finished face of wall. Handle secured to stem by spud and friction lock nut. The sliding sleeve type of valve is a recent modification of the standard type, sleeve and body being one piece cast brass.

Handles and Escutcheons—Handles are of three types: Solid china, "B" china (valve stem through center) and cast brass. The type handle used in any given fixture is indicated by a code number (-1, -2 and -3, respectively) following the full specification number, as, D13022-1 indicates a fixture with a solid china handle. China escutcheons are used with solid china and "B" china handles, and the brass escutcheon with the brass handle.

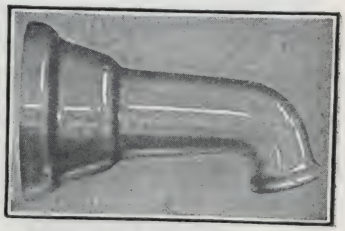
Solid China Handle



"B" China Handle

Spouts, for Overrim Tub Fillers—*No. 13324, Vitreous China Spout*— Brass insert tapped for ¾-in. iron pipe. Reducing bushing supplied for ½-in. iron pipe connection. Large red rubber washer furnished to make tight joint.

No. X. S. 1405, Cast Brass Spout (not illustrated)—Threaded ¾-in. iron pipe size. Tapped for ½-in. iron pipe. Fitted with cast brass flange. Can be furnished polished and nickeled or chromium plated as specified.

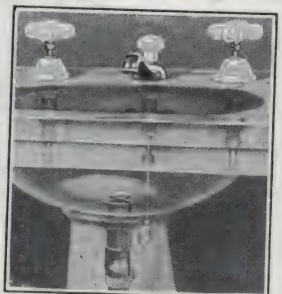


China Spout

Nozzles for Bath Supply and Waste Fixtures—*No. C.N. 13223, Vitreous China Nozzle*— Brass insert tapped for ¾-in. iron pipe. Reducing bushing supplied for ½-in. iron pipe connection. Large red rubber washer furnished to make tight joint between spout and tub.

No. B.N-X.S. 13, Cast Brass Nozzle — Tapped for ¾-in. iron pipe. Can be furnished polished and nickeled or chromium plated as specified.

Brass Nozzle

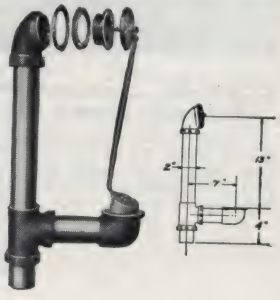


Lavatory Supply and Waste—*14239-1 B.S.*— Cast brass valve and waste bodies. Raised seats in valve bodies allow full flow of water, keeping them free of sediment. Valves fitted with ¼-in. iron pipe size male tail pieces with ground joints. Body equipped with 1¼-in. outside diameter 5-in. long tail piece.

14239-2 B.S.—Same as 14239-1 B.S. above, except equipped with "B" china handles.

14239-3 B.S.—Same as 14239-1 B.S., above, except equipped with brass handles and brass escutcheons.

Scovill Waste and Overflow—*13321-2*— Illustrated. Used with tiled-in tubs. Adjustable. Cast brass top and bottom elbows, cast tee, cast top and bottom strainers. Seamless 2-in. brass tubing, 17 B&S gauge. Equipped with beaded chain, solid rubber stopper and live rubber washers. Exposed metal parts polished and nickeled or chromium plated.



INCORPORATED 1889

SPEAKMAN COMPANY

Showers and Brass Plumbing Fixtures

WILMINGTON, DEL.

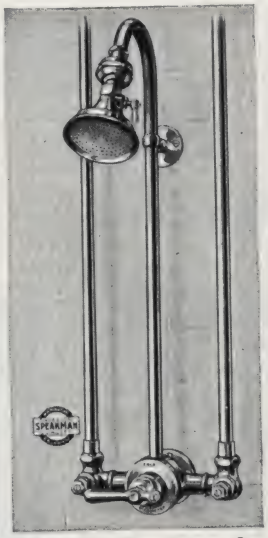
Products

SPEAKMAN SHOWERS for all classes of buildings; COMBINATION FIXTURES for bathtubs, lavatories and sinks. Also other Brass Plumbing Material.

In addition to nickel-plated finish, we can furnish our goods in Speakman Chromium Plate, which is non-tarnishing and therefore requires no polishing.

K-2603-M. Speakman Built-in Metaline Mixometer Shower

Size, ½-in. Mixometer with metal wall plate and metal handle. Straight arm with metal escutcheon, elbow ball joint with screwdriver stop and self-cleaning Anystream Head



K-2675. Speakman Institution Mixometer Shower

½-in. size, with lock-shield controlling valves on supplies to overhead, goose-neck discharge pipe with cast brass supporting strap, ball joint and 4-in. Anyforce cast brass head. For use in a stall or in an open battery

K-2635-M. Speakman Built-in Heavywate Shower

½-in. size, with Hi-Seat valves having unions, renewable seats, metal escutcheons and handles, 4-in. cast brass head with ball joint, bent arm and heavy metal wall flange

Facilities

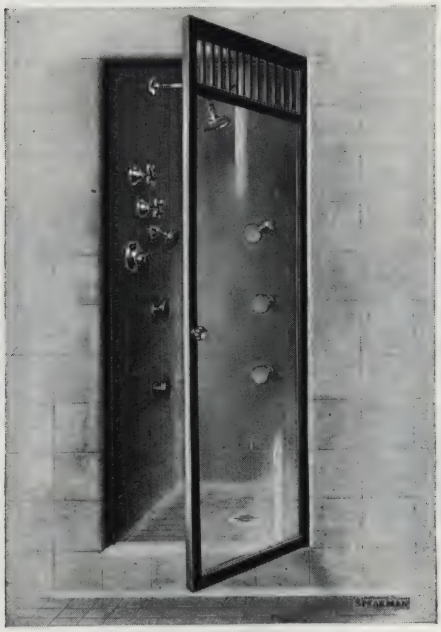
SPEAKMAN COMPANY'S factory is modernly equipped, including engineering department. It has ample capacity to handle large orders. For 61 years this company has built a reputation for efficient, dependable and prompt service.

Prices

Wholesale plumbing supply dealers and plumbing contractors throughout the United States can immediately furnish estimates and quote prices on Speakman products.

Complete Catalogue

In addition to the illustrations on this and the following page, the complete catalogue of SPEAKMAN COMPANY shows many more types of showers and fixtures. It will be sent upon request.



K-2930-M. Speakman Built-in Metaline Mixometer Shower and Needle Bath

Size, ¾-in. Mixometer with unions, check valves, metal wall plate, and metal handle. Nine cast brass sprays; top sprays adjustable. Bent arm with metal escutcheon, ball joint and 5-in. cast brass head

K-4039-M. Speakman Mixometer Shower and Tub Combination

½-in. size. All-metal handles and escutcheons. Has Speakman Anystream self-cleaning shower head and Act-Easy pop-up waste. Valve connected by brass pipe and tested

K-4037. Speakman Artline Waldin Tub and Shower Combination

½-in. size, with Hi-Seat valves having unions, renewable seats, metal escutcheons and handles. Mixometer with metal wall plate and handle. Bent arm with metal wall flange, ball joint and 5-in. cast brass Anyforce head. Willard pop-up waste, 1½-in. size, operated by 4-arm metal handle on wall. All exterior parts special art design

Continued on next page

K-3395

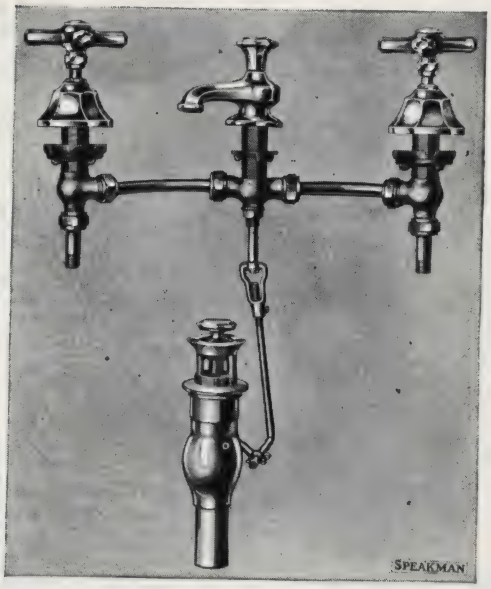
A turn of the lever sluices all sediment away

Another turn of the lever gives a normal spray

Or can be adjusted to a veritable stinging needle shower

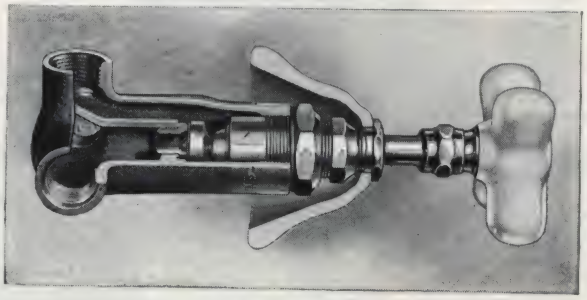
K-3395. Speakman Self-cleaning Anystream Shower Head

For homes, hotels, clubs, etc. The convenient lever enables the user to instantly flush out sediment or to regulate the spray to whatever kind of a shower is desired. Diameter, 4¼ in. ½-in. iron pipe female inlet



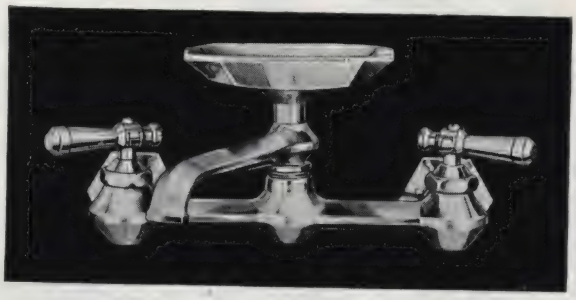
K-5017. Speakman Artline Unit-Acto Lavatory Fixture

Raised nozzle 4½ in. long. Valves with ¼-in. threaded tails, renewable seats, swivel discs and encased washers. Pop-up waste with metal knob and 1¼-in. diameter tail. All parts above lavatory special art design



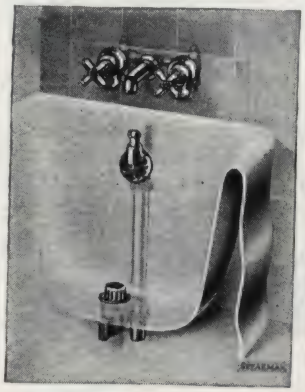
K-6500. Renewable Hi-Seat Valve (Patented)

In the Speakman Hi-Seat valve the seat is only 1⅜ in. from face of wall, making it easy to examine and remove the seat if renewal is necessary. All working parts are renewable from face of wall. Escutcheon adjusts from 2⅝ to 3½ in. Regularly furnished with china handle and escutcheon. It can also be furnished with metal handle and escutcheon when so specified



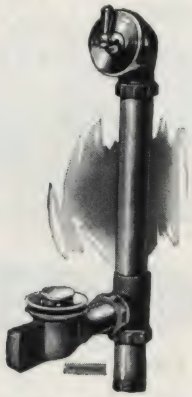
K-5502M. Speakman Diamond Sink Fixture

½-in. male connections, 8 in. center to center. Regularly furnished with outside thread. Inside thread to order without charge. Completely finished in Speakman chromium plate. Soap dish does not turn with nozzle but is removable

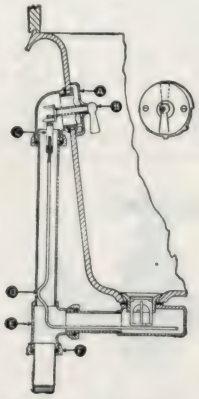


K-4583-M. Speakman Metaline Waldin Tub Combination

Size, ½ in. Hi-seat by-pass pattern valves with integral stops, unions, renewable seats in valves, metal escutcheons with openings to operate stops with screwdriver. Metal handles with black enamel indexes. Metal nozzle over tub. Willard pop-up waste, 1½-in. size



K-4656. Speakman Act-Easy Pop-up Bath Waste



K-4656. Speakman Act-Easy Pop-up Bath Waste in Detail

Size, 1½ in. For built-in tub. Slip connections with metal expansion ring. Slip nut for tail has 1½-in. iron pipe thread, so nut and tail can be discarded and iron pipe size connection used if desired. Waste tee can be reversed, bringing the outlet parallel with the arm for shallow floor construction. Full overflow area through slots around edge of overflow cover. Adjustment made by removing overflow cover. No wall panel required. Easy to install. Nothing to stick or get out of order

K-4660. Speakman Heavy Pattern Concealed Connected Waste and Overflow

With heavy cast brass overflow grate with integral shank that screws into the overflow elbow. Heavy solid link chain with extra heavy rubber stopper and bronze rings, soldered. Made in 1½ and 2-in. sizes. Especially recommended for hotels and public places where fixtures get hard usage

THE BASHLIN COMPANY

Manufacturers of Faucets

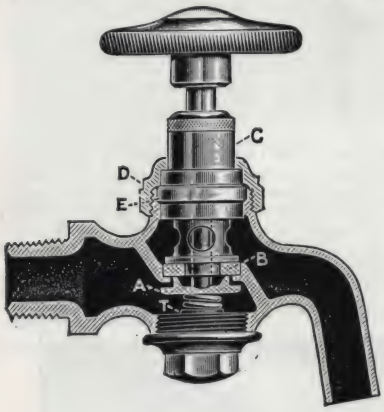
WARREN, PA.

Products

BASHLIN COMPRESSION and SELF-CLOSING FAUCETS, WASH TRAY BIBBS, BASIN COCKS, STOP COCKS, SINK FIXTURES, LAVATORY FIXTURES, PANTRY COCKS, GLASS FILLING FOUNTAINS, PEDAL VALVES, SWING SPOUT FIXTURES, BATH FIXTURES.

Also Bashlin Globe and Corner Valves, Blow-off Valves, Check Valves, etc.

Construction of Bashlin Faucets

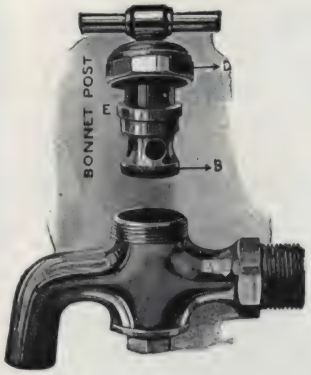


All Bashlin Compression and Self-closing Faucets and Basin Cocks are carefully built from the best material so that they give long and satisfactory service.

One of their chief features is the simplicity with which they may be repaired under water pressure.

Both seat and disc are easily renewed. The seat (B), most subject to abuse, may be replaced under pressure.

An ordinary faucet is liable to get out of repair because of the tendency of some people to exert excessive pressure on the handle. No matter how much force is applied to the handle of a Bashlin faucet neither the seat nor disc is harmed since the excessive strain is not communicated to them. While Bashlin Faucets have not been found leaky in actual use, should one commence to drip, this may be overcome by merely renewing the seat ring. While this repair is being made the water is automatically cut off by its own pressure.



Bashlin Compression and Self-closing Faucets

These faucets are all made for iron pipe size with hexagon, plain or flange on connection side and plain or hose end on discharge side. Finished in polished brass or heavy nickel or chromium plate. May be fitted with a lock shield at slight extra expense. Flanged inlets can be supplied with adjustable flanges.

Fig. 21

STYLES AND SIZES SELF-CLOSING FAUCETS

Code No.	Spout	Style	Sizes, in.
Fig. 21	Plain	Hexagon	⅜ ½ ¾
Fig. 22	Hose	Hexagon	½ ¾
Fig. 23	Plain	Straight	½ ¾
Fig. 24	Hose	Straight	½ ¾
Fig. 27	Plain	Flange	½ ¾
Fig. 28	Hose	Flange	½ ¾

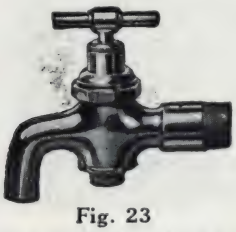


Fig. 23

Fig. 27

Bashlin Wash Tray Bibb

Made in compression and self-closing styles, with flange, for ½-in. iron pipe.

Finish is polished brass, nickel or chromium plated.

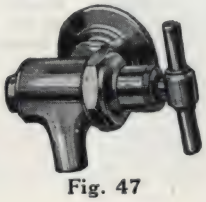


Fig. 47

Bashlin Low Type Basin Cock

A handsome, well proportioned cock for use in washbasins. Made in three sizes. Fig. 33, distance from center of base to near edge of spout opening 2¾ in. Fig. 33L, distance from center of base to near edge of spout opening 3½ in. Fig. 48 heavy pattern, distance from center of base to near edge of spout opening 3½ in. Each is made in both compression and self-closing styles with heavy nickel or chromium plated finish. These basin cocks can be furnished in the push button type (Fig. 33 LP) at less cost.

Fig. 33

Fig. 33 LP

Bashlin Handles for Cocks and Bibbs

Bashlin Cocks and Bibbs can be furnished with any one of several types of handles as illustrated, at slight additional cost depending on the style selected.

Fig. 39 Fig. 40 Fig. 43 Fig. 41 Fig. 38

Bashlin Stop Cock

A stop cock for insertion in pipe lines. Made in ¼, ⅜, ½ and ¾-in. iron pipe sizes. Finish is polished brass, nickel or chromium plated. Compression or self-closing styles. Regularly furnished with bar handle, but can be supplied with wheel handle at slight extra cost.

Fig. 36

Continued on next page

Bashlin Sink Fixture

This fixture has concealed valves of the Bashlin patented type which are renewable under pressure without shutting off the water. Flanges are adjustable. All exposed parts are nickel or chromium plated. Valves and connections back of the wall are rough nickel finish. Metal escutcheons and metal handles, china indexed, can be furnished. Holes in sink back, 1¼-in. diameter.

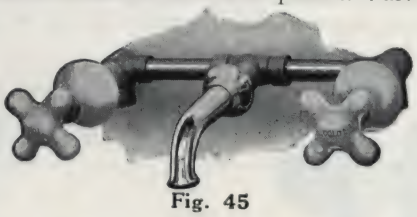
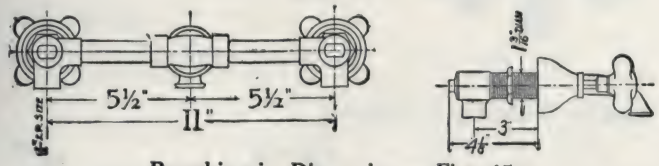


Fig. 45



Roughing-in Dimensions—Fig. 45

Bashlin Lavatory Fixture

A handsome fixture with all exposed metal parts heavily nickel or chromium plated, china escutcheons and solid china four-arm handles. The concealed valves are of the Bashlin patented type which are renewable, under pressure, without shutting off the water. Nozzle is of the semiraised type. Pop-up waste has a china knob. Standard distance between centers of valves is 12 in.; the cock holes in the lavatory should be 1¼-in. diam., the lift rod hole 1-in. diam.

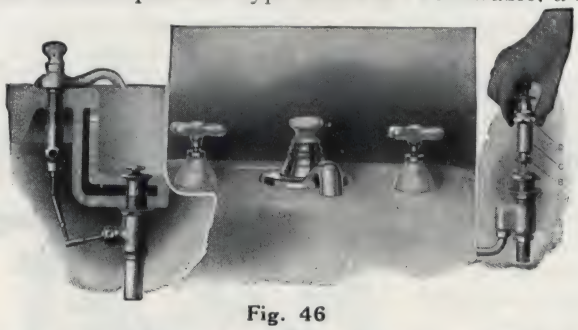


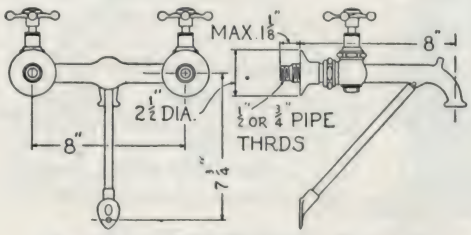
Fig. 46

Bashlin Exposed Slop Sink Fixture

A sturdy fixture for hard service, with pail hook and brace, fitted with Bashlin compression or self-closing cocks. Made for ½ or ¾-in. iron pipe size male inlets and adjustable flanges. Finish, polished brass, nickel or chromium plated.

Fig. 50J is a junior size with spread of 6 in. without pail hook or brace.

Fig. 50



Roughing-in Dimensions—Fig. 50

Bashlin Pantry Cock

Made in compression and self-closing styles with nickelplated finish. Regularly supplied with bar handle. Furnished with wheel handle as illustrated at slight extra expense. (Fig. 44.) Can also be furnished with hose end.

Fig. 44

Bashlin Glass Filling Fountain

These fountains have a pan to hold the glass, are operated by a slight depression of the pan, and are self-closing. Finish, nickel or chromium plated. With vertical connection for ⅜ or ½-in. iron pipe female inlet (Fig. 51) or for horizontal connection (Fig. 52). Vertical inlet style 11½ in. high, horizontal inlet style 10½ in. high.

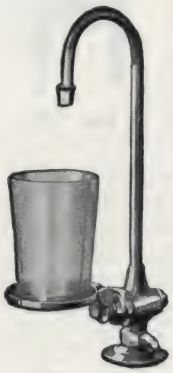


Fig. 51

Fig. 52-C Glass Fillers are operated by a slight deflection of the stirrup. Inlets, ⅜ or ½ in. inside thread. Center line of inlet to bottom of stirrup, 4½ in., width (front to back) 4⅜ in. Nickel or chromium plated finish.

Fig. 52-C

Bashlin Swing Spout Fixtures

This is a well proportioned fixture for use where it is desired to vary the position of the outlet. The spout has a radius of about 6 in.

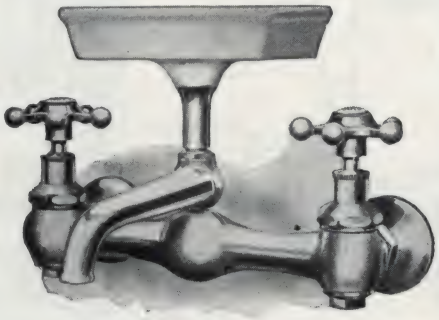


Fig. 53-S

Connections have ½ or ¾-in. male thread iron pipe size and adjustable flanges. Finish, nickel or chromium plated. Made in three styles: Fig. 53 plain; Fig. 53-S with soap holder, as illustrated; Fig. 53-H, a hospital fixture, equipped with special handles which may be easily turned by a touch of the elbow without the necessity of touching with the hands.

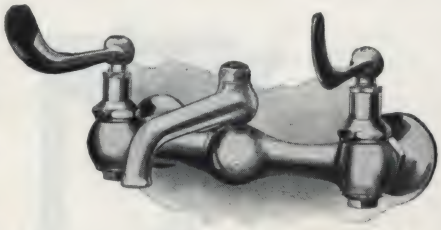
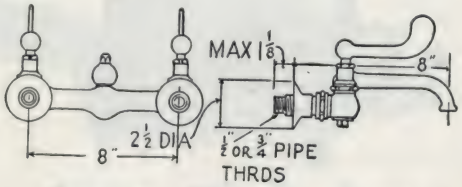


Fig. 53-H

Valves are of the Bashlin patented type which may be renewed under pressure, without shutting off the water.



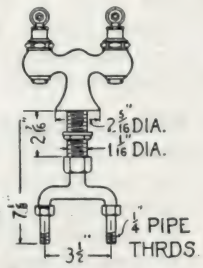
Roughing-in Dimensions—Fig. 53

Continued on next page

Bashlin Double Basin Faucet

A compact basin fixture, with a single outlet spout, requiring but one hole in lavatory. Exposed parts heavily nickel or chromium plated. Handles are of porcelain.

Fig. 55P has a gooseneck instead of the regular spout.



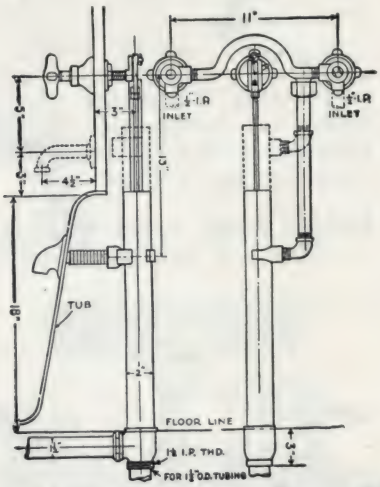
Roughing-in Dimensions—Fig. 55

Fig. 55

Bashlin Concealed Bath Fixture

A superior fixture for use with the modern type of built-in bathtub. Made in two styles: Fig. 54 with spout in the tub and Fig. 56 with spout over the rim. In the dimension diagram Fig. 56 is shown by the dotted lines. Exposed parts nickel or chromium plated. Furnished with china escutcheons and solid china four-arm handles.

Fig. 54

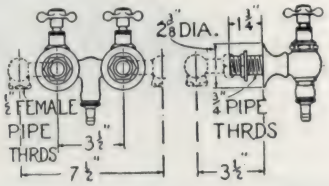


Roughing-in Dimensions—Figs. 54, 56

Bashlin Double Bath Faucet

A handsome, well proportioned fixture for use on bathtubs. Fitted with Bashlin patent valves which may be renewed, under pressure, without shutting off the water. Nickel or chromium plated finish, regularly supplied with round milled handles or the 4-ball type.

Fig. 35



Roughing-in Dimensions—Fig. 35

Bashlin Industrial Fixtures

For factories and schools can be supplied in polished brass, rough nickel, polished nickel, or chromium plated finishes. Compression or self-closing.

Fig. 221

Fig. 351

Bashlin Self-closing Pedal Valve

This valve is convenient in hospital operating rooms, dental offices, or wherever necessary to turn on water without hands coming in contact with the cock. Made with bottom inlet only or with both bottom and side inlets, as illustrated. Inlet connections have female threads ½-in. iron pipe size and outlet has male thread ½ in. iron pipe size. Finish, nickel or chromium plated. Valve is Bashlin patent style which may be renewed, under pressure, without shutting off water.

Fig. 37

Bashlin Shower Control and Tub Filler

A combination fixture for controlling the water for the shower and filling the tub. Outlet spout over the rim of the tub. Exposed metal parts are heavily nickel or chromium plated. Furnished with china escutcheons and solid china four-arm handles. In this combination the distances given can be varied to suit the conditions.

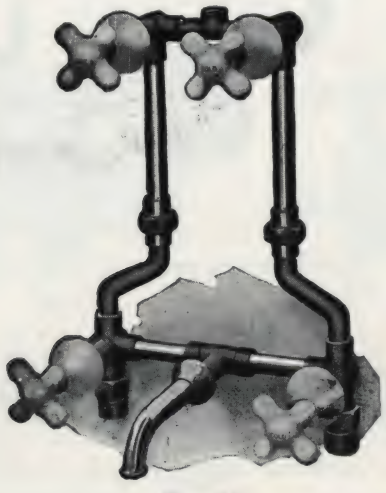
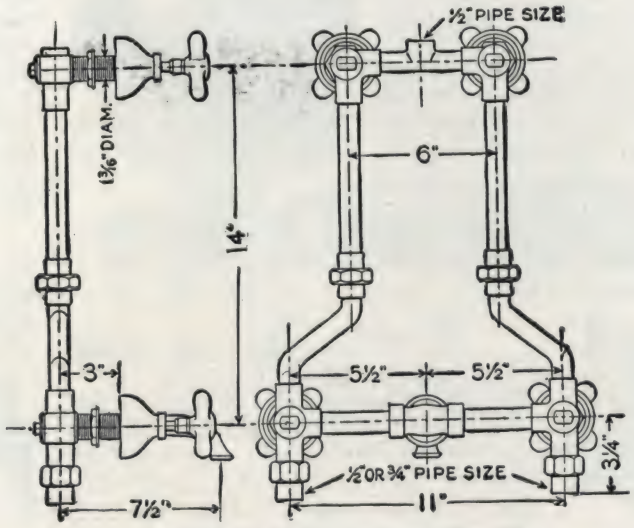


Fig. 58



Roughing-in Dimensions—Fig. 58

CENTRAL BRASS MFG. COMPANY

(PARAGON DIVISION)

Manufacturers of Ball-bearing Self-closing Faucets

CLEVELAND, OHIO

Products

PARAGON BALL BEARING SELF-CLOSING LAVATORY FAUCETS, SINK FAUCETS and STOPS.

SELF-CLOSING FAUCETS Paragon TANK FITTINGS

Description

Paragon Ball-bearing Self-closing Faucets have won preference from architects and engineers everywhere and enjoy a prestige of 36 years, earned by consistent high grade workmanship and the finest materials.

Guarantee

Ten years' guarantee on the wear of working parts of Paragon Ball-bearing Self-closing Faucets.

Catalogue

Complete catalogue showing full line of Paragon Self-closing Faucets as well as Central Staples and Built-in Fixtures, sent on request.

The "Samson" Lock

The simple construction and operation of the Samson Lock which permits *easy* and *rapid* handle adjustment is the result of our many years' experience in building self-closing faucets. Prompt handle adjustment in self-closing faucets is vital and this has been ideally accomplished and perfected in the Samson Lock.

Adjustment

Simply turn the knurled nut "O" down against the washer "L" firmly enough to tighten the handle but not to raise the stem. Screw knurled nut "P" down against "O," tighten until teeth coincide—"O" will not turn. Slip corrugated sleeve over "O" and "P."

This exclusive Paragon feature provides quick adjustment and secure lock.

Three Popular Types of Paragon Ball-bearing Self-closing Faucets

Nickel plated—Chrome plated. All style handles

Fig. D 336A
Ice water faucet with regulator. Sizes ⅜ and ½ in.

Fig. D 213A
China index button. Spout 3½ in. center to center

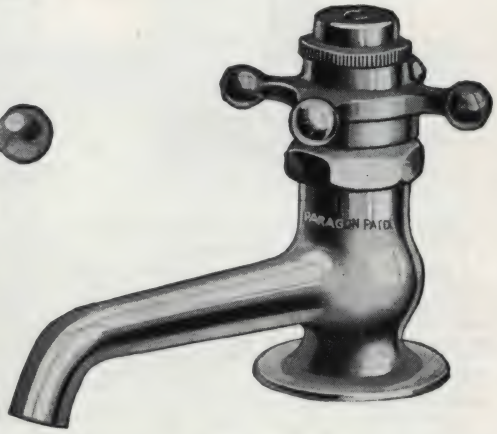


Fig. D 210B
Metal indexed cap. Spout 3¾ in. center to center

AA. Bronze renewable seat.

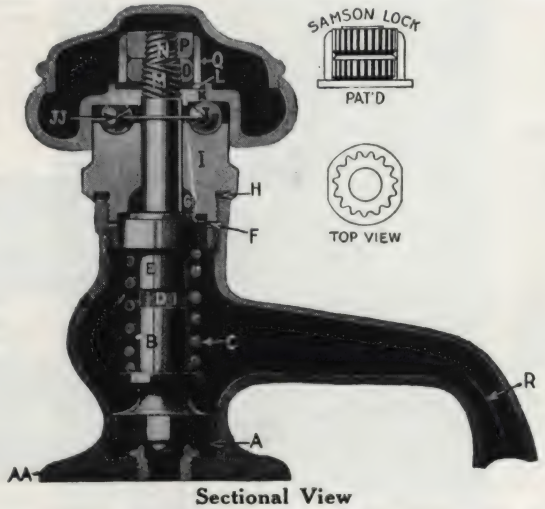
A. Special composition seat washer, encased.

B. Sturdy stem—four guides at base insure central position.

C. Heavy phosphor bronze spring with squared ends provides perfect alignment.

D. Flat face on stem matching inside of bushing *E* with two extended prongs *F* which fit incline *I*. Prevents turning of stem and allows only vertical action.

G. Hard white felt packing fits conical opening in incline and eliminates leakage through top.



Sectional View

H. Durable fibre washer embedded in incline insures tight joint.

I. Drop forged brass incline provides smooth and uniform bearing surface for balls, held in place by retainer *JJ*.

L. Brass washer reduces friction.

M. Left hand thread on stem, fitting corrugated nut *O*.

N. Right hand thread, smaller diameter, fitting corrugated nut *P*.

Q. Corrugated sleeve slips over *O* and *P* and locks them in position.

R. Antisplash device.

HAYS MANUFACTURING COMPANY

ERIE, PA.

For Hays Copper Plumbing Method and Service Connections, see Manufacturers' Index

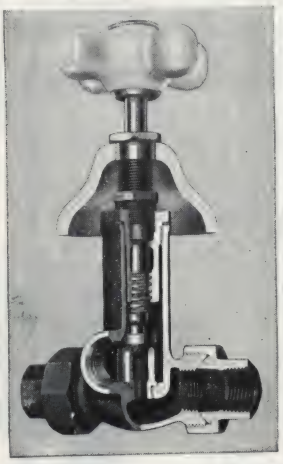
Manufacturing Policies

The HAYS MANUFACTURING COMPANY was established in 1869. From a small foundry, supplying the needs of nearby trade, it has grown to one of the large plants in the industry, with a national distribution. Sixty years ago the founders laid down a policy of manufacture which has been followed so well that brass goods marked "Hays" are known today as having no superior in design or construction. Before a Hays Product leaves the factory, it must pass tests that are more severe than the stresses and strains encountered in actual service.

Common Attributes of Hays Fixtures

Joints are screwed, sweated and thoroughly tested. Supplies to tub are full ¾-in. brass pipe iron pipe size. Standing wastes have 17 gauge tubing; the waste seat is not only carefully machined, but ground in.

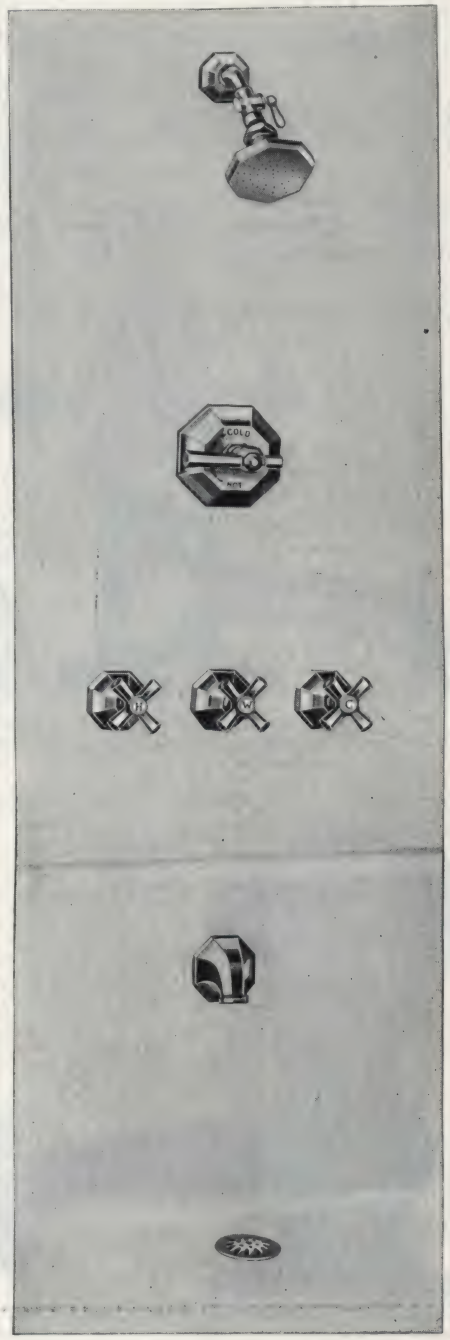
Stems in tub and shower valves are interchangeable with the lavatory fixtures. This is also true of the high renewable seats, bonnet stuffing box nuts, stem packing rings and escutcheon lock nuts. Malleable iron tie plate furnished with all fixtures having standing waste. Vitreous china parts are of selected quality, glazed both outside and inside.



Hays By-pass Valve for Bath and Shower Fixtures

Haysco Valve is constructed so that all parts subject to wear are easily renewable. Valves are 3 in. in length to meet the more standardized wall construction. High seat is chromium plated to give longer life. Seat is also renewable with liberal waterway. Stems have swivel seat holders, designed for ample lift, and when valve is closed several deep heavy threads are engaged in bonnet. Bonnet stem packing, durable graphited asbestos.

To make special adjustment of escutcheons possible when necessary, we have adopted ⅜-in. straight iron pipe thread brass nipple with 1-in. adjustment. This nipple can be cut off for shortening or easily replaced for greater adjustment. Valves can be furnished with or without Erico brass ground joint unions.



Center

"Nuart" Hays Built-in Bathroom Fixtures

The artistic, octagonal design of "Nuart" Fixtures is finished in the deep silver lustre of Hays chromium plating and harmonizes attractively with the bathroom background whether it is white or brightly colored in the modern style. These fixtures, for shower, tub and lavatory, will not tarnish and do not require polishing.

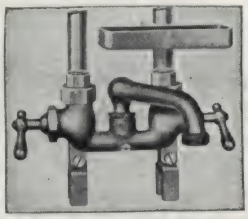
"Nuart" Fixtures are accurately engineered throughout for efficient performance and durability, with every part correctly proportioned. Easy installation is assured. All parts subject to wear are easily accessible. The renewable chromium plated seats in tub and shower valve are interchangeable with the lavatory fixture—and so are the handles, stems with swivel seat holder, bonnet stuffing box nuts, stem packing rings and escutcheon lock nut.

Haysco Lavatory Fixtures with Pop-Up Drain

The valves have high renewable chromium plated seats, swivel seat holders with encased washers; all wearing parts are interchangeable with the bath valve shower on opposite side of page

Hays "Erico" Sink Faucet

The clean, graceful curves of this design give a pleasing appearance that appeals to every housewife. The soap dish rides low to the top of the spout. This faucet fits nicely in any sink, especially those with low backs. "Erico" Faucet, including handles and soap tray, is made of high grade red metal with a bright, long-wearing Hays chromium plated finish. Furnished with flanged female or adjustable screw flanged male. Efficient design and expert workmanship are combined to make this Hays Faucet one of the most reliable and durable as well as one of the *finest looking* sink faucets on the market.



Hays "Mova" Laundry Tray Faucet

Not by any means the least of our new designs and improvements is the double laundry tray faucet. Swinging spout directs the water to any tray compartment and swings aside when not in use. Water may be regulated to temperature desired. Faucet is complete, including clamps, unions and bolts. It is all-brass, rough nickelplated; there are no iron parts. Space between clamps is 3 in. Large cast aluminum soap dish can be furnished if desired. For 3-part trays an extension to the spout is furnished, giving the same convenience for all three compartments.

THE BEAD CHAIN MANUFACTURING COMPANY

110 Mt. Grove Street, BRIDGEPORT, CONN.

Bead Chain

Bead Chain, as its name implies, is a type of chain formed from hollow metal beads with special fastening devices inside of the bead. The construction is such that a length of Bead Chain offers unusual strength, extreme flexibility and is absolutely non-kinking.

USE BEAD CHAIN FOR PLUMBING

Trade Mark Reg. U. S. Pat. Off.

Besides these advantages it is neat and handsome in appearance, so that it can be employed with the finest types of plumbing installations. It will show to good advantage anywhere.

Nickel Silver Bead Chain is standard equipment with leading manufacturers of lavatories, tubs and trays. It is sanitary and holds its color where ordinary nickel-plated plumbing chain might wear brassy. It may also be obtained plated with chromium metal.

Uses of Bead Chain

Plumbing and Heating—With rubber stopper in bathtubs, lavatories, laundry trays, kitchen sinks; shower bath curtain hold backs; on furnace damper doors; tank pull chains and draft regulators.

Lighting Fixtures—On pull chain sockets in connection with lighting fixtures.

Miscellaneous—Necklaces, bracelets, knife and pencil chains, jewelry items and lamp shades, dress, hat and belt trimmings, dog leashes, key rings, calendar and placard hangers.

A variety of special end rings and connectors, splicing links, stop balls, pendant balls and tassels are also manufactured for use with Bead Chain.

Material and Finishes

Bead Chain is manufactured in brass, bronze, copper, nickel silver, sterling silver and aluminum. Bead Chain may also be secured plated with chromium metal, Roman and old gold, or lacquered in various colors. Also manufactured and furnished in polished brass.

How to Specify Bead Chain

All chain between waste and overflow connections of lavatories, trays and tubs shall be nickel silver Bead Chain of suitable lengths.

No. 10 Bead Chain

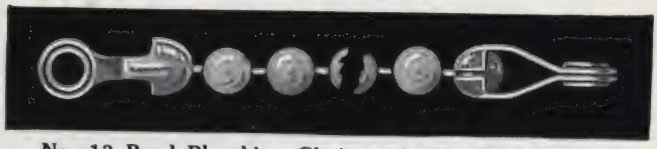
Made throughout of Grade A nickel silver. Beads are $\frac{3}{16}$ in. in diameter. Tensile strength 50 lb. Equipped with new Type B combined jump ring couplings and splicing links. Also furnished with Type A couplings. Patents applied for.

No. 10 Bead Plumbing Chain with Type A Coupling

No. 10 Bead Plumbing Chain with Type B Coupling

No. 13 Bead Chain

Beads ¼ in. in diameter. Made throughout of Grade A nickel silver. Tensile strength 135 to 140 lbs. Equipped with Type A patented jump ring couplings.

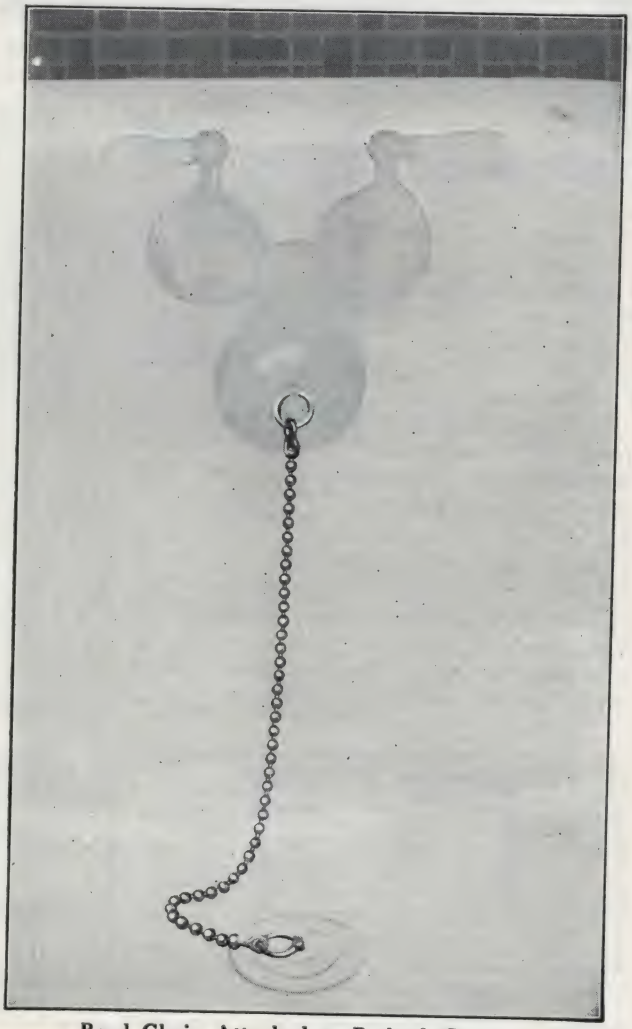


No. 13 Bead Plumbing Chain with Type A Coupling
Actual size

Sizes and Lengths

Both No. 10 and No. 13 are stocked in inch lengths from 10 to 18 in., inclusive, with jump ring couplings attached. Other lengths with jump ring couplings attached are furnished on request. Measurements are from center to center of eye. Bead Chain is also furnished on reels, jump ring couplings in bulk—No. 10 on reels of 500 ft., and No. 13 on reels of 250 ft. Jump ring couplings are sold by pairs.

Bead Chain is standard equipment with manufacturers of dependable plumbing supplies.



Bead Chain Attached to Bathtub Stopper

THE HIGGIN MANUFACTURING CO.

Metal Access Panels

NEWPORT, KY.

SALES AGENCIES IN PRINCIPAL CITIES

HIGGIN
ALL METAL
Access Panel
(Patented)

Product

HIGGIN ALL-METAL ACCESS PANELS.

For Higgin All-metal Weatherstrips and Window and Door Screens, see Manufacturers' Index.

Purpose

The Higgin All-metal Access Panel fills a long-felt need for an inconspicuous flush panel giving quick access to critical places in plumbing, heating and refrigerating systems, as well as for use as scuttles and for many other places. It is ideal for residences, apartment houses, hotels, hospitals, office and other buildings.

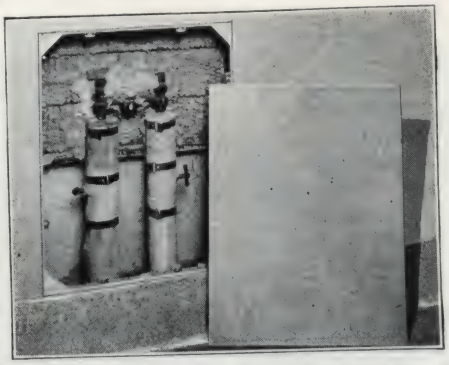


Fig. 1. Panel Open for Access to Supplies in Back of Bathtub

Fig. 1 shows panel open for access to supplies in back of bathtub. Small size panel for reaching concealed valves is shown in Fig. 2. Fig. 3 shows lid in place. Hinged type panel for ceiling use is shown in Fig. 4.

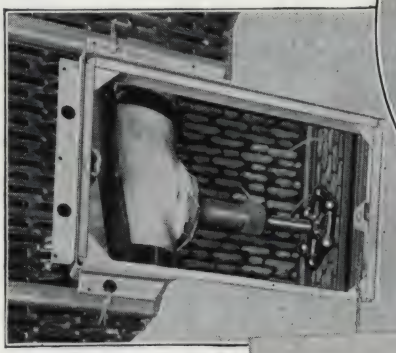


Fig. 2. Small Size Panel for Concealed Valves

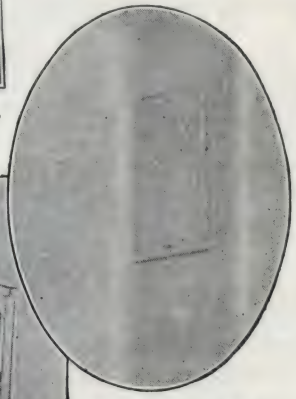


Fig. 3. Metal Panel with Lid in Place

Construction

Frame is of one piece, with small continuous angle on inside forming a rabbet for lid. Perforated channels are spot-welded to outside of frame for fastening and plaster key. Retaining clips and special cam fasteners are used on all sizes of panels. Cam is operated by screw head bolt set flush with surface of lid. Panels may also be equipped with concealed hinges, allowing door to swing 180°. Cam fasteners are provided with this type of panel also.

Advantages

Both panel and frame are of metal. Comes ready to install. Can be placed quickly and easily where desired. No special framing required. Avoids chance of plasterer sealing the opening. Eliminates necessity of tearing down walls to get at concealed fittings. Fits flush with wall in plaster, marble or tile, and permits painting, decorating or papering over to make inconspicuousness complete.

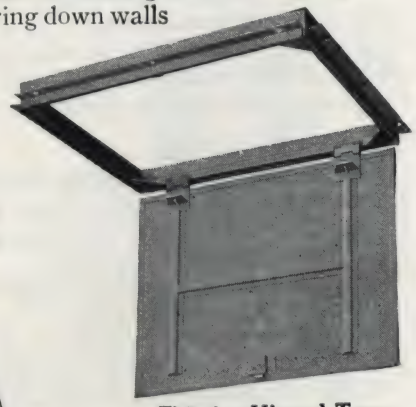


Fig. 4. Hinged Type Panel for Ceiling

Stock Sizes

7½x11½ in.
12½x16½ in.
14½x18½ in.
18½x24½ in.
18½x30½ in.

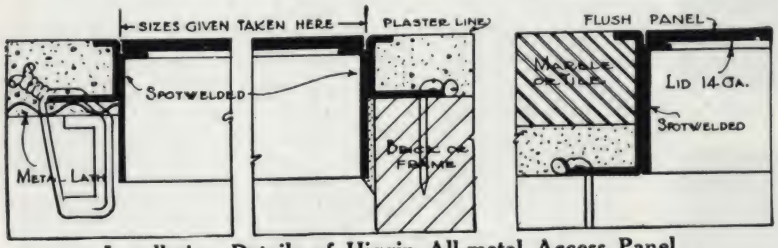
Measurement points are shown on detail drawing in lower left-hand corner.

To Locate Panel

To locate the panel covered with wall paper, tap lightly on the wall.

To release the panel, cut the wall paper by simply running the knife or screwdriver around the edge of the panel and open.

Locating Position of Panel



Installation Details of Higgin All-metal Access Panel

Showing Higgin All-metal Access Panel in metal lath and plaster, plaster on brick or building tile, and with marble or tile facing. When panels are to be used in tile or marble, it must be so stated in ordering

Smooth Surface

Where walls are to be painted, the crack between the panel and the frame can be filled with putty, making one smooth surface without mar or break.

Smoothing the Wall Surface

THE F. H. LAWSON CO.

Famous Since 1816 as Manufacturers of High Grade Metal Products

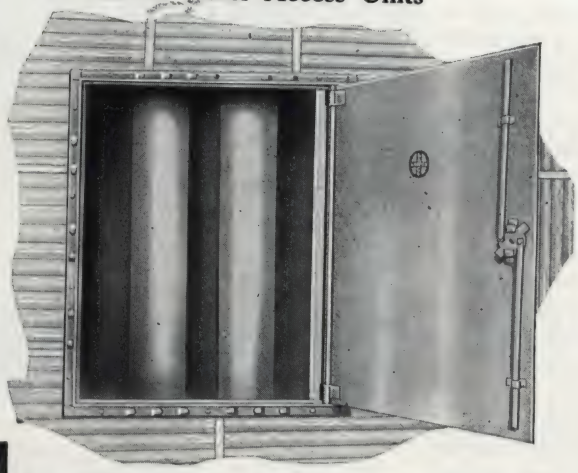
MAIN FACTORY AND OFFICES
Evans, Whately, Boston and B. & O. R. R.
CINCINNATI, OHIO

BRANCH OFFICES: NEW YORK, N. Y., and CHICAGO, ILL.
For Lawco Bathroom Cabinets, see Manufacturers' Index

Lawco Steel Access Units

Dust-tight, fire-proof, easily installed, they give instant access to pipes, valves, airshafts in or behind walls. Panel closes firmly, dust-tight, on inside flange. Edge of door panel and frame flush with plaster or wall surface. May be painted or papered over. Latched in place by perfected 3-point locking device. Frame and panels of 1/8-in. steel. Strongly reinforced corners; plaster hooks on flanges.

Cost less, last longer, look better.

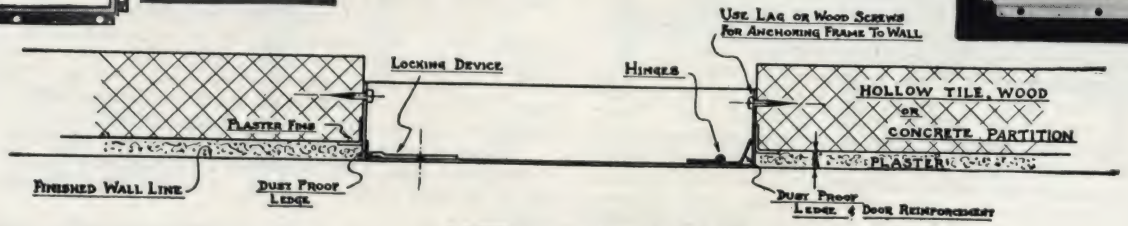


Lawco Hinged Unit Installation in Gypsum Tile Block Wall

Right and Left:

Lawco Access Unit—Standard Type

Same as hinged panel type, except that the panels are separate, not fastened to the frame



HORIZONTAL SECTION

Cross Section of Typical Lawco Access Unit Installation

Catalogue Nos.	Panel size, in.	Wall opening, in.	Wt., lbs.	Price, each
5 05	8 x10	8½x10½	9	$3.50
10 010	13 5/16x16	13¾x16½	15	4.50
15 015	13 5/16x24	13¾x24½	24½	6.50
20 020	19 5/16x24	19¾x24½	28	7.50
22 022	19 5/16x30	19¾x30¾	35	8.50

Numbers preceded by 0 are separate panel type; all others are hinged panel type.

Lawco All-Metal Clothes Chute Doors

Modern, attractive, convenient. Frames and doors stamped from one piece. Finished in white prime, easily painted to match room decorations.

Invisible hinges, crystal glass knobs. Door held in place by brass bullet catches.

Quickly installed.

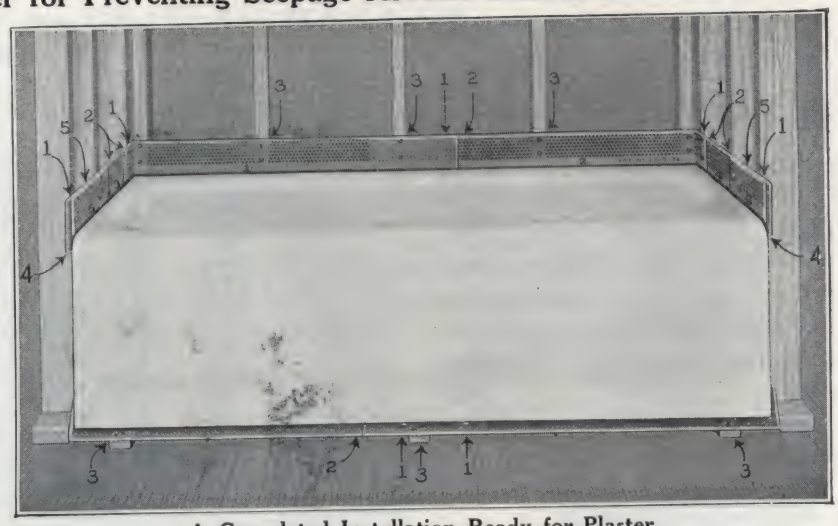
No.	Panel size, in.	Wall opening, in.	Wt., lbs.	Price, each
26	10x11¾	9½x11¼	4½	$3.00

LUCKE LEAKPROOF ADJUSTABLE BATHTUB HANGERS

MANUFACTURED BY
WILLIAM B. LUCKE
WILMETTE, ILL.

Lucke Leakproof Tub Hanger for Preventing Seepage Around Built-in Bathtubs

The Lucke Leakproof Tub Hanger has been designed to prevent leaks around edges of built-in tubs by acting as a water seal between any wall and the edge of a built-in tub or shower receptor, and also to act as a water seal between the apron of tub and the floor. Its second and very important purpose is to prevent tub from settling and pulling away from plaster or tile work, thus eliminating all ugly cracks around edge of tub or receptor.



A Completed Installation Ready for Plaster

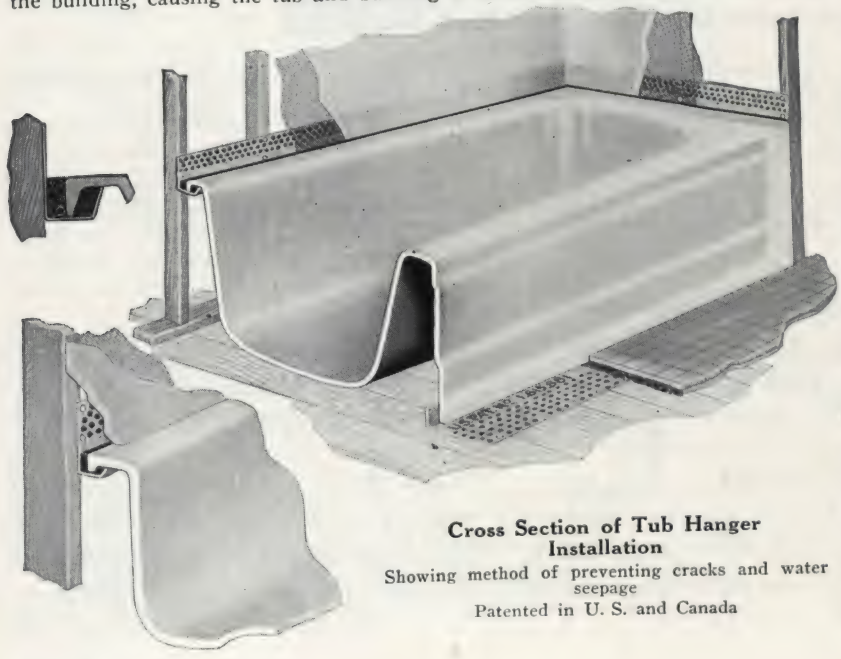
(1) Bolts where necessary.
(2) Filler to seal all joints.
(3) Necessity of two nails at every stud.
(4) Filler in groove between tub and hanger.
(5) Oakum to fill space between pieces 3 and 5 and 4 and 6.

Note: Surplus filler can easily be removed with gasoline. Hangers for right and left-hand corner tubs and shower receptors installed same as recess tub hanger

Construction and Installation

The hanger is made from heavy gauge galvanized steel—18 gauge is used for the back of tub, 12 gauge for ends of tub and 20 gauge for floor strips. The hanger is fashioned like a trough or gutter, with a wide upper strip, part of which is perforated to serve as a base for plaster, cement or any other kind of wall material to key into. The gutter of the hanger is partly filled with Lucke Leakproof Filler (a special wax combination), which is easily applied and which retains its elasticity indefinitely. It does not stain any form of wall material except marble; will stand a heat temperature of 180° F. and will not freeze or crack due to cold weather. When the filler has been applied the hanger is pushed up tightly under tub rim and is fastened or hung to the partitions or walls. After the hanger is completely installed, the remaining space between tub and hanger is filled with Lucke Leakproof Filler up to and even with the tub rim. This renders edges of tub watertight.

The floor strip is turned up at right angles to act as a perfect seal at base of tub between apron of tub and the floor. The floor strip is perforated to key itself with the concrete. This strip is set back about 1 in. from apron of the tub and about ⅞ in. below the apron to allow the cement to be pushed back securely against the hanger under apron of tub. There should also be an allowance of about ⅞ in. between hanger and floor to allow the concrete to be applied both under and above the hanger so that hanger will be embedded in concrete, making an absolutely tight edge at bottom of tub and free from shrinkage. The installation of the hanger makes the tub a unit with the building, causing the tub and building to settle as one unit. The installation is simple. Complete instructions are furnished with every hanger.



Cross Section of Tub Hanger Installation

Showing method of preventing cracks and water seepage

Patented in U. S. and Canada

Strength As Demonstrated by Test

The hanger weighs 30 lb., is strong and durable, as evidenced by the following test made by the engineers of Armour Institute of Technology of Chicago:

"The end hangers only were used with three studs (2x4 in.) at each end. Total length of lip at each end 20 in. The end hangers were nailed to studs with four nails to each stud. Nails, length 1.5 in., diameter of head 0.40 in. Diameter of shank 0.190 in. Thickness of metal of hanger 0.105 in. Load applied to lip by beam on rod lying in lip.

"Lip started to bend at 7650 lb., or a load of 191 lb. per inch of length of lip. The maximum load was 8650 lb., or a load of 216 lb. per inch of length of lip. The lips bent. Vertical section buckled.

"With above set-up, using a porcelain tub, if tub weighs 1400 lb., water and bather 600 lb., the factor would be 4.3.

From this test it will be seen that hanger will easily support a weight of 5000 lb. or over.

The installation of a Lucke Hanger absolutely insulates all joints from water penetration and prevents that crack between tub and wall, which causes leaks when shampoo or shower is used. The hanger installation also eliminates ruined ceilings under the bathroom and prevents the joists from rotting away. It also eliminates all dirt, grease and other particles which may lodge in the cracks around the tub, giving the added feature of a perfect sanitary condition.

Sizes and Specifications

The tub hangers are adjustable from 4 to 6 ft. in length and from 30 to 33 in. in width; also made for tubs from 33 to 36 in. in width, and can be made for any special tub installations upon request.

The Lucke Hanger should be included in the Plumbing Specifications and should read: "All tubs or shower receptors shall be installed with Lucke Leakproof Tub Hangers as directed by Manufacturer."

Hangers are sold through the plumbing supply houses.

S. BLICKMAN, INC.

Manufacturers of Heavy Duty Sinks and Cooks' Tables

526-544 Gregory Avenue
WEEHAWKEN, N. J.

Products

HEAVY DUTY GALVANIZED KITCHEN SINKS.
MONEL METAL and STAINLESS STEEL SINKS.
VEGETABLE and POT SINKS.
HEAVY DUTY COOKS' TABLES.

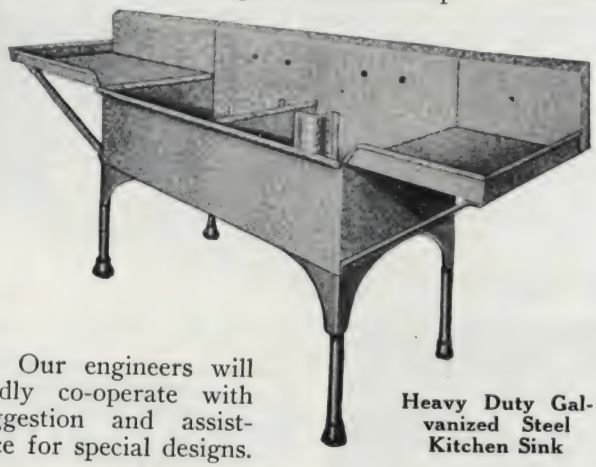
Also, Heavy Duty Pantry Sinks and Drainboards, made in Monel Metal and Stainless Steel.

Complete Food Service Equipment for Hospitals, Schools and Institutions.

For our page on Kitchen and Cafeteria Equipment, see Manufacturers' Index.

Organization and Services

The 41 years' experience in building kitchen equipment has placed S. BLICKMAN, INC. among the leaders in the industry. Their staff of planning and designing experts are constantly adding new and modern equipment which combines wear resisting qualities, sanitation, economy and expert workmanship.



Heavy Duty Galvanized Steel Kitchen Sink

Our engineers will gladly co-operate with suggestion and assistance for special designs.

Heavy Duty Kitchen Sinks

Blickman's Standard Heavy Duty Sinks feature the following construction:

Metal—Armco galvanized steel, or monel metal emery ground and brushed to bright satin finish.

Seams—All inside seams sweat-soldered, and heavy filet of solder smoothly finished is flushed into all seams, eliminating sharp corners and grease pockets. Minimum amount of rivets visible.

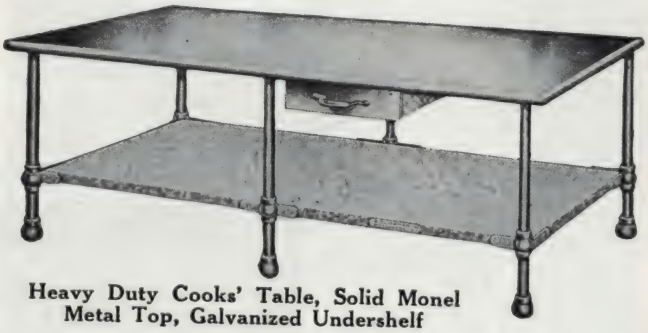
Seamless Sinks—Constructed of No. 10 gauge full pickeled steel and thoroughly hot galvanized after fabrication.

Drain Outlets—The 1½-in. drain outlets fitted with sliding strainer eliminate clogging. Sink bottoms pitch toward outlet, assuring complete drainage.

Roll Rims—Unless otherwise specified, front has large sanitary, roll rim, integral with body of sink. Side and partition edges fitted with U-shaped galvanized steel members.

Drainboards—Drainboards 3½ ft. long and over are attached to sinks with heavy channel steel brackets. Drainboards 4 ft. long and over are supported on heavy pipe legs.

Leg Supports—Sanitary heavy wrought iron pipe legs, securely riveted on heavy galvanized steel corner braces in a way to eliminate visible means of support.

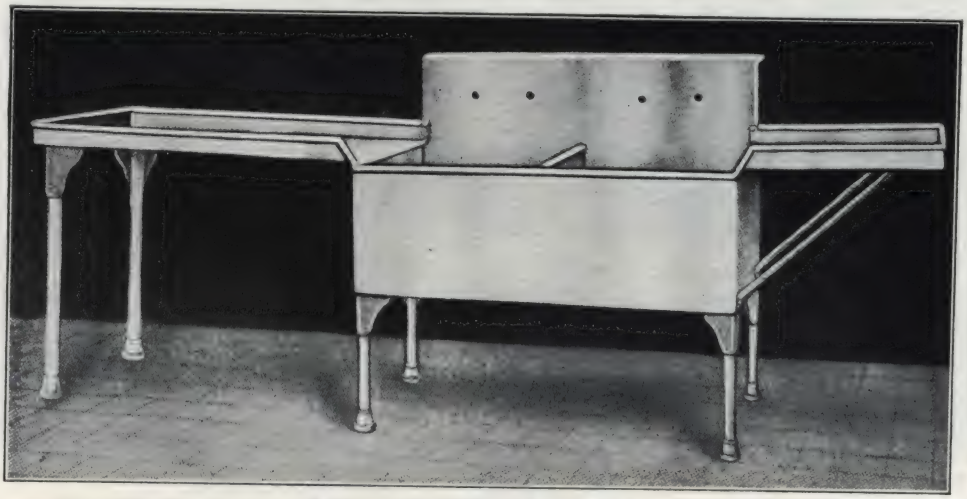


Heavy Duty Cooks' Table, Solid Monel Metal Top, Galvanized Undershelf

Cooks' Tables

S. BLICKMAN, INC. specialize in the manufacture of heavy duty cooks' tables with galvanized steel, polished steel or monel metal tops or undershelves.

Tables are furnished in any gauge metal desired, in the open, semi-enclosed, enclosed, or in combination table and dish heater types.



Heavy Duty Monel Metal Sink

No. KT Heavy Duty Cooks' Table

This heavy duty cooks' table, illustrated above, is furnished with Nos. 12 or 14 gauge solid monel metal top, 2-in. full curved roll rim, corners mitered and welded. Shelf of No. 14 gauge galvanized steel, attached to legs with heavy cast shelf brackets. Legs of 1⅝ in. diam. steel pipe. Galvanized drawer, 20x20x4 in. Front of drawer faced with heavy monel metal and has white metal handle. Legs and fittings gray duco brushed enamel. Made 24, 30, or 36-in. widths. Height 34 in.

Catalogue

Catalogue "G," with complete listing of kitchen sinks and cooking equipment, mailed upon request.

THE CONOVER COMPANY

140 South Dearborn Street, CHICAGO, ILL.

DISTRICT OFFICES

101 Park Avenue (Architects Bldg.)
NEW YORK, N. Y.

1700 Walnut Street
PHILADELPHIA, PA.

115 Chauncy Street
BOSTON, MASS.

THE CONOVER ELECTRIC DISHWASHER SINK

For Residences and Apartments

Conover Dishwashers

THE CONOVER COMPANY specializes in the manufacture of household electric dishwashers, and has been a pioneer in the development of practical electric dishwashers for the home. Besides the electric dishwasher sinks described here and sold exclusively through the plumbing trade, THE CONOVER COMPANY manufactures portable electric dishwashers which are sold exclusively through the electrical trade.

Endorsement

All Conover models are approved by Good Housekeeping Institute and Delineator Home Institute.

Distinctive Features

Interchangeability—The Conover Electric Dishwasher Sink requires no special roughing; connects with trap at regular height, and is interchangeable with the regular kitchen sink. Ideal for either new or old buildings.

Capacity—The ingenious design of the upper and lower dishracks and large tank make possible once-a-day dishwashing for many Conover users. Holds 55 pieces of china and glassware plus silverware.

Flexibility—Stemware and deep dishes and platters can be washed easily and thoroughly in this dishwasher, as can the smaller and more regularly shaped dishes.

Compactness—Requires about the same floor space as a sink of corresponding size without the dishwasher feature.

Rubber-plated Dishracks—Insure quiet operation and avoid chipping of dishes. Finest of china can be handled more safely than in soapy, slippery suds.

Sliding Drainboard Top of Chrome Alloy Stainless Steel—Gives use of drainboard at all times, makes loading easier, requires less handling of dishes. Retains luster.

Self-cleansing—Dishwasher requires no hand cleansing.

Operation

Principles—The Conover dishwashing unit is the impeller type. The elements of the dishwashing job are: Abrasion, by millions of globules of softened soapy water thrown against the dishes with great force by the impeller; the melting of greases and dissolving of sugars by hot water; and the removal of food particles floated off in the soap emulsion.

Ease—The Conover Electric Dishwasher Sink is easily operated. The flexible rubber-plated dishracks are easily loaded. The water is measured automatically and softened as it flows into the dishwasher. Two tablespoonfuls of ordinary soap flakes and a teaspoonful of water softener are used, producing a creamy suds. The dishes are washed for five minutes in hot soapsuds. Soiled water is drained at the turn of a lever and then dishes are rinsed for one minute with softened hot water and for one minute with clear hot water. The dishes are then so hot that they dry almost immediately when the cover is opened.

DESCRIPTION OF PARTS

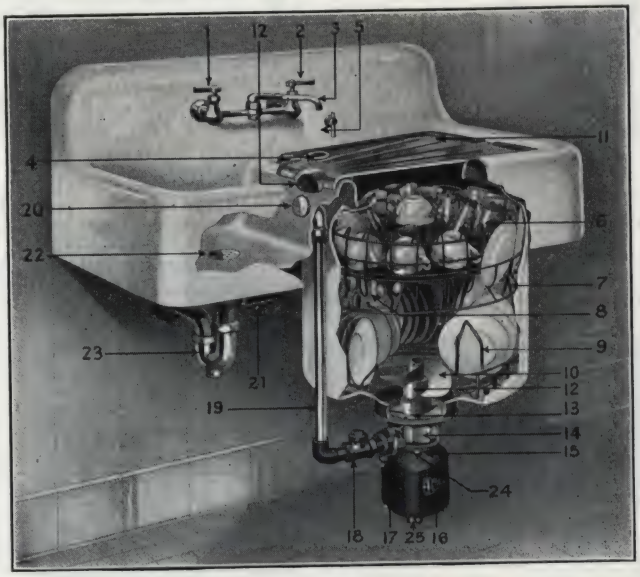


Diagram and Schedule

(1) *Hot Water Control* on sink mixer faucet.

(2) *Cold Water Control* on sink mixer faucet.

(3) *9-in. swing spout* for use at the sink and for filling the dishwasher.

(4) *Ventilator and Water Inlet* to dishwasher tank for adding water softener and water for washing and rinsing through the drainboard in the closed position.

(5) *Drain Valve Control Lever* to open and close drain valve when emptying wash and rinse water.

(6) *Rubber-plated Cup and Glass Rack.*

(7) *Rubber-plated Upper Dishrack* for small flat dishes, such as: bread and butter plates or tea saucers.

(8) *Silver Rack* for supporting the silverware in a vertical position. Easily removed and loaded.

(9) *Rubber-plated Lower Dishrack* for large dishes, such as: soup plates, dinner plates, salad plates, sauce dishes, etc.

(10) *Aluminum Bronze Impeller* rotating at 1725 r.p.m., picking up hot sudsy water and throwing it over the fronts and the backs of the dishes. Direct drive, non-leakable unit, no gears or belts to require service.

(11) *Movable Drainboard* of highly polished chrome alloy, stainless steel. Easy to keep clean—retains luster. Acts as cover for dishwasher as well as work space on the sink.

(12) *Overflow Measuring Device* which automatically controls the amount of water used for the washing and rinsing operations, the excess water being pumped out of the dishwasher tank into the sink.

(13) *Drain Holes* through which the dishwasher tank is drained when the drain lever, No. 5, is turned to the open position.

(14) *Rotary Centrifugal Ejector* directly connected to the driving unit and emptying the wash and rinse waters from the dishwasher tank.

(15) *Rubber Cushions* between motor and tank for the prevention of noise.

(16) *¼ Hp. Motor* for driving impeller and ejector. When ordering specify current, volts, and cycles required.

(17) *Emergency Drain Plug.*

(18) *Horizontal Check Valve* prevents the waste water from sink backing into dishwasher. Permits the flow of water from the dishwasher into the sink only.

(19) *Chrome Plated Vertical Drain Tube.*

(20) *Outlet Cover* of Chrome Alloy Stainless Steel to prevent water splashing when being discharged into the sink.

(21) *Motor Toggle Switch* (meets Underwriters' requirements).

(22) *Ordinary Sink Strainer.*

(23) *Ordinary Sink Trap.*

(24) *Oil Hole for Upper Motor Bearing.*

(25) *Oil Hole for Lower Motor Bearing.*

Continued on next page

DESCRIPTION OF MODELS

Options—All models are furnished with the dishwasher unit on either the right or left side as one faces the sink. The letter R denotes dishwasher is at the right; L denotes dishwasher at left.

SD-501 (R or L)—Size 43¼x25 in. Apron sink with 8-in. back, 8-in. front and nominal 8-in. sink. A single chrome alloy, stainless steel sliding drainboard is also top for dishwasher. Weight, ready to hang, 335 lb.

SD-502 (R or L)—Size 43x25 in. Flat rim sink for built-in cabinet or tile installation. A single chrome alloy, stainless steel sliding drainboard is also top for dishwasher. Weight, ready to hang, 215 lb.

SD-503 (R or L)—Size 61x25 in. Apron sink with 8-in. back, 8-in. front and nominal 8-in. sink. Two drainboards—one stationary enamel, and one chrome alloy, stainless steel sliding drainboard which is also the top for dishwasher. Weight, ready to hang, 460 lb.

SD-504—Size 26x24. Flat-rim style individual dishwasher unit. Hinged enamel top. Weight ready to hang, 178 lb. (Not illustrated.)

SD-505—Size 26x24. Apron style individual dishwasher unit. 6-in. front apron, 8-in. back apron. Hinged enamel top. Weight, ready to hang, 193 lb. (Not illustrated.)

Faucet, trap and strainer standard equipment on all models.

SPECIFICATIONS

Finish—All models are furnished in regular or acid-resisting vitreous enamel in white, green, ivory or blue.

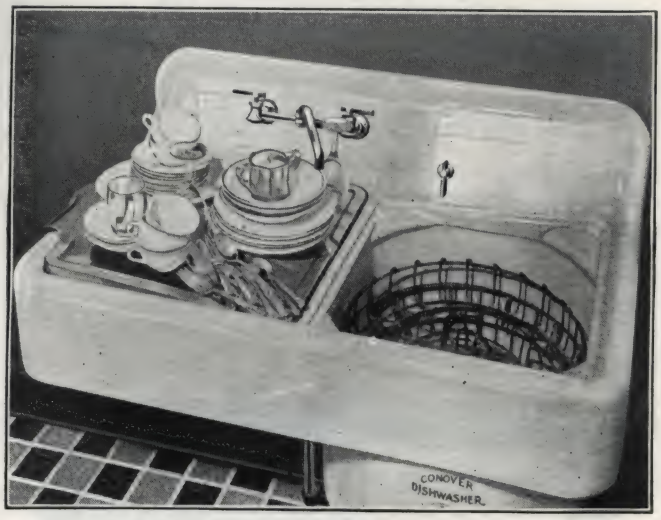
Drainboard — Sliding drainboard top over dishwasher on all sink and dishwasher combinations is made of highly polished chrome-alloy, stainless steel, and will match chrome fittings.

Motor—Is a ¼ hp. reactor type split phase motor manufactured by General Electric Co. The starting load is less than 15 amperes. This motor meets the utilities companies' requirements for starting loads for fractional horse-power motors. Wiring is completely intact on machine with outlet box and cord to plug into wall socket under the sink. BX can be attached directly to outlet box under sink by your electrician after the sink is hung if this is a local requirement. Architect should specify current available for each job.

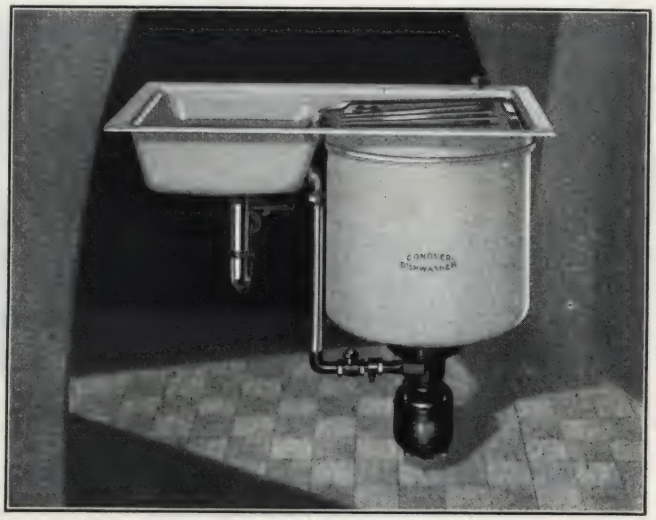
DIMENSIONS IN INCHES

Model	Length, in.	Width, in.	Size of metal drainboard, in.	Tank diameter, in.	Sink size, in.	Sink depth, in.	Back, in.	Front, in.
SD501	43¼	25	19x19½	21	17x20½	7½	8	8
SD502	43	25	19x19½	21	17x20½	7½	flat rim	flat rim
SD503	61	25	19x19½*	21	17x20½	7½	8	8

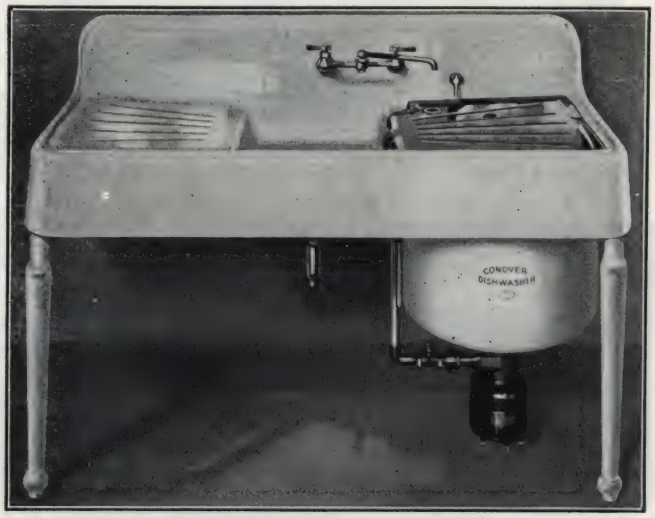
*Model SD503 also has a stationary enamel drainboard 18x19½ in.



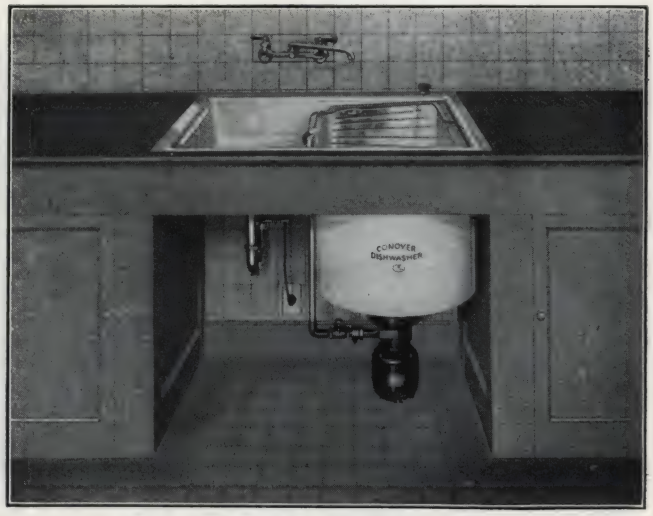
Model SD501R. Single Drainboard Model
Sliding drainboard provides working space at all times



Model SD502R. Flat Rim Style
Before mounting ready for building into tile or metal top cabinets



Model SD503R. Double Drainboard
An enamel drainboard in addition to sliding drainboard top



Model SD502R. Typical Installation
With cabinets and tile drainboard

THE D. A. EBINGER SANITARY MFG. CO.

Manufacturers of "Ebco" Dish Washing Sinks

COLUMBUS, OHIO

Product

"Ebco" Dish Washing Sinks.

For "Ebco" Steel Enclosures for Toilet, Dressing and Shower Rooms, Wash Sinks and Sanitary Drinking Fountains, see Manufacturers' Index.

"Ebco" Dish Washing Sink

Washing dishes, preparing fruits, vegetables and meats and numerous other kitchen duties are not the tedious, tiresome tasks when performed with the aid of the built-in dish pan of the "Ebco" Kitchen Sink. Beautiful in design and an assortment of colors: nile green, canary yellow, light blue, old ivory, gray, black and white, durable vitreous enamel or "Ebco" acid resisting enamel. Duo strainer, twin waste combination and wire drain basket complete an ensemble of utility features unsurpassed in any other kitchen sink.

"Ebco" Three-compartment Sink

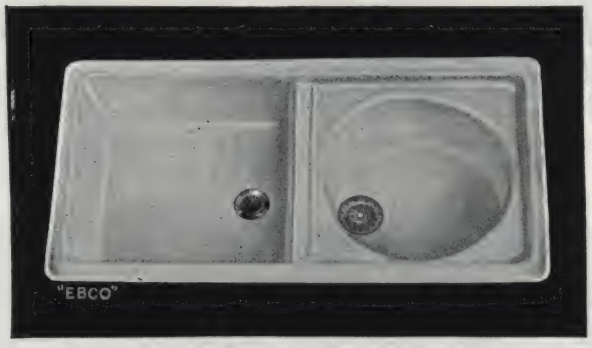
Model L-165 drainboard on the left.
Model R-166 drainboard on the right.
Equipped with Duo lift-up waste combination. Obtainable with or without adjustable legs

Dimensions—Length 60 in., width 23 in., height of back 8 in. Dish-washing compartment, 8½ in. deep. Draining compartment, 17½x18 in., 8 in. deep. Drainboard width 17½ in., length 19 in.

View of Model L-163

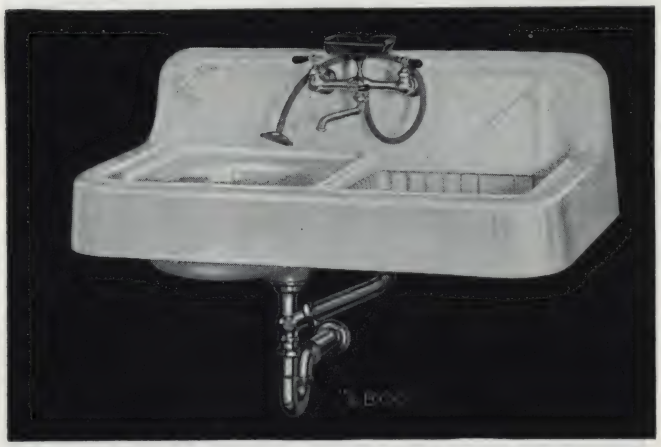
The model pictured above, L-163, is equipped with a special pop-up Duo waste combination. The waste strainer is removable for easy cleaning and to prevent clogging. Note safety overflow feature in the dividing wall between round and square compartment; it is below level of sink rim. Models with backs are obtainable with or without legs and with right or left dish pan.

A two-compartment "Ebco" Dishwashing Sink especially designed for tiled-in kitchen and kitchen cabinets. Finished in high grade vitreous enamel, white or colors. Also furnished with "Ebco" acid resisting enamel if desired. Equipment includes twin waste combination No. 111 and draining basket No. 105 for LR-141 and No. 104 for LR-131. Equipped with lift waste.



"Ebco" Flat Rim Model

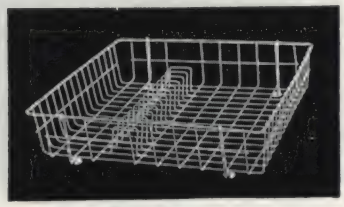
Model LR-141 Size 39¼x20⅛ in.
Model LR-131 Size 30x18 in.



"Ebco" Two-compartment Sink

Model L-151 round compartment at left.
Model R-152 round compartment at right.
Furnished with or without legs and in white or colors. Equipped with lift waste

Duo Strainer Twin Waste Combination
With lift plug No. 111



Draining Basket
Fits square compartment of sink

THE INTERNATIONAL NICKEL COMPANY, INC.

Monel Metal and Nickel and Allied Products

EXECUTIVE OFFICES
67 Wall Street
NEW YORK, N. Y.

MINES AND SMELTER: Copper Cliff, Ont., Canada
ROLLING MILL AND REFINERY: Huntington, W. Va.
REFINERY: Port Colborne, Ont., Canada
FOUNDRY: Bayonne, N. J.

For Our Other Products, see Manufacturers' Index

Products

MONEL METAL—available from stocks conveniently located throughout the country and made in all commercial forms required by manufacturers of household sinks. (See Manufacturers' Index, our section on Metals, for commercial forms and location of warehouses.) All necessary accessories, such as nuts, bolts, screws, rivets, etc., are also available.

INCO MONEL METAL
TRADE-MARK

Monel Metal

Monel Metal is a registered trade-mark applied to a technically controlled nickel-copper alloy of high nickel content. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

Advantages of Monel Metal for Household Sinks

(1) Absolutely rustproof.
(2) Resists corrosion by food juices and fruit acids.
(3) Strong as steel; tougher than steel.
(4) Easy to clean; therefore sanitary.
(5) Beautiful appearance; has color of platinum.
(6) Harmonizes with any color scheme.
(7) Easily fabricated.

Instructions for Specifying Monel Metal Sinks

It is necessary only to submit the dimensions of the space into which the sink is to fit. If a special design is desired, a drawing or blue print is necessary. For special instructions desired by some metal sink manufacturers, see their pages included in this section.

Sources of Supply

Custom-built Monel Metal sinks are *not* made by THE INTERNATIONAL NICKEL CO., INC. Plumbers and plumbing supply jobbers will furnish Monel Metal sinks. Manufacturers of metal sinks will also furnish quotations; turn to their pages included in this section. Additional manufacturers' names will be furnished upon request.

Features of Monel Metal Custom-built Sinks

Constructed of time-tested Monel Metal. (For over 20 years Monel Metal has been used by architects for food service equipment in hotels, hospitals and restaurants.)

Can be made to suit individual taste and fit unusual corners or spaces. (A decided advantage to the architect and the home owner.)

Household dishwashers can be readily incorporated in a Monel Metal Sink.

Drawers can be built into the aprons and the drainboards continued into the cabinet or work tops giving a greater area of working surface.

The elimination of the dishpan is possible as the bowls can be made deep enough to hold a large number of dishes and the resiliency of the metal prevents dish breakage.

Waste outlets of different makes can be used with Monel Metal sinks.

Types—For Kitchen and Pantry

Kitchen sinks are subjected to heavy duty service and should be ruggedly constructed. See recommendations for gauges and finishes below.

Pantry sinks are for light duty service, the washing of silverware, fine china and glassware. Manufacturers specializing in this type of sink often use light gauge Monel Metal sheet backed with wood or other metal. The cushion-effect thus formed minimizes chipping and breakage. Sinks of this type are often made with two bowls, one for washing and one for rinsing.

Gauges and Finishes Recommended

Kitchen Sinks—A gauge no lighter than No. 16 USS (.062) should always be used for this type of sink in order to withstand the abuse that it may receive. A satin finish (Inco No. 8) is recommended for the kitchen sink and, in fact, for all working surfaces. This finish closely resembles a buffed pewter and the cleaning with abrasive household cleansers, coupled with the regular day to day use adds to the lustre of the original finish—it actually looks better after several years of service than the day it was installed.

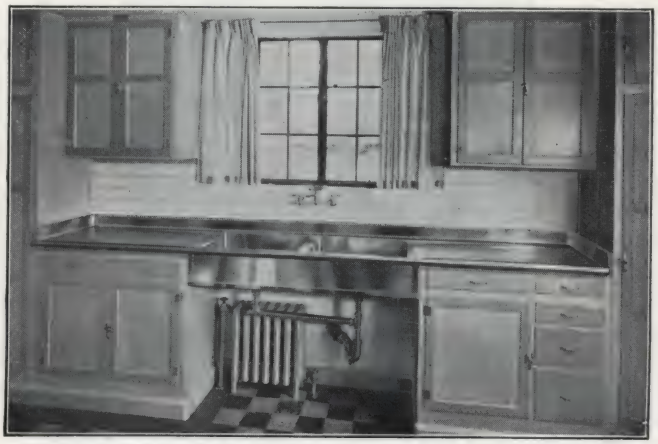
Pantry Sinks—Gauges as light as No. 24 USS (.025) give very satisfactory service. It is necessary, however, to support metal of this gauge with a backing of wood or other metal. The satin finish (Inco No. 8) is recommended although some prefer the highly reflective mirror finish (Inco No. 5).

Available Publications

"Planning the Modern Kitchen"—A booklet of modern kitchen floor plans and Monel Metal sink illustrations.

"Monel Metal in the Kitchen and Pantry"—A pamphlet which includes a model kitchen layout as suggested by the Good Housekeeping Institute.

Arrangement of Monel Metal Kitchen Sink and Cabinet
Note the continuous Monel Metal working surface



Kitchen Sink Made of Heavy Gauge Monel Metal
Note the fluted drain boards on either side of double bowls

GENERAL PORCELAIN ENAMELING & MFG. CO.

Porcelain Enameled Steel Drainboards and Combined Tops and Sinks

OFFICE AND FACTORY

4135 Parker Avenue, CHICAGO, ILL.

Products

VERIBRITE PORCELAIN ENAMELED DRAINBOARDS.

VERIBRITE ONE-PIECE PORCELAIN ENAMELED STEEL TOPS with Rectangular or Round Sinks.

SPECIAL SIZE TABLE TOPS.

Where Veribrite Products Are Used

Wherever truly sanitary conditions in the kitchen are desired, Veribrite Porcelain Enameled Sink Tops and Drainboards are being extensively used. In kitchens of large or small apartments, apartment hotels, and in the better class residences Veribrite products provide the absolute cleanliness and bright shining appearance which make for positive sanitation.

Their fireproof qualities, together with flexibility which is adaptable to practically any space, as well as the beautiful finish in a variety of colors, are further advantages which commend them to architects and owners.

Veribrite Drainboards

Veribrite Porcelain Enameled Drainboards are made of one piece of Armco ingot iron beautifully porcelain enameled in white or colors. They can be furnished in any size required, either right or left, and for use with or without a shelf. Height of back and end can be any size up to 15 in. and can be varied to suit the conditions.

The diagram and suggestions on the opposite page make specifying and ordering easy.

40 East Oak Street Apartments
Chicago, Ill.

MAURICE L. BEIN, Architect
DRY FAST CO., Kitchen Equipment
76 round sink tops have been installed in this building

Manufacturers Now Using Veribrite Products

The following well-known manufacturing organizations have put the stamp of approval on Veribrite Products by incorporating them as a standard part of their equipment:

Coppes Bros. & Zook, Inc., Nappanee, Ind.
Circle A Products Corp., New Castle, Ind.
R. Cooper Jr. Inc. (General Electric Co.), Chicago, Ill.
Dry Fast Company, Chicago, Ill.
Elgin Stove & Oven Co., Elgin, Ill.
Gibson Refrigerator Co. (L. V. Whitney), Chicago, Ill.
Gurney Refrigerator Co., Fond du Lac, Wis.
Ranney Refrigerator Co. (Frank H. Johnson & Sons), Chicago, Ill.
Rhinelander Refrigerator Co., Rhinelander, Wis.
Rockford Steel Furniture Co., Rockford, Ill.
Stover Co. (Frigidaire), Chicago, Ill.
Wasmuth-Endicott Co., Andrews, Ind.
White Door Bed Co., New York, N. Y.
McDougall Co., Frankfort, Ind.

Group of Apartments, Philadelphia, Pa.

KARL F. OTTO, Architect
COPPES BROS. & ZOOK, INC., Kitchen Equipment
In this group of apartments 276 Veribrite rectangular sink tops are used

A-33843 Right Drainboard

Made to fit any size refrigerator or cabinet top. Construction shown has 2-in. back and end. Lip which extends over rolled rim of sink is 2½ in. and can be changed to suit special conditions

B-33843 Left Drainboard

Made to fit any size refrigerator or cabinet top. Construction shown has 10-in. back and 1-in. end. Can be made with 10, 12 or 14-in. backs and ends to suit individual conditions

Continued on next page

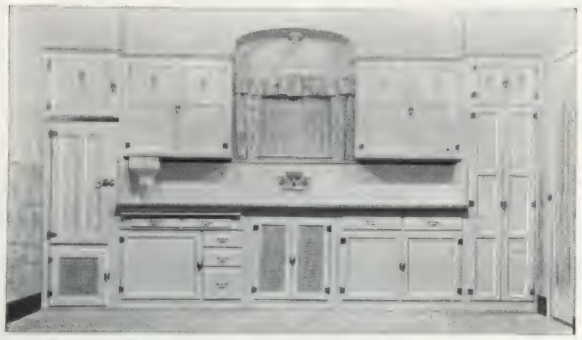
Veribrite Combination Tops and Sinks (Patents Pending)

Veribrite One-piece Tops and Sinks are made of heavy Armco enameling iron and are enameled in one piece regardless of size or location of drain. They are impervious to odor and moisture absorption and are easily maintained in a bright, sanitary condition.

These combined sinks and tops can be furnished in any size and quantity. Any color scheme in the kitchen may be followed as they can be furnished enameled in the desired color, with contrasting color on the edges.

The tops have a depression of 3/8 to 1/2 in. (not shown in the accompanying illustrations), with the raised offset edge on the front. The faucet holes in the back splashers may be located in any position required.

The diagram and suggestions below will assist in specifying or ordering.

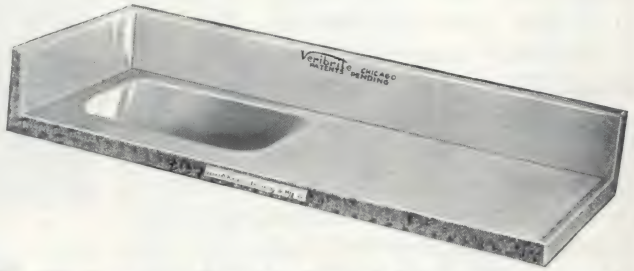


No. 300 One-piece Porcelain Enameled Top with Rectangular Sink

Showing a typical installation for homes. Tops can be made up to 123 in. long with back and both end splashers. If without end splashers, 117 in. is maximum length. Location of sink may be specified as desired. The rectangular sinks are made in the sizes listed below

No. 300-A One-piece Porcelain Enameled Top with Rectangular Sink

Showing top with 12x18-in. rectangular sink in center with 12-in. back and both end splashers

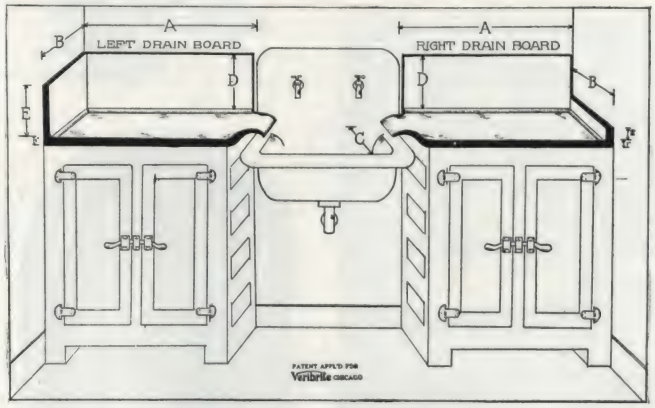


No. 300 One-piece Porcelain Enameled Top with Rectangular Sink

Showing top made with 12x18-in. rectangular sink at left end with 6-in. back and left end splasher

Suggestions for Specifying or Ordering

The diagrams and information given below are for assisting in specifying or ordering Veribrite Drainboards and Combined Drain Tops and Sinks. The dimensions indicated are necessary for the proper installation of these products and should be given in specifications or drawings furnished to the contractor or installer. The combination drain tops and sinks are furnished with 18-in. round sinks and 12x18, 14x22 or 18x28 rectangular sinks placed parallel or at right angles to the front line of the top.

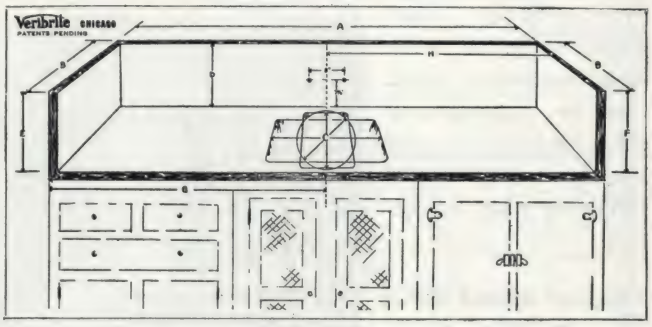


Porcelain Enameled Drainboard

For kitchens of all sizes

(A) Distance from outside edge of sink to side wall.
(B) Distance from front of ice box to back wall.
(C) Size of sink used (16, 18 or 20 in.).
(D) Height of back splasher.
(E) Height of end splasher. (This end is always made 1 in. high unless specified differently.)

Note: All drain boards are provided with two holes in the front flange, which can be used for wood screws to fasten to the ice box if desired. In all installations of this kind care should be taken to see that the sink is hung 1 in. below the top of the ice box. This will provide for the rolled lip on the drainboard. All sizes of our drainboards are made of one piece of 16 or 18-gauge armco enameling stock. They can be made flat if desired, i.e., without a back or end splasher



Porcelain Enameled Top and Sink

For kitchens of all sizes

(A) Extreme width of top (maximum, 123 in.).
(B) Extreme depth of top (minimum, 17 in.).
(C) Width of sink (18 in. dia. round) (12x18, 14x22, or 18x28 in. rectangular).
(C) Depth of sink.
Drain connection for all sinks is in center. All sink openings are 1½ in. from back splasher unless otherwise specified.
State type of strainer to be used whether regular or Standard Dual K878.
(D) Height of back splasher.
(E) Height of left end splasher.
(F) Height of right end splasher.
(G) Distance from extreme left edge of top to center of sink.
(H) Distance from extreme right edge of top to center of faucet holes and number of holes.
State colors in which top and edges are to be enameled.
D, E, F splasher back and ends may vary in height if desired. If back only is used, 10 in. is maximum height. If splashers are not required please specify as Flat Tops. Faucet holes may be changed to suit conditions. Shaded flange is 1¾ in. wide all around. Holes in front or end flanges may be arranged as desired. Cabinet under sink must provide at least as much clearance for bowl of sink as size specified

JOHN TRAGESER STEAM COPPER WORKS

ESTABLISHED 1850

Metal Products

MASPETH, LONG ISLAND, NEW YORK, N. Y.

Products

WHITE METAL and MONEL METAL PANTRY SINKS and DRAINBOARDS.

MONEL METAL DRINKING FOUNTAINS.

Also Copper and Steel Hot Water Storage Tanks and Range Boilers.

Metal Flower Sink

Trageser white metal or monel metal flower sink, Plate T114, with a drain ledge 10 in. wide and a box back 9 in. high with a 4-in. shelf covered and sheathed with metal. White metal concealed combination supply fixture with ½-in. compression supply valves, swinging spout with removable spray, china indexed handles, open standing waste and overflow with beehive strainer coupling and tailpiece for 1½-in. cast brass P trap, 2-in. metal legs and supports to wall.

Plate T114

Double Pantry Sink and Drainboard

In Combination with Electric Dishwasher—Plate T128 shows a special combination with single drainboard for use in connection with electric dishwashers.

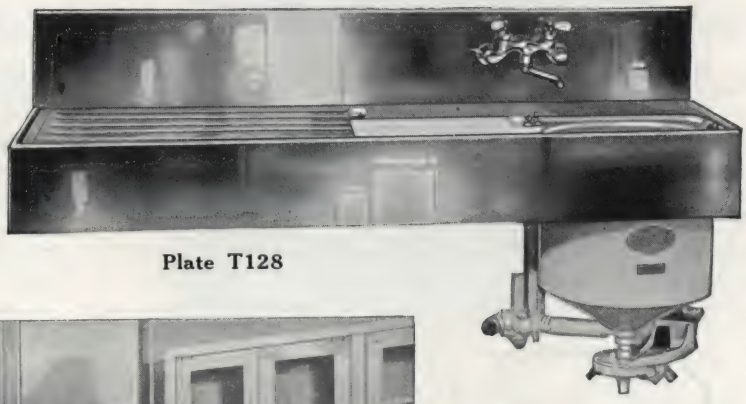


Plate T128

Plate T102—Double pantry sinks and drainboards, Plate T102, made of white metal or monel metal. Can be furnished to suit conditions. See the drawing on the following page for details.

Plate T102

Trageser Monel Metal Drinking Fountain

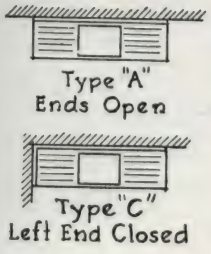
Illustrated by Plate T131. Furnished with bubbler if desired.

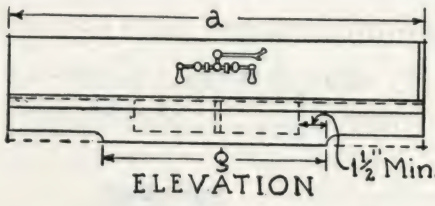
Plate T131

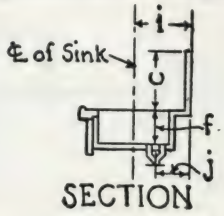
Catalogue

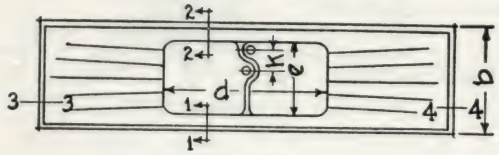
Catalogue T, on pantry sinks with illustrations of several types, will be sent on request.

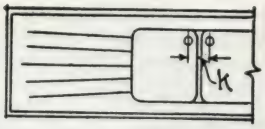
Continued on next page









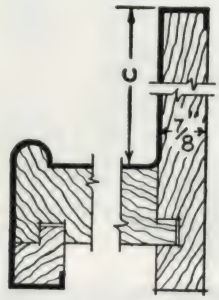


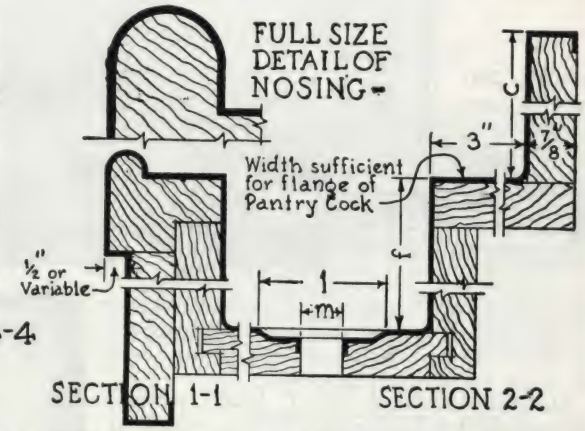
INFORMATION REQUIRED WHEN ORDERING

Letters below are keyed up to drawings.

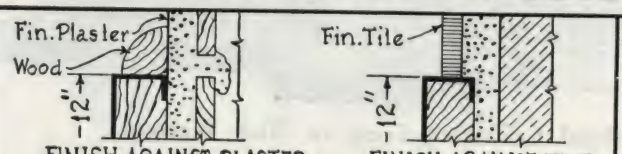
Details are standard and sinks are made to any required dimensions.

a-Length over all.
b-Width over all.
c-Height of back.
d-Length of sink.
e-Width of sink.
f-Depth of sink.
g-Length of apron.
h-"S" or straight partition.
i-Center of sink to wall.
j-Center to center of twin waste.
k-Center to center of twin waste.
l-Diameter of waste plug flange.
m-Diameter of waste plug tail-piece.

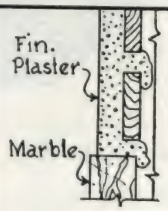


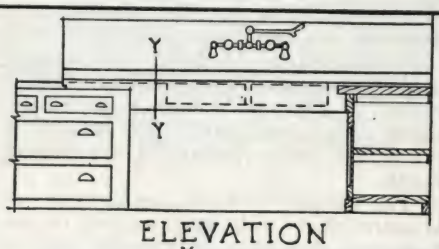


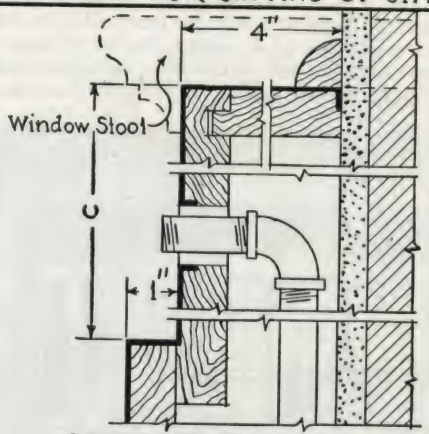
STANDARD DETAILS OF DOUBLE PANTRY SINK & DRAINBOARD

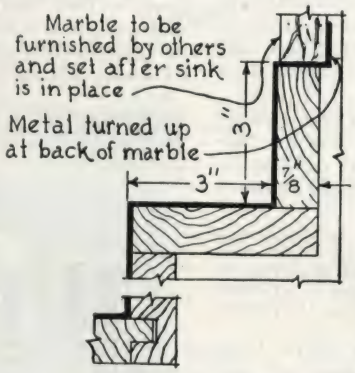


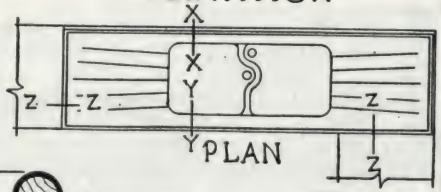
DETAILS FOR SETTING OF STANDARD BACK

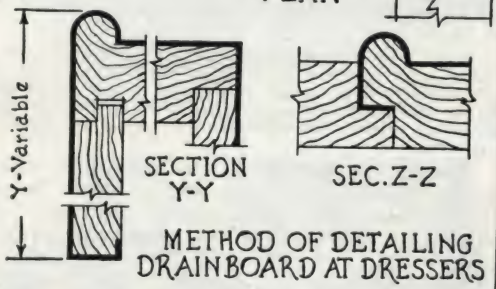












SUGGESTIONS FOR DETAILING OF SPECIAL SINKS TO MEET VARIOUS CONDITIONS

DETAILS OF STANDARD AND SPECIAL TRAGESER SINKS AND DRAINBOARDS

SCALE: F.S. ½", 3" EQUALS 1-0
DATE-JULY 27
DRWG 1

ZAHNER MANUFACTURING CO.

Manufacturers of All-metal Sinks

1213-1215 Walnut Street, KANSAS CITY, MO.

DISTRIBUTED THROUGH PLUMBING SUPPLY JOBBERS

Products

ALL-METAL KITCHEN and PANTRY SINKS—99% pure solid nickel; also of monel metal or Allegheny metal (no wood backing).

METAL CABINETS.

For our page on Shower Bath Doors, see Manufacturers' Index.

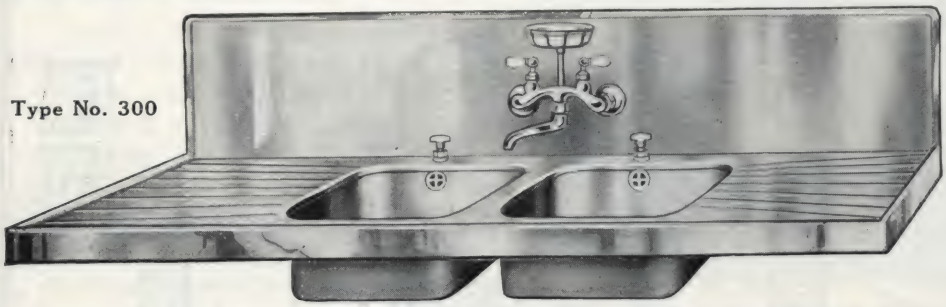
ZAHNER KANSAS CITY U.S.A. IS FOR QUALITY

TRADE-MARK

All-metal Sinks

Advantages—The metal drainboards and basins have a distinct advantage over other types of sinks in that they are cushioned and do eliminate breakage and chipping of fine china and crystal. No dishpan is required since the basins are of the most convenient size and shape for washing purposes.

Type No. 300



Material—Material is of heavy polished monel metal, 99% pure solid nickel or Allegheny metal. All stainless metals. Non-corrosive and everlasting.

Note: Specify whether sink wanted is to be of monel metal, 99% pure solid nickel or Allegheny metal.

Construction—All sinks are supported on rigidly constructed rectangular angle iron frames at sides and ends with cross angle braces under drainboards and between bowls. Over angle frames are heavy galvanized reinforcing plates for drainboards.

The bottoms of bowls are likewise reinforced with heavy galvanized plates. No wood backing or supports are used, thus eliminating shrinkage or warpage and deterioration in construction. Pop-up wastes, overflows, faucets, legs and brackets are of nickel plated brass. May be had chromium finish; if so wanted, so specify.

Drainboards and Splashbacks—Drainboards and splashbacks are made of one piece of metal. Drainage ribs are substituted for the customary grooves to facilitate ease of cleaning and rapidity of drainage. The entire drainboard pitches toward the basin.

Note: Any sink may be obtained with right, left, or both ends with splasher to fit in corner or between walls. Splashbacks may be arranged with flanges to turn up back of wall tile or may be eliminated entirely to take tile splashback if desired. They may also be constructed to accommodate piping between the splashback and the face of the wall. If required, so specify.

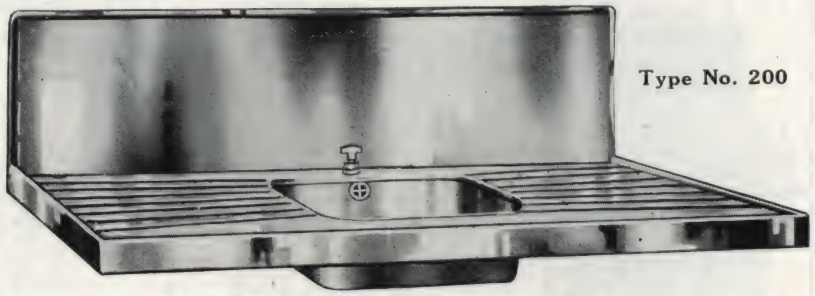
Basins or Bowls—Basins are made with extra large rounded vertical re-entrant angle. Basin bottoms are specially formed for quick positive drainage. All joints at drainboards and bottoms are locked and sweated tight with solder.

Standard Sizes—Any type, 6, 7, 8, 9, 10 and 12 ft. long x 24 in. (may be had any special size). All bowls for single-bowl sinks are 18x24x7 in. All bowls for two-bowl sinks are 15x18x7 in. All splash backs for type Nos. 200, 300, 400, 500, 550 and 600 are 12 in. high and lay flat against wall; for types Nos. 420, 440, 460, 480, 620, 640 and 660, are 8 in. high. All aprons are 8 in. except on Type Nos. 200 and 300 which are built to set over cabinets. Splashers or aprons may be had any size to fit any requirements.

Type Nos. 200 and 300 are used where it is desired to have cabinets under (see detail on next page). May be had any special size to meet any requirement.

Wood Cabinets—For Types No. 200 and No. 300 sinks, build cabinets the customary way but without any tops or obstructions for bowls, and 1 in. less in depth than sink specified. For a 36 in. over-all working height build cabinets 34⅜ in. high. Sink apron overlaps cabinets ⅝ in.

Catalogue and Blue Prints—Catalogue showing other types of sinks for kitchens, pantries, recreation rooms, hospitals, domestic science, scullery, etc.; also detailed blue prints, showing roughing-in measurements, etc., of any size, standard or special, sent on request. Our Service Department is yours without obligation.



Type No. 200

Metal Cabinets—Food or Dish Warmers

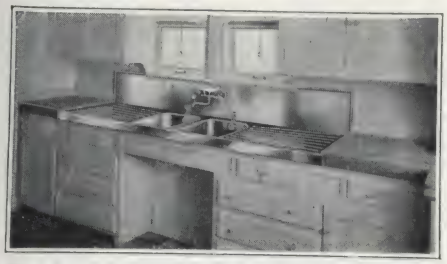
Metal cabinets are obtainable from us on special order, to fit under any sink made by us. May be had with any number or arrangement of drawers or doors, and with built-in sections for food, or plate warmers with electric units to heat. May be had with only prime coat; or a finished job, any solid color of lacquer, or any color porcelain enamel fronts with nickel or monel trim, or made entirely of pure nickel, monel or Allegheny metal.

Zahner All-metal Sink

This shows Type No. 300—11-ft. unit, with 12-in. back and end splashers. Sets securely on cabinets, no trouble to install. Zahner Sinks are for the modern kitchen and pantry. Specify them

Continued on next page

Standard No. 300 Sink for Kitchen Use
7 ft. long. Wood cabinet by others



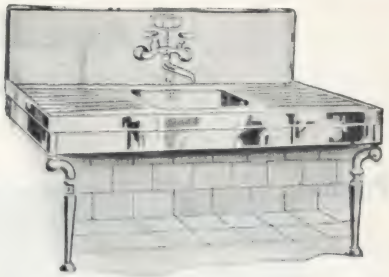
Standard No. 300 Sink with 3-in. Thick Maple Cutting Blocks at Each End
8 ft. long. Wood cabinets by others

We build into any of our sinks, and to your order, Kohler, Standard Sanitary, Walker, or most any make of dishwashing machine.

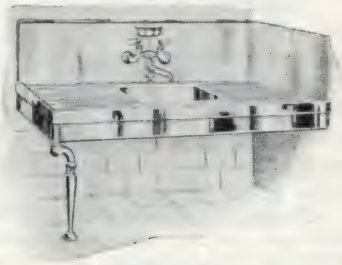
Outlet valves: No. 3 is standard equipment. Nos. 4 and 5 are furnished only when specified.

All sinks, whether standard or special, built for quick and easy installation.

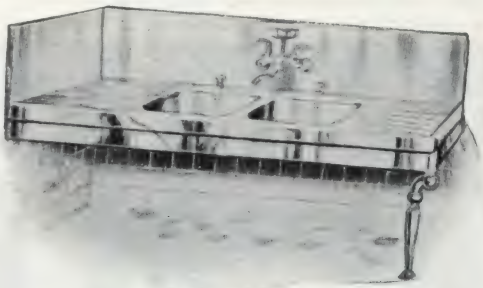
Send for our complete catalogue.



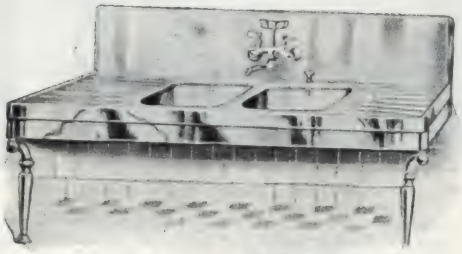
No. 500



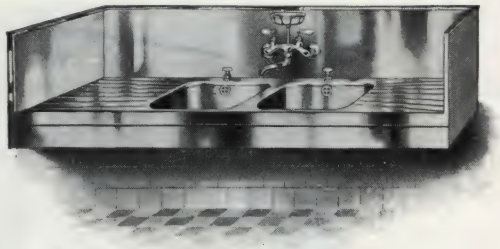
No. 550



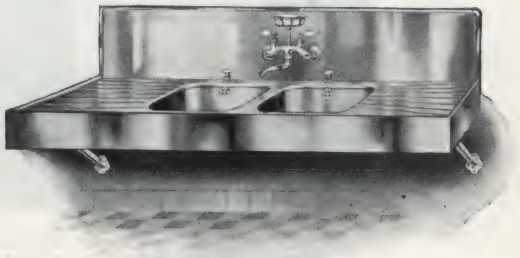
No. 650



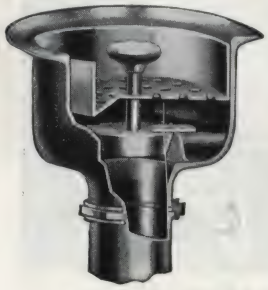
No. 600



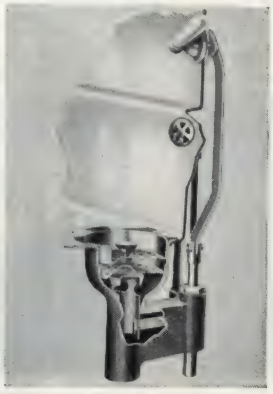
No. 640



No. 400

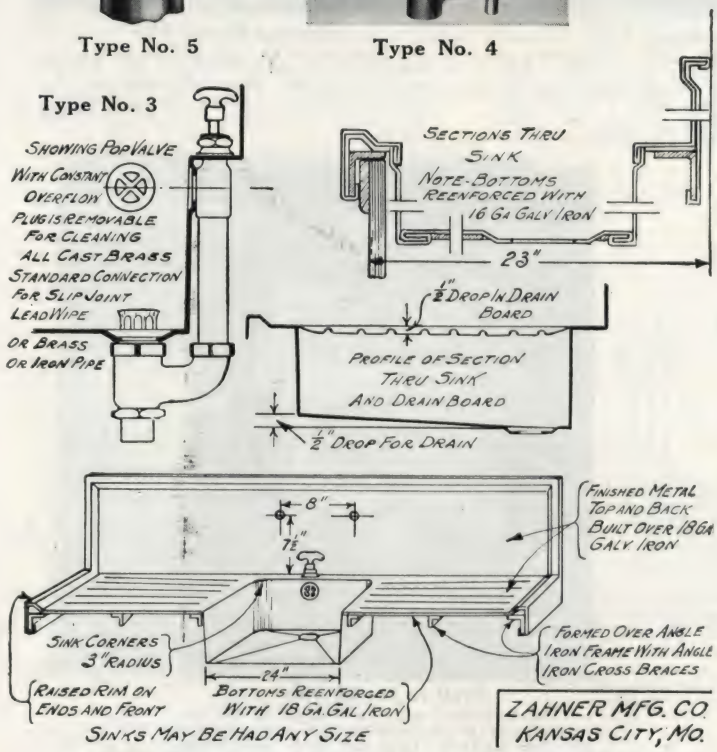


Type No. 5



Type No. 4

Type No. 3



Detail Showing Construction of Drains, Bowls and Valves

WALKER DISHWASHER CORPORATION

Manufacturers of Walker Dishwashers and Electric Sinks

1024 South Waller Avenue, CHICAGO, ILL.

Products

WALKER ELECTRIC DISHWASHERS.
WALKER ELECTRIC DISHWASHER-SINKS.

Walker Electric Dishwasher

Endorsed by thousands of enthusiastic users, gives the architect an unusual opportunity to satisfy the growing demand for colorful and drudgery-free kitchens.

The Walker washes, rinses and dries the dishes with a single handling. It may be used for pots and pans, glassware, silverware, and kitchen utensils, as well as the finest china.

Operation—The dishes are placed in rubber-coated racks which are quickly and easily loaded. The racks and dishes remain stationary during the entire process.

The water action is created by a small dasher which revolves on 60 cycle current at 1750 r.p.m. Only 1 gal. of water is required for washing a complete loading of dishes, and an equal quantity for the rinse. However, the dasher action is so designed that the equivalent of 500 gal. of hot water is circulated through the dishes every minute. The amount of water to be used is controlled by a patented overflow valve which automatically takes care of any surplus.

An outstanding feature of the Walker is its absolute simplicity. There are no pumps, gears, stuffing-boxes, or sprays to get out of order or require service. The dasher, attached directly to the drive shaft of a General Electric motor, is the only moving part.

Construction—All models are built of highest grade porcelain enameled iron and steel, in white or color. They are designed for beauty and permanence as well as the highest efficiency. Many new refinements such as a leak-proof dasher shaft and automatic overflow valve add greatly to the ease and cleanliness of operation.

Capacity—All machines have the same capacity—ample for a family of six or more people.

Features

Absolute Simplicity—Only one moving part outside of the motor.

Self-cleansing—Porcelain bowl and racks are washed with the dishes and kept permanently clean.

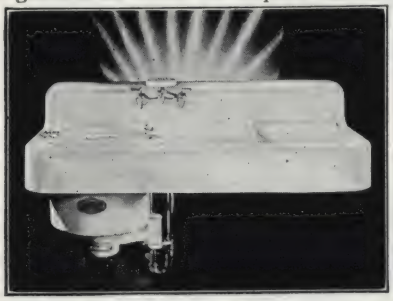
Greatest of Time-savers—Saves more actual time than all other household labor-savers put together.

Sanitary—Doctors approve it because it washes and rinses in water far hotter than the hands can stand. Only in this way can bacteria be destroyed.

Models for Every Need—Walker's leadership makes possible a large variety of models for every requirement, for either new or old homes or apartments.

Installation—All Walker models can be roughed-in through the floor or wall with ½-in. supply and 1½-in. drain tubing. Faucets and traps are not regularly supplied, but can be furnished if desired.

An electrical outlet can be provided in the wall or baseboard conveniently near the dishwasher.



Walker Model 112

Standard combination unit for better class homes and apartments. Design follows the most recent trend with 8-in. apron, sink and back. Supplied with dishwasher on right or left-hand. Dimensions over all 61½ in. by 24 in.

Walker Model 114

Same size sink and dishwasher as model 112 but without drainboard. Flat top on dishwasher compartment may be used as practical work space. Dishwasher on right or left side, as required. 8-in. apron, sink and back. Dimensions over all 43½ in. by 24 in.

Walker Model 108

Flat rim to be built in flush with drainboards of glazed or rubber tile, ash or other material. Especially desirable for colorful kitchens. Dishwasher on right or left side. Dimensions over all 45 in. by 23 in.

Walker Model 107

Another flat rim model for building in with separate flat rim sink. Particularly suitable for monel metal or german silver installations. Same capacity as the other models. Dimensions over all 22½ in. deep by 22 in. wide

Walker Model 106

An individual machine with all of the features found in the dishwashing compartments of other models. Designed to be plumbed-in near kitchen sink or in butler's pantry. Dimensions over all 24 in. by 24 in.

THE D. A. EBINGER SANITARY MFG. CO.

Manufacturers of "Ebco" Wash Sinks

COLUMBUS, OHIO

Product

"Ebco" Circular Wash Sink.

For "Ebco" Steel Enclosures for Toilet, Dressing and Shower Rooms, Dish Washing Sinks and Sanitary Drinking Fountains, see Manufacturers' Index.

"Ebco" Circular Wash Sink

Conserves Floor Space—Space in factories is valuable. The circular wash sink requires considerably less space than the rectangular sink or individual basins. It reduces washing time because it is conveniently accessible from all sides.

Individual Control and Conserves Water—Each spray head is controlled by a valve integral with the spray which results in water economy, as only the actual users are being supplied. The total flow of water is only ½ gal. per minute through each spray. The concentrated spray insures a real wash.

Automatic Pressure Regulation and Temperature Control—The combination shown is typical of the water control apparatus on all "Ebco" models. Automatic pressure control insures uniform flow with one or ten users. The temperature control is simple and dependable. Removable strainers stop all foreign material. Check valves positively prevent circulation between hot and cold lines. These features are included on "Ebco" models.

Complete Washup Possible without Splash—The individual spray heads are 8½ in. above the rim of the receptor, permitting the users to wash their heads and shoulders without difficulty, and without splash or water drip to the floor. The extra deep receptor, 10 in., the automatic pressure control and general shape of the receptor insures a non-splash fixture.

Finish and Equipment—The receptor, column and pedestal are vitreous enameled in white or colors. Soap tray and liquid soap container finished in black vitreous enamel. All fittings of highest grade red brass chrome plated; 2-in. trap is galvanized. Water tempering valve (when specified); check valves and strainers for both hot and cold supplies and automatic pressure regulating valves are standard equipment on all models.

"Ebco" Semi-circular

For narrow washrooms, halls or other limited spaces. 60-in. width for 6 persons. 36-in. width for 3 persons. Individual spray heads, temperature control, automatic pressure regulation same as on all full round "Ebco" models

Model D-245 White Vitreous Enameled
Model D-245 G Gray Vitreous Enameled

Without liquid soap container.

Model D-255 is similar but includes liquid soap container and soap valves

Model D-251

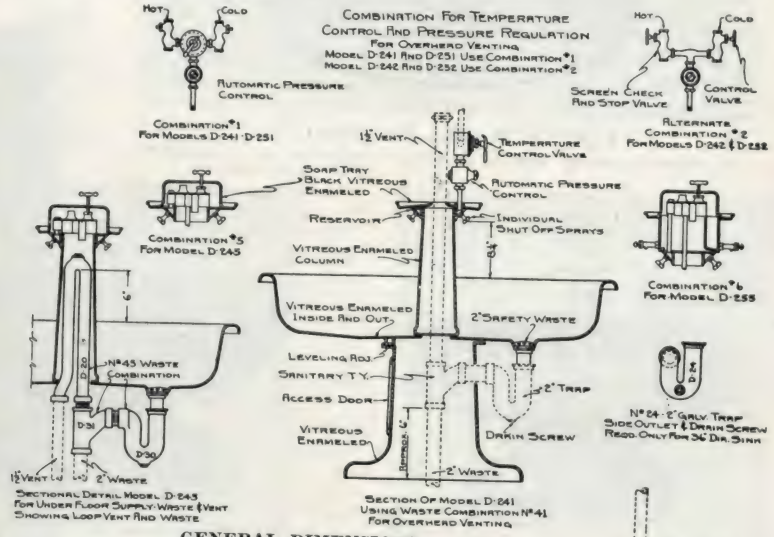
Similar to D-241 but includes liquid soap container and soap valves

Model D-241

Patented, December 2, 1924, April 6, 1926. Other patents pending.

For overhead supplies and overhead vent.

This model does not have liquid soap container



GENERAL DIMENSIONS

Persons	Diam. receptor, in.	Diam. base, in.	Depth receptor, in.
6	36	22	8
8	48	27	10
10	54	27	10

Height, floor to top receptor, 30 in.

Note: Special height for juveniles, 24 in., on order.

BRADLEY WASHFOUNTAIN CO.

Manufacturers of Fixtures for Group Washing

2209 Michigan Street
MILWAUKEE, WIS.

REPRESENTATIVES IN ALL PRINCIPAL CITIES IN THE UNITED STATES AND CANADA

Products

Diversified line of Equipment for Group Washing, including BRADLEY WASHFOUNTAINS, BRADLEY GROUP SHOWERS, etc.

Catalogues

Complete descriptive literature, prices, measurements and installation data furnished on request.

Bradley Washfountains

Where Bradley Washfountains Are Used—The great gain in popularity of group washing with Bradley Washfountains has led to their adoption by 59 railroad systems, 74 leading printing establishments, manufacturing plants of every kind, steel mills, foundries, bakeries, airports, department stores, public utilities, schools, asylums—in fact, wherever there are groups of people to be served.

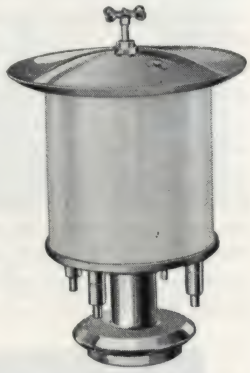
Type "A" Bradley Washfountain
Particularly popular because all piping connections are concealed

Construction and Materials—Each type of Bradley Washfountain may be had in any of the following materials: Granito, Standard Marmorite, Tinted Marmorite. *Marmorite* is a marble composition with all the durable and beautiful qualities of genuine marble. *Granito* is basically a non-porous highly abrasive stone product of a practical color, attractive in appearance. Bradley Washfountains may also be obtained in high grade porcelain, enameled iron, and *vitreous* stoneware, proof against all commercial acids except hydrofluoric. A thermostatic mixer can be used with any Bradley Washfountain.

A Modern Washroom Equipped with Type "B" Bradley Washfountains and with Steel Lockers Grouped About Each Washfountain

Durability of Finish—Made of materials of a homogeneous nature, with no thin exterior surface finish to chip or crack, the Bradley Washfountain after years of usage and continuous cleaning retains its original attractive finish.

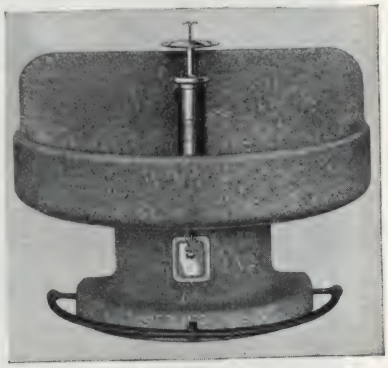
Soap Fixture—The cake soap tray, heavy brass chromium plated, is standard equipment. The newly developed liquid soap dispenser illustrated is the push-up type, furnished with opaque glass container while all metal parts are brass chromium plated.



New Bradley Liquid Soap Dispenser with All-brass, Chromium Plated Fittings

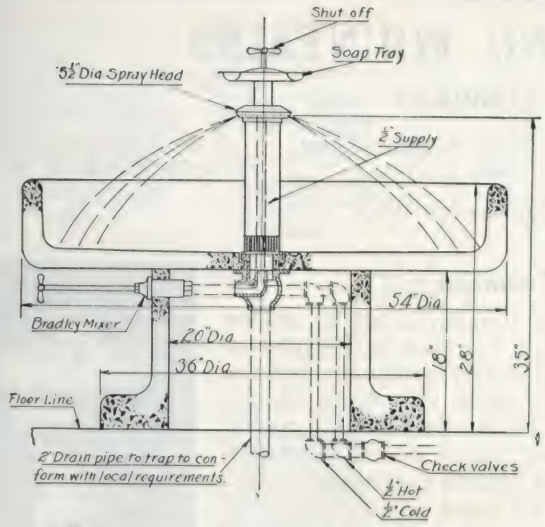
Type "O" Bradley Washfountain
Vent connections from below and supply from above, with mixer valve as illustrated. A very popular type because of low installation cost. Frequently specified when washroom remodeling is in progress

Type "D" Bradley Washfountain
Foot control of water flow assures maximum water economy. Type "D" incorporates all advantages of Type "A" with added feature of foot control of water flow. Mixer valve located in pedestal is readily accessible



Type "F" Bradley Washfountain
Designed for narrow or irregular washrooms, and has the advantage of foot control of water flow. Supplies made through wall or floor in 54-in. diameter fountain; through wall only in 32-in. diameter size. Placement of mixer valve dependent on supplies

Continued on next page



Typical Roughing-in Drawing for a 54-in. Type "A" Washfountain

Illustrating simplicity of design, ease of installation and placement of drain at *center* of bowl. Check valves may be placed at any convenient and accessible location in the lines

In Enameled Iron

Several styles of Washfountains are available but in the 54-in. size only

Porcelain

This style Washfountain is available in all standard sizes and colors

Type "A" Bradley Washfountain

Advantages—***Economy of Water Consumption***—Accommodating a group of users at one time, the amount of water used is but slightly in excess of that required by a single person washing at an individual lavatory.

Floor Space Economy—The circular and semi-circular Bradleys permit a flexible arrangement and saving in floor space amounting to approximately 25%.

Saving in Maintenance—The *single* Bradley sprayhead, and *one* central drain, compared with the twenty faucets and ten drains of ten individual lavatories, offers striking proof of Bradley economy of maintenance.

Reduction of Janitor Expense—The self-flushing bowl, with its *central* drain, made of materials impervious to the action of grease or alkali, can be kept clean and sanitary with a minimum of janitor expense.

Cleaner Washrooms—Water from the sprayhead is delivered in such a position above the bowl that, in washing, each person leans downward a trifle, thus no water drips off elbows to the floor.

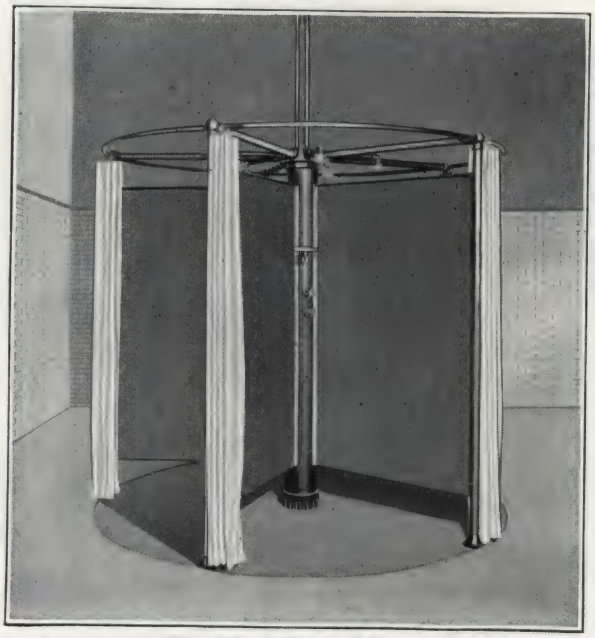
Sanitary—Like the shower bath—clean running water for each person insures maximum sanitary washing facilities.

Service to Architects—There is a Bradley Washfountain for every type of washroom. Detailed roughing-in information and drawings are furnished upon request. Experienced Bradley Engineers are well equipped to co-operate, if desired, in the arrangement and installation of the most satisfactory washroom layout. The simplicity of the Bradley Washfountain installation makes it particularly adaptable in cases of remodeling and necessitates a minimum of plumbing connections in regular installations.

Bradley Group Shower

Where Group Showers Are Used—The Bradley Group Shower, accommodating five users at one time, is adapted for use in industrial establishments, institutions, etc. Junior Model, 71-in. diameter, particularly popular for schools.

New Features—***Erection***—The Bradley Group Showe furnished completely piped, ready for connection to supply and drain lines, is easy to erect and may be installed on any floor pitched slightly to carry off water.



Five Can Wash at Once

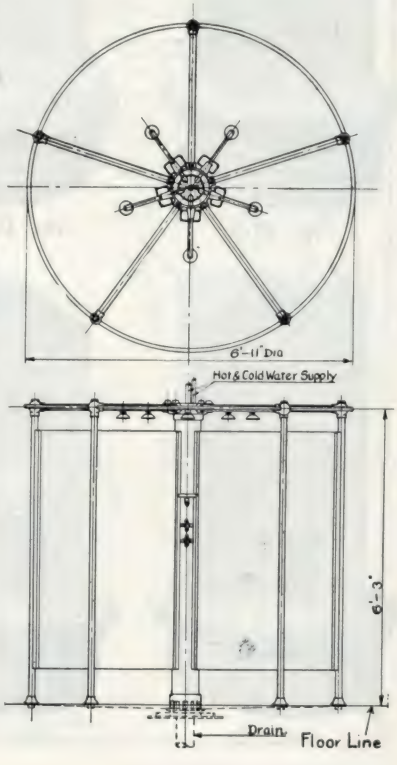
Mixing Chamber—The Bradley mixing chamber furnishes tempered water to users, acting independently of other showers. Water may be tempered to any desired degree at any pressure, thus effecting a considerable saving of water.

Shower Head — The new type Bradley shower head is provided with a monel metal wire screen as a protection against clogging. Due to its design, the shower head is economical in water consumption.

Construction and Materials — Standard partitions are made of heavy gauge, pickled, cold rolled steel. Partitions of non-ferrous materials available on special order at additional cost. Soap trays, mixing valves, and shower heads of brass chromium plated.

Entire shower (excepting chromium plated parts) lacquered in attractive cactus green color. Special colors can be furnished at additional cost.

Shower regularly furnished with white duck curtains; without curtains an allowance will be made.



BATCHELDER DRINKING FOUNTAINS

BATCHELDER-WILSON COMPANY

2633 Artesian Street
LOS ANGELES, CALIF.

557 Market Street
SAN FRANCISCO, CALIF.

38 South Dearborn Street
CHICAGO, ILL.

101 Park Avenue
NEW YORK, N. Y.

For Batchelder Tiles refer to Manufacturers' Index

No. 1050-X

Batchelder Drinking Fountains

Construction—Batchelder Drinking Fountains are of glazed terra cotta, two-piece construction. Each fountain is designed to make use of a definite plumbing fitting clearly designated by the manufacturer's name. All openings are made exactly as shown. Modifications to fit special requirements can be done only on special order. Questions pertaining to plumbing requirements should be studied carefully and orders should be by definite catalogue number. We furnish no plumbing fittings nor do we quote on anything other than the terra cotta members. If these facts are kept in mind it will avoid misunderstandings.

Color—Color is Patina glaze, fired to high temperatures. We generally advise choice of one of four different colors: ivory, tan, gray-blue, or green. These colors appear to harmonize with a large number of decorative schemes. The color selected represents the general over-all tone of the fountain, with subordinate touches of other color in the modeling.

Under no circumstances do we attempt to reproduce designs, colors or glazes of other manufacturers.

We are glad to send glazed samples showing our suggestion for a color scheme to harmonize with any material.

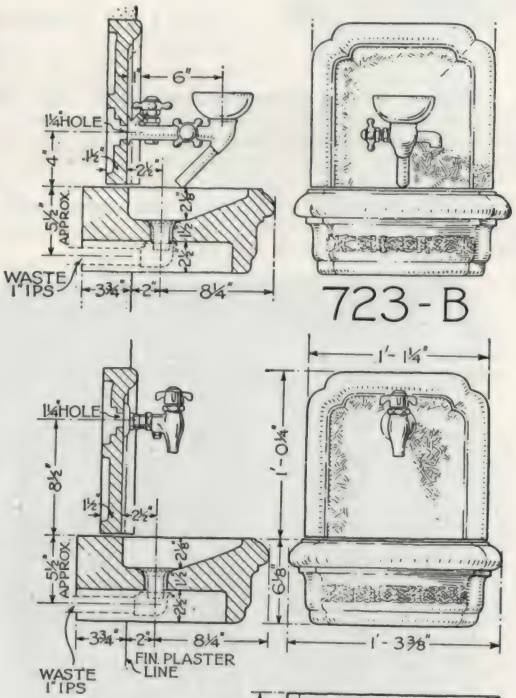
No. 809-AX

No. 62-X

No. 1053-B

No. 723-B

No. 723-F



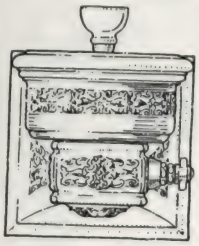
No. 152

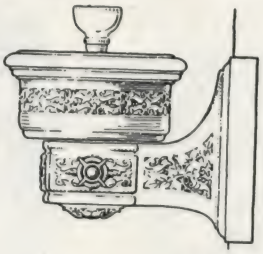
No. 726-B

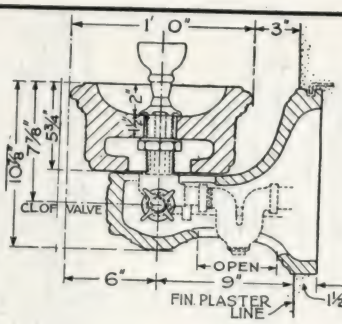
DES. NO. 723-B	BUBBLER CRANE CO. C 9462-A	WASTE CRANE CO. BSK-821
DES. NO. 723-F	FAUCET STANDARD MFG. CO. K-868	WASTE CRANE CO. BSK-821

Details of No. 723-B and No. 723-F Drinking Fountains

Continued on next page



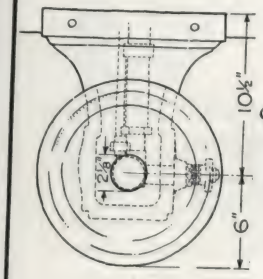


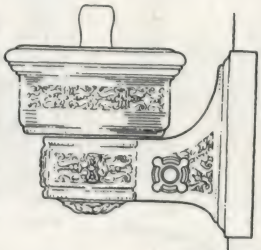


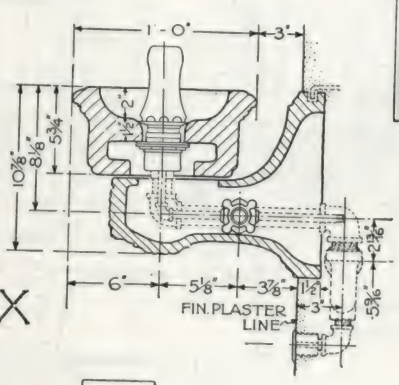
810

810

NOTE:-WALL FOUNTAINS SHOULD BE BEDDED IN SOLID MASONRY CONSTRUCTION OR ADEQUATE PROVISION SHOULD BE MADE OTHERWISE TO SUPPORT THEM.

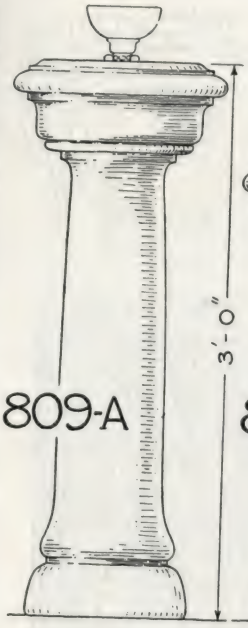




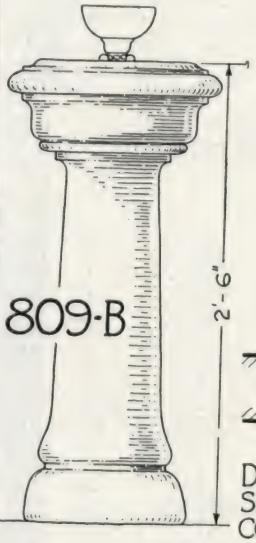


810-X

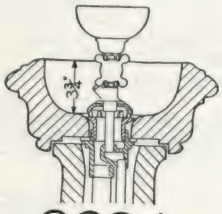
NOTE:-DESIGNS SHOULD BE REFERRED TO BY NUMBER AND LETTER ~ ORDERS SHOULD SPECIFY COLOR.



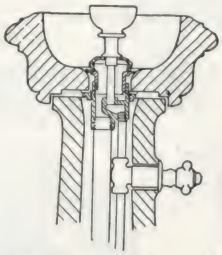
809-A



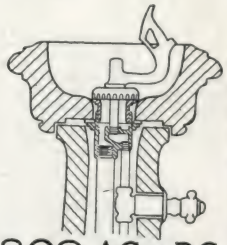
809-B



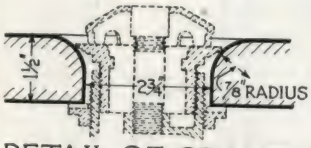
809-A
809-B



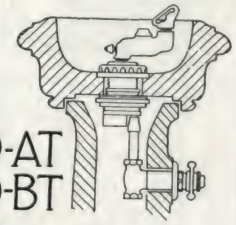
809-AX
809-BX



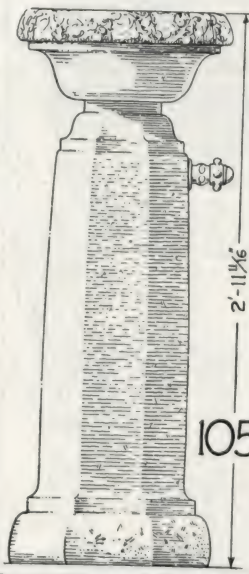
809-ACorBC



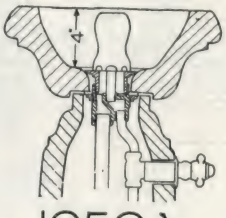
DETAIL OF CRANE CO. SUPPLY AND WASTE FITTING COMBINED ¼ FULL SIZE



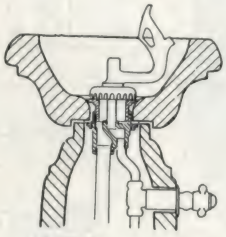
809-AT
809-BT



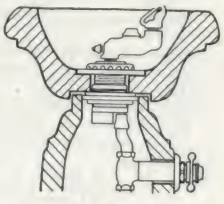
1050-X



1050-X

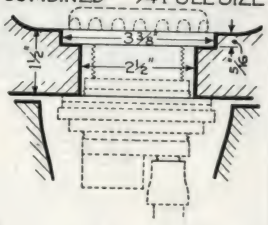


1050-C



1050-T

DETAIL OF HALSEY W. TAYLOR CO. SUPPLY AND WASTE FITTING COMBINED ¼ FULL SIZE



DES. NO.	BUBBLER		SUPPLY AND WASTE
810	STANDARD MFG., CO.	K-823	SOP-1039-A
810-X	CRANE CO.	C-9500	ASK 623-B
809-A	CRANE CO.	C-9516	ASK - 623-B
809-B	CRANE CO.	C-9516	ASK - 850
809-AX	CRANE CO.	C-9506	ASK - 850
809-BX	CRANE CO.	C-9506	ASK - 850
809-AC	CRANE CO.	C-9530	ASK - 850
809-BC	CRANE CO.	C-9530	
809-AT	HALSEY W. TAYLOR CO.	592	
809-BT	HALSEY W. TAYLOR CO.	592	
1050-X	CRANE CO.	C-9500	HSK - 749
1050-C	CRANE CO.	C-9530	HSK - 749
1050-T	HALSEY W. TAYLOR CO.	592	

NOTE:-WE FURNISH NO PLUMBING FITTINGS - OUR DESIGN NUMBERS REFER TO TWO PIECE TERRA COTTA FOUNTAIN ONLY

DETAILS OF BATCHELDER DRINKING FOUNTAINS

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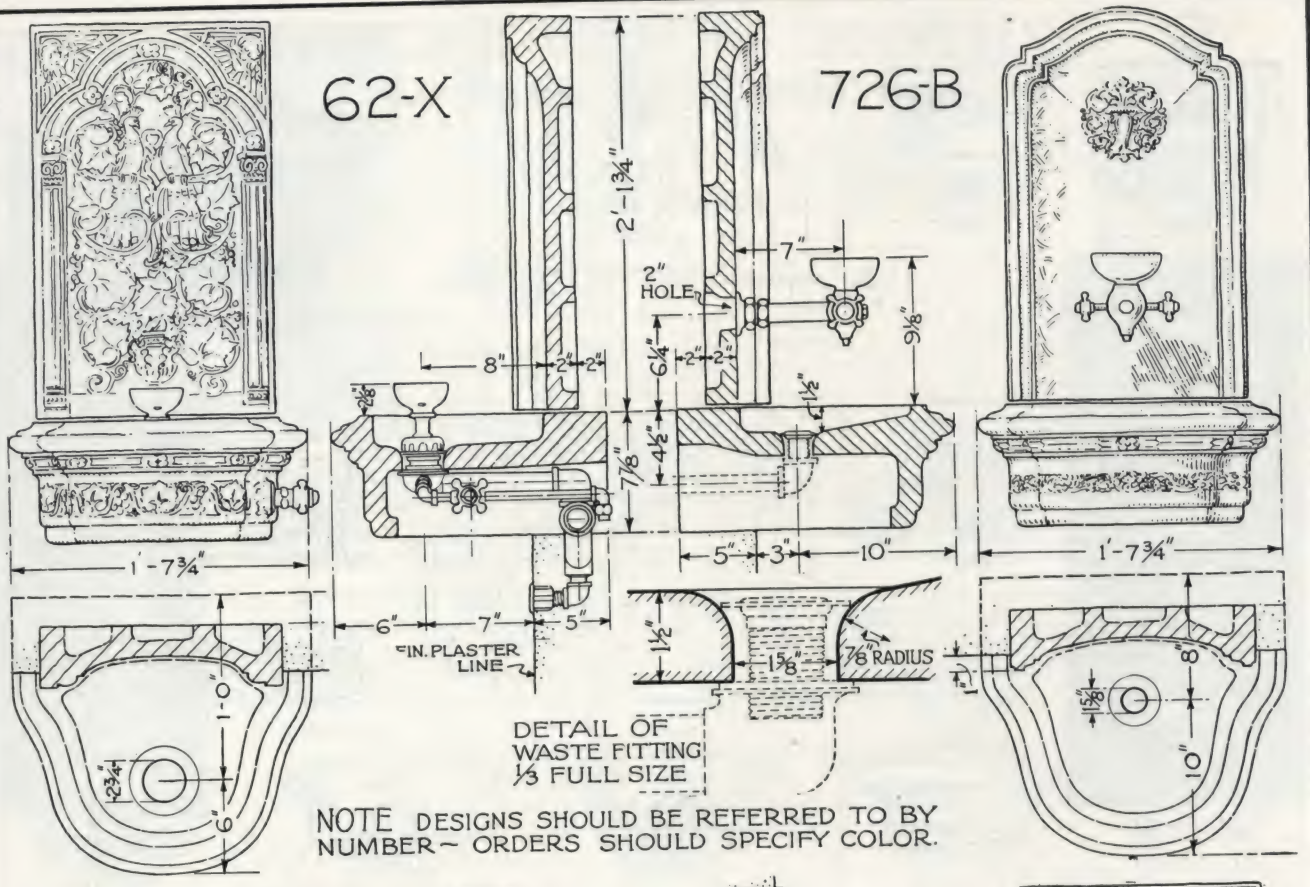
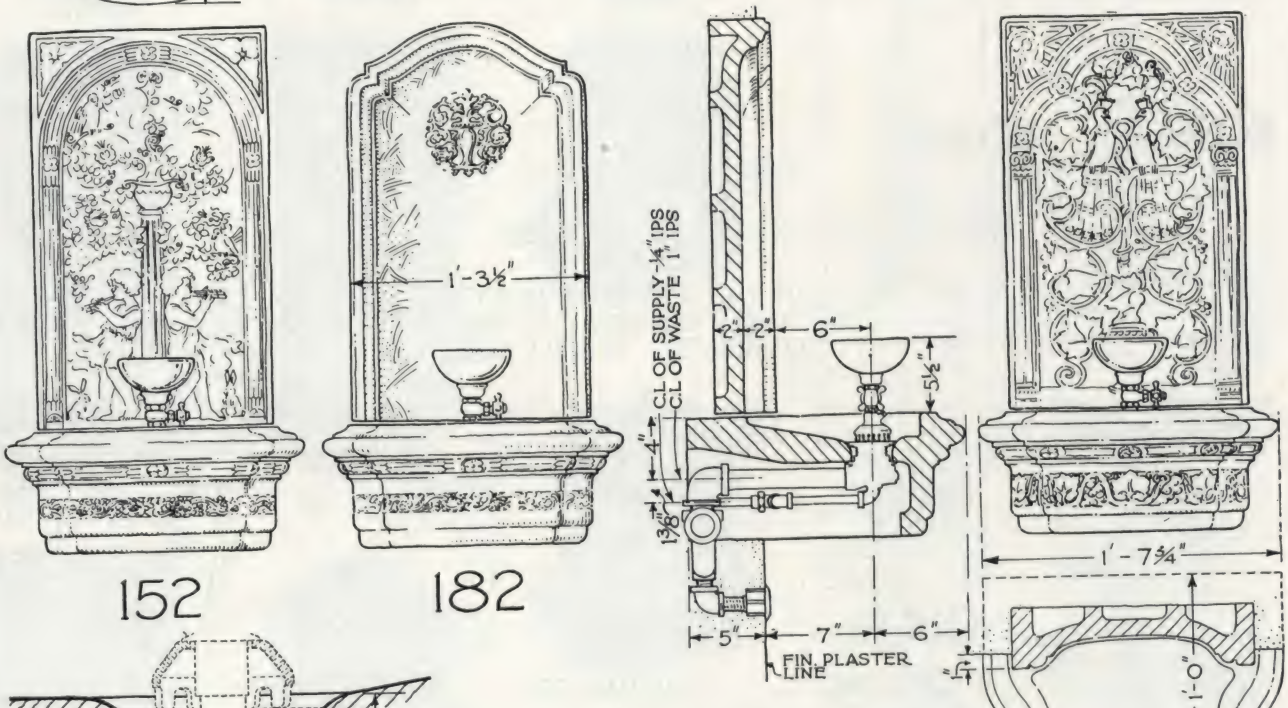
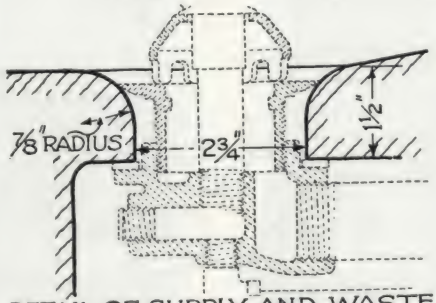


NOTE DESIGNS SHOULD BE REFERRED TO BY NUMBER~ ORDERS SHOULD SPECIFY COLOR.



152 182 62



DETAIL OF SUPPLY AND WASTE FITTING COMBINED ⅓ FULL SIZE

DES. NO.	BUBBLER	SUPPLY AND WASTE
62	CRANE CO. C-9516	SOP-871-E
62-X	CRANE CO. C-9504 OR 6	SOP-1037
152	CRANE CO. C-9516	SOP-871-E
182	CRANE CO. C-9516	SOP 871-E
726-B	CRANE CO. C 9460	BSK 821

NOTE:-WE FURNISH NO PLUMBING FITTINGS

DETAILS OF BATCHELDER DRINKING FOUNTAINS

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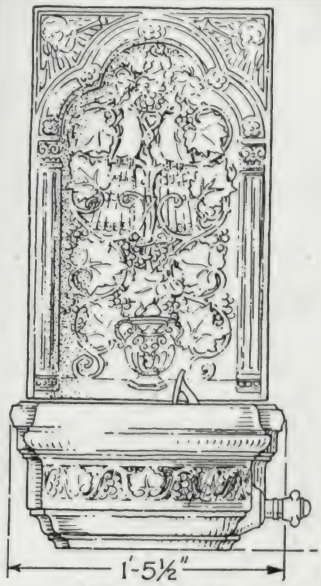
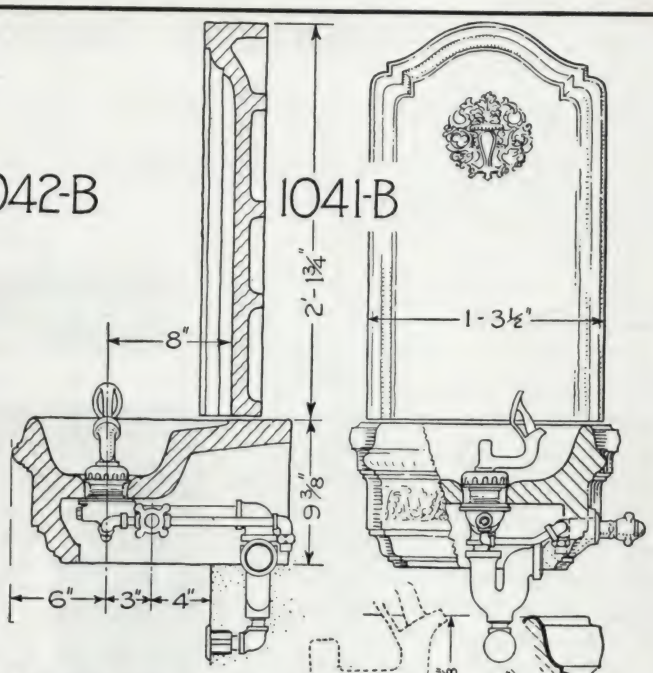
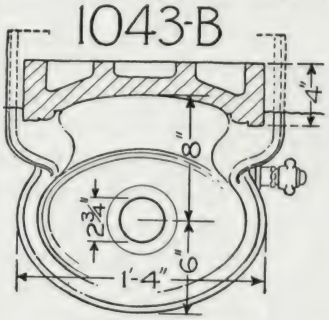
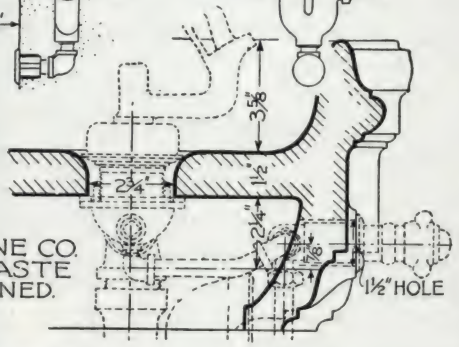


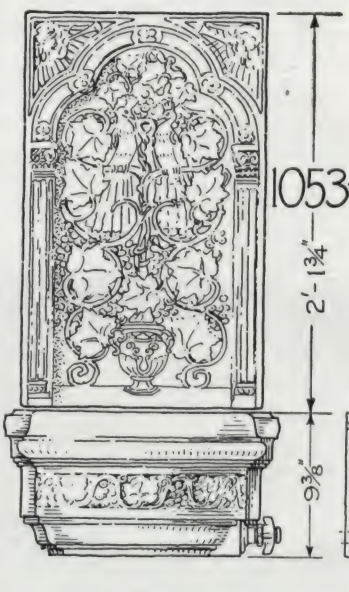


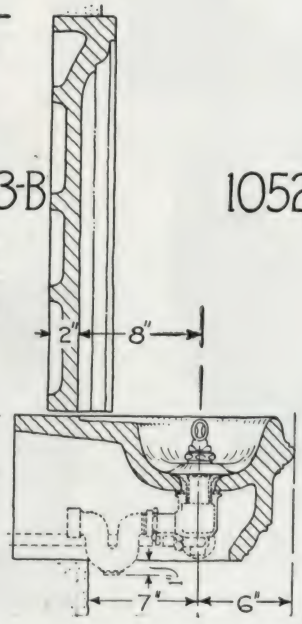


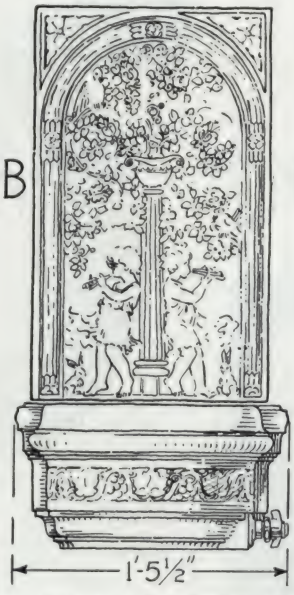
NOTE - DESIGNS SHOULD BE REFERRED TO BY NUMBER~ ORDERS SHOULD SPECIFY COLOR

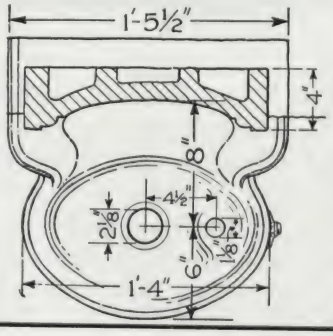


DETAIL OF CRANE CO. SUPPLY AND WASTE FITTING COMBINED.



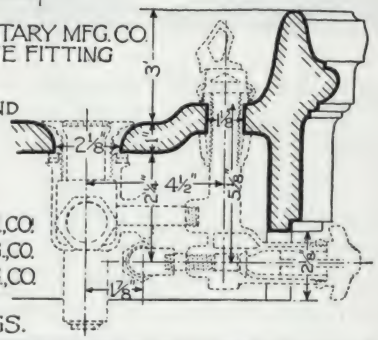






DES. NO.	BUBBLER	SUPPLY AND WASTE
1041-B	CRANE CO. C-9530	CRANE CO.
1042-B	CRANE CO. C-9530	CRANE CO.
1043-B	CRANE CO. C-9530	CRANE CO.
1051-B	STANDARD MFG.,CO.	STANDARD MFG.,CO.
1052-B	STANDARD MFG.,CO.	STANDARD MFG.,CO.
1053-B	STANDARD MFG.,CO.	STANDARD MFG.,CO.

DETAIL STANDARD SANITARY MFG.CO. SUPPLY AND WASTE FITTING



NOTE:-WE FURNISH NO PLUMBING FITTINGS.

DETAILS OF BATCHELDER DRINKING FOUNTAINS

CENTURY BRASS WORKS, INC.

Drinking Fountain Specialists

BELLEVILLE, ILL.

Century SANITARY DRINKING Fountains

Beauty of Design

The Century Company manufactures a complete line of vitreous china and porcelain enameled drinking fountains. Exclusive Century designs are available for hotels, theaters, schools, institutions, stores and every industrial need. All fountains are available in white or seven striking colors. Century equipment enhances the appearance of the finest interiors.

The quality of Century products is recognized everywhere. The vitreous china and porcelain enamel are the finest manufactured. Exposed fittings are solid brass, plated with both nickel and chromium. Century equipment provides a lifetime of efficient service. Illustrated are three Century Fountains equipped with the famous Century Automatic Bubblerhead. For detail specifications of the complete Century line refer to Century A. I. A. Catalog "R-1." If you do not have it write for your copy today.

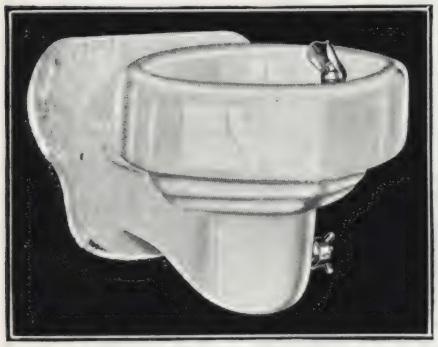
Automatic Bubblerhead

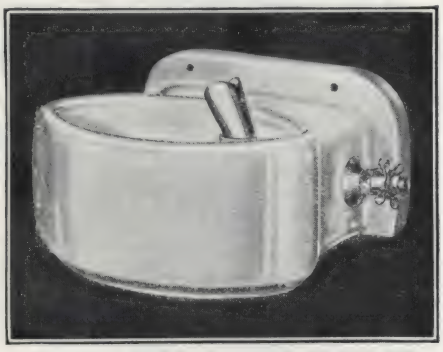
An outstanding bubblerhead, completely automatic, it constantly maintains a healthful drinking stream regardless of fluctuating water pressure. Many mechanical features and simplicity of its solid brass construction cause it to be preferred. Write for catalogue and complete specifications

True Sanitation

In the great public places where throngs daily gather Century equipment best demonstrates its true superiority. Here usage is hard and hurried drinks are numbered by the thousands. Here Century's outstanding efficiency provides a new standard of sanitation. Each turn of the strong, sturdy stopcock instantly produces a full convenient drinking stream. A clean, wholesome drink! There is no prolonged waiting for water. Sudden splashing gushes and tantalizing trickles are completely banished. The new Century Bubblerhead automatically and instantly compensates for variations in water pressure. It provides every day in the year a wholesome, convenient drinking stream and incorporates every mechanical device to promote health. Investigate these health fountains now.

The Century Company invites your inquiry and will be glad to cooperate fully. Write today.





Porcelain Enameled Fountains

The Century line of Porcelain Enameled Fountains is complete. Fountains are available in every combination and scores of styles. Century multiple wall fountains offer particular advantages to schools and public institutions. The battleship construction of these fountains is unique and guarantees a lifetime of carefree, dependable service. Illustrations and complete specifications of all Century products are contained in Century A. I. A. Catalog "R-1."

Vitreous China Fountains

Century Vitreous China Fountains are carefully constructed by skilled mechanics from the finest materials available. Here you will find wall fountains, pedestal fountains, recessed and semi-recessed fountains in many attractive styles and colors. Proportions and designs have been carefully planned and gracefully harmonize with the finest interiors. These fountains are fully illustrated in Century A. I. A. Catalog "R-1."

HALSEY TAYLOR
DRINKING FOUNTAINS

Sanitary Drinking Fountains with practical automatic stream control.

The Halsey W. Taylor Co.
Warren, Ohio

LOCAL REPRESENTATIVE

COLOR

in vitreous china fountains

TO MEET the demand for fountains of vitreous china in colors to harmonize or contrast with walls or interiors of various tones, Halsey Taylor Drinking Fountains can be furnished in any of the following colors:

C-251. Straw or Yellow
C-252. Buff or Brick
C-253. Ivory or Dark Marble
C-254. Blue
C-255. Sage Green
C-258. Chrome Green
C-260. Black
C-269. Copper
C-270. Forest Green
C-271. Orchid
C-280. Autumn Brown
C-281. Ivory or Light Yellow
C-282. Tan or Java Tan
C-283. Light Marble

Although these colors meet the average requirements along this line, special colors may be had if desired.

Prices on Colored Glaze Quoted on Request

THE HALSEY W. TAYLOR CO.

Automatic Stream Control Drinking Fountains

WARREN, OHIO

OFFICES IN THE FOLLOWING CITIES

ALBANY, N. Y.
BIRMINGHAM, ALA.
CHARLOTTE, N. C.
CHATTANOOGA, TENN.
CHICAGO, ILL.
CINCINNATI, OHIO
DENVER, COLO.
DETROIT, MICH.
HALIFAX, N. S.
HOUSTON, TEX.
TAMPA, FLA.
KANSAS CITY, MO.
LOS ANGELES, CAL.
MINNEAPOLIS, MINN.
MONTREAL, QUE.
NASHVILLE, TENN.
WASHINGTON, D. C.
NEW ORLEANS, LA.
NEW YORK, N. Y.
PHILADELPHIA, PA.
PITTSBURGH, PA.
RICHMOND, VA.
SALT LAKE CITY, UTAH
SAN FRANCISCO, CAL.
SEATTLE, WASH.
ST. LOUIS, MO.
SYRACUSE, N. Y.
WORCESTER, MASS.

Products

HALSEY TAYLOR SANITARY DRINKING FOUNTAINS (Patented) Automatic Stream Control; PRACTICAL DRINKING MOUND, NON-SQUIRTING.

Also Electric Coolers and Ice Coolers.

Foreword

Long before the great war, Halsey Taylor Drinking Fountains were becoming increasingly popular. But it was during America's entry into the war that the 2-Stream Projector Halsey Taylor Fountain was accorded Government approval as the most sanitary—the so-called "Cantonment" types being adopted as standard for all training camps.

From that day to this, these fountains have been improved and refined until now they are recommended and preferred by architects and builders generally because of their decided advantages in promoting practical drinking convenience and sanitation.

Considering the fact that their exclusive benefits can be had without sacrifice of economy and with the additional factor of beauty of design, architects will find their specification logical and sure to please their clientele. They embody distinctive, patented features found in no other make or type and result in the following advantages:

(1) Practical Automatic Stream Control—An automatic device maintains a constant height in the drinking stream even though the line pressure may vary 50 lb. The stream is never too high, never too low.

(2) Ideal Drinking Mound—The 2-stream projector was designed for and adopted by the Government during the war. This exclusive design makes the side stream really practical, and removes the objections found with ordinary sidestream foundations because of their hoselike stream.

(3) Absolute Sanitation—The drinking mound is formed by the converging of two streams of water, thus setting up an interference forming a localized drinking mound which makes it impractical to drink from any other point, therefore sanitary in the extreme. The finger or lips cannot come in contact with or contaminate the source of supply. It is absolutely impossible to squirt the water.

Recognized by Architects

Especially in schools, where health-safety counts most, Halsey Taylor Drinking Fountains are recognized by architects everywhere as ideal. In industrial plants, in public buildings of every type, in municipal structures, churches, hospitals and hotels, these modern health-safe fountains are daily specified.

Moreover, it must be remembered that Halsey Taylor Fountains are made and sold by the largest organization devoted exclusively to that line of manufacture. Our sole aim and purpose is to produce the best fountain for any need and our entire resources and facilities are pointed toward that end. We aim to sell a service rather than a mere fountain, and invite architects or builders to write us relative to any problems that may come up in connection with drinking-water provision.

Fountains to Meet Every Requirement

In the following pages of this catalogue you will find shown various fountains to meet every requirement.

Halsey Taylor exclusive features are now available in cabinets for use with various types of electric refrigeration units. Write for special literature.

General Information for Architects

Heights Recommended—For kindergartens 24 in.; grade schools 30 in.; high schools 30 or 36 in.; factories 36, 39, or 42 in. For kindergarten lever handle self-closing stop will be found much easier for smaller children to operate.

Number of Pupils—Experience teaches that one drinking fountain should be provided for each fifty pupils—however, in no case should one fountain be planned to serve more than seventy pupils.

Continuous Flow—Where it is desired to have continuous flow of water, we can furnish a by-pass valve on most types which will permit a small stream of water to flow continuously and a full stream when the self-closing stop is operated.

Finish—Exposed fittings on all fountains with the exception of fixtures Nos. 501 to 515 are furnished in chromium plate. However we can furnish nickel plate, bronze or polished brass upon request.

Water Consumption—The amount of water required in different classes of installations will vary and, where the actual amount of water required is not known, the following data will give the approximate demand to be expected.

(1)	Heavy manufacturing	¼ gal. per hour per person.
(2)	Light manufacturing.	⅙ gal. per hour per person.
(3)	Office buildings.....	⅛ gal. per hour per person
(4)	Transients 1	gal. per hour per 100 persons
(5)	Hotels	⅛ gal. per hour per room. (maximum 1½ gal. per day.)
(6)	Restaurants	1/10 gal. per person served.
(7)	Cafeteria	1/12 gal. per person served.
(8)	Theaters 1	gal. per hour per 75 seats.
(9)	Schools	⅛ gal. per hour per student.
(10)	Hospitals	½ gal. per hour per bed. (Plus ⅛ gal. per hour per attendant.)

Color—All vitreous china fixtures shown in catalogue can be furnished in various colors to match the woodwork, marble, or interior trim. See preceding page.

Marble Fountains—Send for roughing-in measurements of Halsey Taylor fittings for marble, or terra cotta wall and pedestal fountains.

Blue Prints—Blue prints giving details will be furnished for any fixtures shown.

Continued on next page

WALL FOUNTAINS

No. 600 Wall Fountain

Specification—Halsey Taylor No. 600 Wall Fountain with heavy vitreous china receptor; brass strainer; cast iron baked gray enameled bracket to wall; self-closing stop; loose key volume regulator; ⅜-in. brass supply; 1¼-in. brass trap and waste pipe; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 30 lb.

Dimensions—

Receptor	7½x10 in.
Depth of receptor	3 in.
Projection from wall	11½ in.
To center of drinking mound	8 in.
Supply	⅜ in. I.P.
Waste outlet—tapped	1-in. I.P. thread

Price—

As described, each	$30.50
Complete less trap, each	28.00
Without trap, supply and waste fittings, each	26.00

No. 601 and No. 602 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 601 heavy vitreous china wall drinking fountain with integral trap housing, concealed wall hanger, brass strainer, self-closing stop with cross handle, loose key regulator and union connection for ⅜-in. iron pipe supply, brass trap for 1¼-in. iron pipe outlet, *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

No. 602 Specification—Same as above, except furnished less trap and with waste fittings for drain to wall.

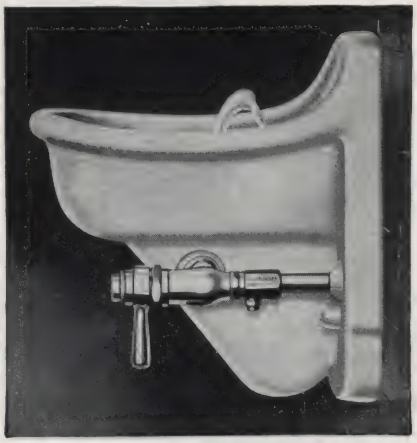
Shipping weight, 40 lb.

Dimensions—

Depth of receptor	3¼ in.
Projection from wall	11¼ in.
Width	11 in.
Supply	⅜ in.
Waste	1¼ in.

Price—

No. 601, as described and complete with trap, each	$35.00
No. 602, as described complete less trap and with waste fitting for drain to wall, each	32.00



No. 603 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 603 heavy vitreous china wall drinking fountain with integral trap and clean-out plug; lever handle self-closing stop; loose key volume regulator; 1¼-in. waste outlet and ⅜-in. supply; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 35 lb.

Dimensions—

Depth of receptor	3½ in.
Projection from wall	12 in.
Width	9½ in.
Supply	⅜ in.
Waste	1¼ in.

Price—

As described, each	$35.00

No. 604 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 604 heavy vitreous china wall drinking fountain with completely closed integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; loose key regulator and union connection; ⅜-in. supply; 1½-in. New York regulation rough brass trap with clean-out plug through trap housing; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 40 lb.

Dimensions—

Depth of receptor	3½ in.
Projection from wall	12 in.
Width	9½ in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each	$40.00

Continued on next page

WALL FOUNTAINS

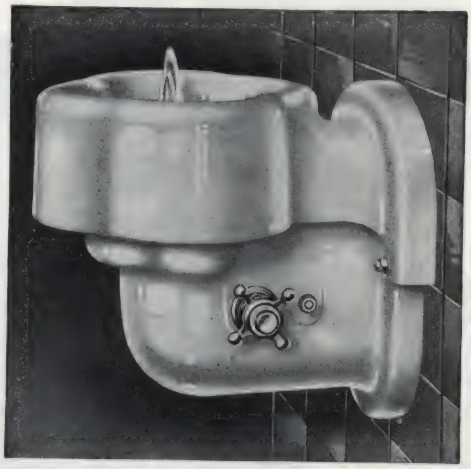
No. 605 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 605 heavy vitreous china wall drinking fountain with integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; loose key regulator and union connection for ⅜ in. iron pipe supply; rough brass trap for 1¼ in. iron pipe outlet; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*
Shipping weight, 50 lb.

Dimensions—

Receptor	10x13	in.
Depth of receptor	3½	in.
Width over all	13	in.
Wall to drinking stream	8	in.
Wall to front of fountain	13	in.
Supply	⅜	in.
Waste	1¼	in.

Price—
Each $45 00



No. 607 Cast Iron Vitreous Enameled Wall Fountain

Specification—Halsey Taylor No. 607 heavy cast iron vitreous enamel all-over wall drinking fountain with integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; loose key regulator and union connection for ⅜ in. iron pipe outlet; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*
Shipping weight, 85 lb.

Dimensions—

Receptor	10x13	in.
Depth of receptor	3¼	in.
Width over all	13½	in.
Wall to drinking stream	8	in.
Wall to front of fountain	14	in.
Supply	⅜	in.
Waste	1¼	in.

Price—
As described, each $50.00

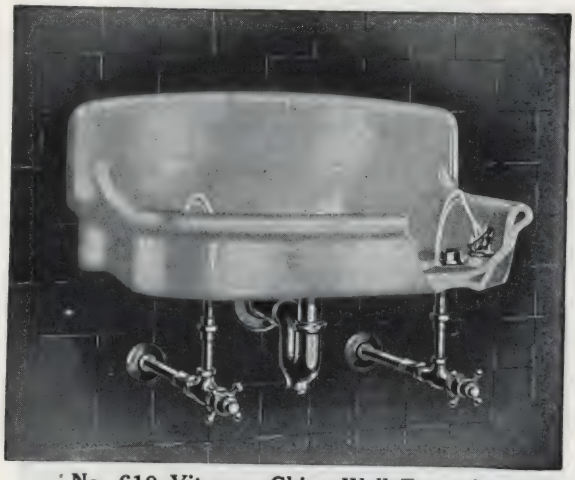
No. 608 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 608 heavy vitreous china wall drinking fountain with completely closed integral trap housing; concealed wall hanger; brass wall bolts; brass strainer; self-closing stop with cross handle; ⅜ in. iron pipe supply; loose key regulator and union connection; 1½ in. New York regulation rough brass trap with clean-out plug through trap housing; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*
Shipping weight, 50 lb.

Dimensions—

Receptor	10x13	in.
Depth of receptor	3½	in.
Wall to drinking stream	8	in.
Wall to front of fountain	13	in.
Supply	⅜	in.
Waste	1½	in.

Price—
As described, each $50.00



No. 610 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 610 heavy vitreous china wall drinking fountain with integral back and concealed hangers; brass strainer; self-closing stops with cross handle; loose key volume regulators; ⅜ in. iron pipe supply; 1¼ in. brass trap; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*
Shipping weight, 90 lb.

Dimensions—

Depth of receptor	3½	in.
Length over all	24	in.
Height of back over all	10½	in.
Wall to drinking stream	8	in.
Wall to front of fountain	13	in.
Supply	⅜	in.
Waste	1¼	in.

Price—
As described, each $80.00

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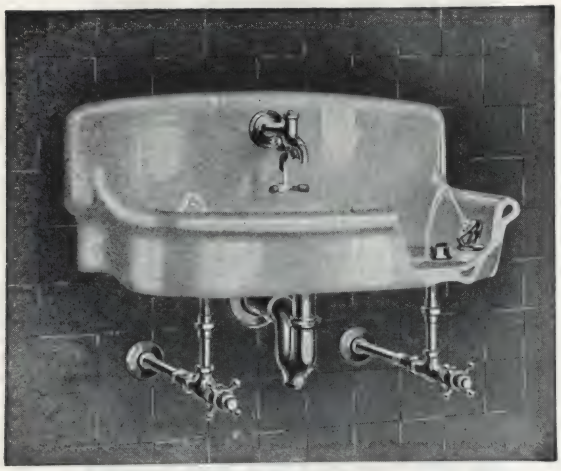
WALL FOUNTAINS



No. 611 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 611 heavy vitreous china wall drinking fountain with integral back and concealed hangers; brass strainer; self-closing stops with cross handle; loose key volume regulators; 1¼-in. brass trap; ⅜-in. iron pipe supply; self-opening and self-closing glass filler faucet; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Can be furnished with any combination of heads, fillers or faucets. Prices on request.

Shipping weight, 92 lb.

Dimensions—

Depth of receptor	3½ in.
Length over all	23 in.
Height of back over all	10½ in.
Wall to drinking stream	8 in.
Wall to front of fountain	13 in.
Supply	⅜ in.
Waste	1¼ in.

Price—

As shown, each $95.00

No. 612 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 612 heavy vitreous china wall drinking fountain without back; brass strainer; self-closing stops with cross handle; loose key volume regulators; 1¼-in. brass trap; ⅜-in. iron pipe supply; two painted cast-iron wall brackets; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

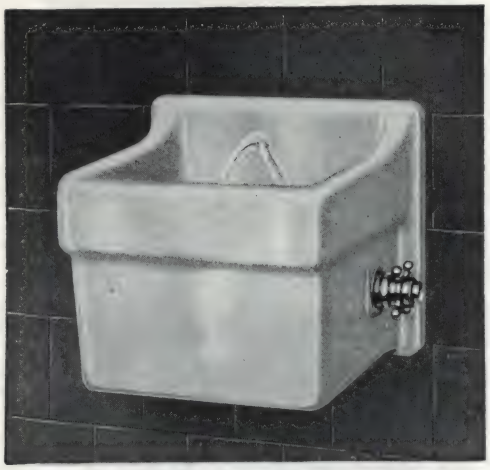
Shipping weight, 70 lb.

Dimensions—

Depth of receptor	3½ in.
Length over all	24 in.
Wall to drinking stream	8 in.
Wall to front of fountain	13 in.
Supply	⅜ in.
Waste	1¼ in.

Price—

As described, each $70.00



No. 622 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 622 heavy vitreous china wall drinking fountain with integral trap housing; concealed wall hanger; brass strainer; self-closing cross handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York Regulation trap with clean-out plug; *2-stream mound building projector and Taylor Automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 50 lb.

Dimensions—

Receptor	12x13 in.
Depth of receptor	3½ in.
Width over all	13 in.
Projection from wall	13 in.
Height over all	12 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $50.00

No. 623 Vitreous China Wall Fountain

Specification—Halsey Taylor No. 623 heavy vitreous china wall drinking fountain with integral trap housing; concealed wall hanger; brass strainer; self-closing stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York regulation trap with clean-out plug; equipped with oscillating lever handle glass filling faucet through back; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Specification Halsey Taylor No. 624, same as No. 623, except with 24-in. back.

Shipping weights, 105 and 115 lb. respectively.

Dimensions—

Receptor	12x13 in.
Depth of receptor	3½ in.
Width over all	13 in.
Projection from wall	13 in.
Height over all	18 in.
Supply	⅜ in.
Waste	1½ in.

Prices—

No. 623, as described, each	$65.00
No. 624, as described, each	75.00

Continued on next page

WALL FOUNTAINS

No. 625 Vitreous China Recessed Wall Fountain

Specification—Halsey Taylor No. 625 heavy vitreous china recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York regulation trap with clean-out and metal wall flange; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* When ordering state whether for plaster or marble wall.

Shipping weight, 110 lb.

Dimensions—

Width over all	16 in.
Height over all	29½ in.
Receptor opening	12½ in. wide by 20¾ in. high by 10 in. deep
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $100.00

No. 626 Vitreous China Recessed Wall Fountain with Glass Filler

Specification—Halsey Taylor No. 626 heavy vitreous china recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; 1½-in. New York regulation trap with clean-out and metal wall flange; equipped with oscillating lever handle glass filling faucet through back; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* When ordering, state whether for plaster or marble wall.

Shipping weight, 110 lb.

Dimensions—

Width over all	16 in.
Height over all	29½ in.
Receptor opening	12½ in. wide by 20¾ in. high by 10 in. deep
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $105.00

No. 627 Vitreous China Recessed Wall Fountain with Glass Filler Only

Specification—Halsey Taylor No. 627 heavy vitreous china recessed wall drinking fountain; brass strainer; loose key regulator; 1½-in. New York regulation trap with clean-out and metal wall flange; equipped with oscillating lever handle glass filling faucet through back. All exposed fittings *chromium plate.* When ordering, state whether for plaster or marble wall.

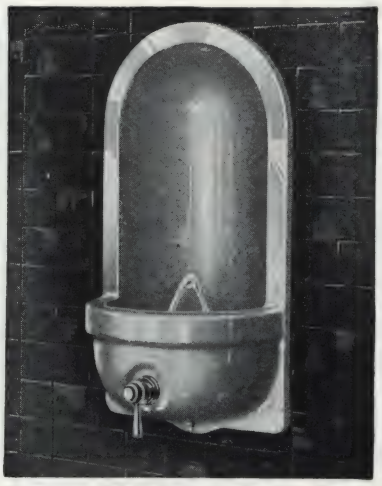
Shipping weight, 105 lb.

Dimensions—

Width over all	16 in.
Height over all	29½ in.
Receptor opening	12½ in. wide by 20¾ in. high by 10 in. deep
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $93.00



No. 630 Vitreous China Semi-recessed Wall Fountain

Specification—Halsey Taylor No. 630 heavy vitreous china semi-recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; waste outlet 1¼-in. iron pipe. (Trap not furnished but may be placed in wall if required.) *2-stream projector and Taylor automatic control.* All exposed fittings *chromium plate.*

Shipping weight, 85 lb.

Dimensions—

Width over all	14 in.
Height over all	25½ in.
Recessed depth	4½ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $90.00

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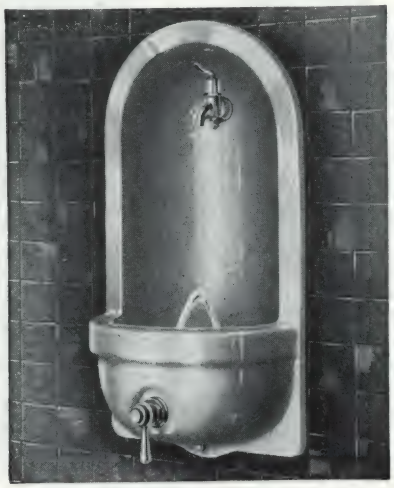
WALL FOUNTAINS



No. 631 Vitreous China Semi-recessed Wall Fountain with Glass Filler

Specification—Halsey Taylor No. 631 heavy vitreous china semi-recessed wall drinking fountain; brass strainer; self-closing lever handle stop; loose key regulator and union connection for ⅜-in. iron pipe supply; waste outlet 1¼-in. iron pipe (trap not furnished but may be placed in wall if desired); equipped with oscillating lever handle glass filler faucet through back; *2-stream projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 90 lb.

Dimensions—

Width over all	14 in.
Height over all	25½ in.
Recessed depth	5¼ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $95.00

No. 632 Vitreous China Semi-recessed Wall Fountain with Glass Filler Only

Specification—Halsey Taylor No. 632 heavy vitreous china semi-recessed wall drinking fountain; brass strainer; ⅜-in. iron pipe supply; waste outlet 1¼-in. iron pipe (trap not furnished but can be placed in wall if required); equipped with oscillating lever handle glass filler faucet through back. All exposed fittings *chromium plate.*

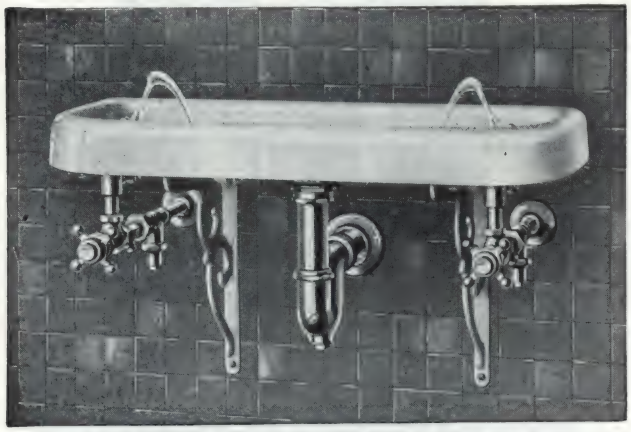
Shipping weight, 80 lb.

Dimensions—

Width over all	14 in.
Height over all	25½ in.
Recessed depth	4½ in.
Projection from wall	7 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $83.00



No. 702 Cast Iron Vitreous Enameled Battery Wall Fountain

Specification—Halsey Taylor No. 702 Battery Wall Fountain; cast iron trough with apron vitreous enameled; on painted iron supporting brackets; brass supply fittings; self-closing supply valves and loose key compression stop; 1½-in. brass P trap with clean-out; ⅜-in. iron pipe supply; *two 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Shipping weight, 85 lb.

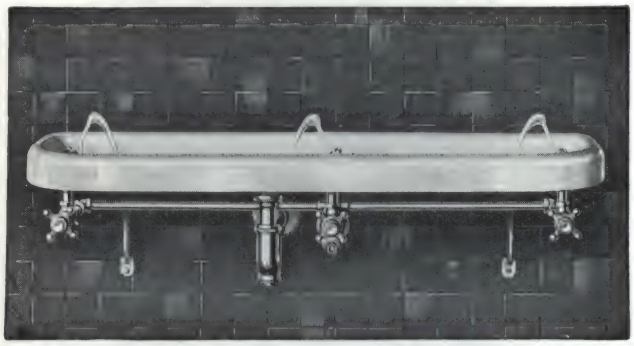
Dimensions—

Length over all	26 in.
Distance between heads	19 in.
Distance wall to front	13 in.
Supply	⅜ in.
Waste	1½ in.

Price—

As described, each $70.00

If furnished with metal guard, add $2.00 per head to list price, and with vitreous china guard, add $3.00 extra per head.



No. 703 and No. 704 Cast Iron Vitreous Enameled Battery Wall Fountain

Specification—Halsey Taylor No. 703 Battery Wall Fountain; cast iron trough with apron vitreous enameled; on painted iron supporting brackets; brass supply fittings; self-closing supply valves and loose key compression stop; 1½-in. brass P trap with clean-out; ¾-in. iron pipe supply; *three or four 2-stream mound building projectors and Taylor automatic stream control.* All exposed fittings *chromium plate.*

No.	703	704
Projectors	3	4
Shipping weight	115 lb.	140 lb.

Dimensions—

Length over all	44 in.	55 in.
Distance between heads	17 in.	15 in.
Distance wall to front	13 in.	13 in.
Supply	¾ in.	¾ in.
Waste	1½ in.	1½ in.

Prices—

As shown, each $95.00 $120.00

If furnished with metal guard, add $2.00 per head to list price, and with vitreous china guard, add $3.00 extra per head.

Continued on next page

PEDESTAL FOUNTAINS

No. 520-68

No. 520-68 Pedestal Fountain

Specification—Halsey Taylor No. 520-68 Pedestal Fountain; receptor made from cast iron, vitreous enameled; set in cast iron protecting shield; heavy cast iron top and base; 4-in. outside diameter steel tubing standard; enclosed galvanized supply and waste pipes; self-closing stop; loose key volume regulator concealed in base; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray. For details of installation see No. 520-600 pedestal below.

Shipping weights, 87, 90 and 95 lb., respectively.

Dimensions—

Receptor	7½x10 in.
Diameter adjustable base cover	16½ in.
Height of base cover	10½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height	$39.00
	39-in. height	40.00
	42-in. height	41.00

Fig. 1

Fig. 2

No. 520-600 Pedestal Fountains

Specification—Halsey Taylor No. 520-600 Pedestal Fountain; heavy vitreous china receptor; brass strainer; 4-in. outside diameter steel tubing standard and heavy cast iron tripod base and cover; enclosed galvanized supply and waste pipes; self-closing stop; loose key regulator concealed in base; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

By raising base cover (Fig. 1) connections can be made without disturbing floor or concrete. After connections are made pedestal is bolted to foundation, stream adjusted, and base cover lowered to proper position, concealing regulator (Fig. 2).

Shipping weights, 85, 87 and 89 lb., respectively.

Dimensions—

Receptor	7½x10 in.
Diameter adjustable base cover	16½ in.
Height of base cover	10½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height	$42.00
	39-in. height	43.00
	42-in. height	44.00

No. 616 Vitreous China Pedestal Fountain

Specification—Halsey Taylor No. 616 heavy vitreous china pedestal fountain with 10-in. x 13-in. receptor; brass strainer; cast brass supply and waste connection; self-closing stop with loose key volume regulator at side of pedestal; floor screws with cap nuts; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

30-in. height, shipping weight, 85 lb.; 36-in. height, shipping weight, 94 lb.

No. 616

Dimensions—

Receptor	10x13 in.
Height top of pedestal	30 or 36 in.
Depth of receptor inside	3½ in.
Diameter of pedestal at floor	15 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	30-in. height	$66.00
	36-in. height	70.00

No. 617

No. 618

No. 617 and No. 618 Pedestal Fountains

Specification—Halsey Taylor No. 617 Pedestal Fountain; heavy vitreous china receptor; brass strainer; 2⅜-in. outside diameter steel tubing standard and cast iron closed base; self-closing stop; loose key volume regulator; ⅜-in. iron pipe supply; 1-in. waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Specification—Halsey Taylor No. 618 Pedestal Fountain; same as above but with cast iron open base for connections above floor line. Both styles finished in gray.

Shipping weights, 45 and 50 lb., respectively.

Dimensions—

Receptor	7½x10 in.
Depth of receptor	3 in.
Base	9½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height	$32.00
	39-in. height	33.00

Continued on next page

PEDESTAL FOUNTAINS

No. 618-2

No. 618-4

No. 618-2 and No. 618-4 Pedestal Fountains

No. 520

No. 520 Pedestal Fountain

Specification—Halsey Taylor No. 618-2 Pedestal Fountain; two heavy vitreous china receptors; brass strainers; 2½-in. outside diameter steel tubing standard and cast iron open base; self-closing stops; loose key volume regulators and loose key compression stop; supply—note dimensions in margin; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Specification—Halsey Taylor No. 618-4 Pedestal Fountain; same as above but with four heads.

No. 618-2 shipping weight, 75 lb.
No. 618-4 shipping weight, 110 lb.

Dimensions—

Receptors	7½x10 in.
Depth of receptor	3 in.
Base	12½ in.
Width over receptors	28½ in.
Supply—No. 618-2	½ in.
No. 618-4	¾ in.
Waste	1 in.

Prices—

No. 618-2, 36-in. height	$ 60.00
No. 618-4, 36-in. height	115.00

No. 567

No. 568

No. 567 and No. 568 Pedestal Fountains

Specification—Halsey Taylor No. 567 Pedestal Fountain; heavy cast iron vitreous enameled bowl; 2⅜-in. outside diameter steel tubing standard and cast iron closed base; self-closing valve; loose key volume regulator; ⅜-in. iron pipe supply; 1-in. iron pipe waste; *2-stream mound building projector.* All exposed fittings *chromium plate.*

Specification—Halsey Taylor No. 568 Pedestal Fountain; same as above but has cast iron open base for connections above the floor line. Both styles finished in gray.

Shipping weights, 45 and 48 lb., respectively.

Dimensions—

Receptor	7½x 9½ in.
Base	9½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height $25.00
	39-in. height 26.00

Specification—Halsey Taylor No. 520 Pedestal Fountain; heavy vitreous china receptor; *4-stream angle jet projector;* cast iron top with base with 4-in. outside diameter steel tubing standard; enclosed galvanized supply and waste pipe; self-closing stop; loose key volume regulator concealed in base; ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.* Finished in gray.

By raising base cover, connections can be made without disturbing floor or concrete. After connections are made pedestal is bolted to foundation, stream adjusted, and base cover lowered to proper position, concealing regulator.

Shipping weights, 86, 88 and 90 lb., respectively.

Dimensions—

Receptor	6 in.
Diameter adjustable base cover	16½ in.
Height base cover	10½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	36-in. height $34.00
	39-in. height 35.00
	42-in. height 36.00

No. 547

No. 548

No. 547 and No. 548 Pedestal Fountains

Specification—Halsey Taylor No. 547 Pedestal Fountain; heavy vitreous china receptor, with No. 515 fountain head; self-closing stop; loose key volume regulator; *4-stream angle jet projector;* 2⅜-in. outside diameter steel tubing standard with cast iron closed base. Galvanized supply and waste pipes concealed within standard; ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.*

Specification—Halsey Taylor No. 548 Pedestal Fountain; same as above but with cast iron open base for connections above floor line. Both styles finished in gray.

Shipping weights, 45 and 52 lb., respectively.

Dimensions—

Receptor	9½ in.
Diameter of base	9½ in.
Supply	⅜-in. I.P.
Waste	½-in. I.P.

Prices—

As described, each	36-in. height $25.00
	39-in. height 26.00

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COMBINATION COOLER AND DRINKING FOUNTAINS

No. 800 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 800 Combination Cooler and Drinking Fountain; heavy vitreous china receptor; brass strainer; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation, re-granulated cork in sidewalls and pressed cork-board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator; ⅜-in. iron pipe supply, 1-in. iron pipe waste. Cover furnished so that padlock may be used to prevent removal of ice. *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 148 lb.

Dimensions—

Receptor	7½x10 in.
Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Diameter of base	14 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.
Ice capacity	80 lb.

Ice consumption approximately 1 lb. per capita per day

Price—

As described, each.....$72.00

No. 802 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 802 Combination Cooler and Drinking Fountain with two heads; heavy vitreous china receptors; brass strainers; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation; re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator; ⅜-in. iron pipe supply, 1-in. iron pipe waste; cover furnished so that padlock may be used to prevent removal of ice. *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 160 lb.

Dimensions—

Receptors	7½x10 in.
Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Diameter of base	14 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.
Ice capacity	80 lb.

Ice consumption approximately 1 lb. per capita per day

Price—

As described, each.....$110.00

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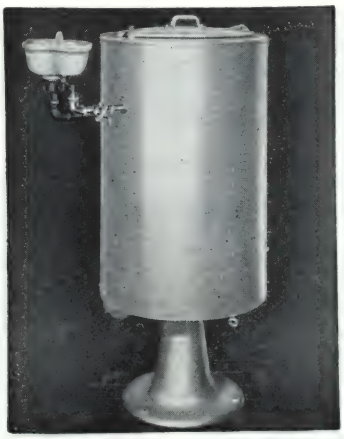
COMBINATION COOLER AND DRINKING FOUNTAINS



No. 820 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 820 Combination Cooler and Drinking Fountain; same as No. 800 excepting ice capacity of 120 lb. and cooling coil of double length. Dimensions of ice chamber 20-in. outside diameter x 30 in. high. Height to top of fountain receptor, 42 in.; ⅜-in. iron pipe supply and 1-in. iron pipe waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 194 lb.

Dimensions—

Ice chamber	20-in. o.d. x 30-in. height
Height to top of ice chamber	42 in.
Height to top of receptor	42 in.
Ice capacity	120 lb.

Price—

As described, each.....$87.00

No. 822 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 822 Combination Cooler and Drinking Fountain, same as No. 820 illustrated and described above, except furnished with two heads; ice capacity of 120 lb. and cooling coil of double length. Dimensions of ice chamber 20-in. outside diameter x 30 in. high. Height to top of fountain receptor, 42 in.; ⅜-in. I.P. supply and 1-in. iron pipe waste; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 210 lb.

Dimensions—

Ice chamber	20-in. o.d. x 30-in. height
Height to top of ice chamber	42 in.
Height to top of receptor	42 in.
Ice capacity	120 lb.

Price—

As described, each.....$120.00

No. 580 Combination Cooler and Drinking Fountain

Specification—Halsey Taylor No. 580 Cafeteria Cooler and Drinking Fountain; 15½-in. diameter combination cast iron cover and catch basin, with perforated nickel plated brass drain plate; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; ⅜-in. iron pipe supply and 1-in. iron pipe waste. Catchbasin is removed to replenish ice in cooler.

Equipped with vitreous china receptor, *2-stream mound building projector and Taylor automatic stream control* and one self-opening, self-closing glass filler. All exposed fittings *chromium plate.* Finished in gray or white.

Shipping weight, 170 lb.

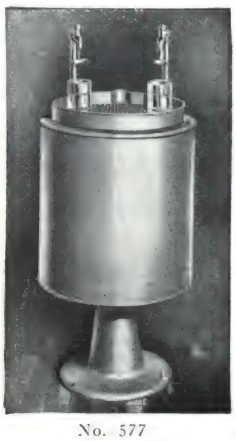
Dimensions—

Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Height to top of receptor	40 in.
Ice capacity	80 lb.

Price—

As described, each.....$92.00

No. 577 Cafeteria Cooler and Drinking Fountain



No. 577

Specification — Halsey Taylor No. 577 Cafeteria Cooler and Drinking Fountain; 15½-in. diameter combination cast iron cover and catch basin, with perforated nickel plated brass drain plate; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; ⅜-in. iron pipe supply and 1-in. iron pipe waste. Catchbasin is removed to replenish ice in cooler.

Equipped with two self-opening, self-closing glass fillers. All exposed fittings *chromium plate.* Finished in gray or white.

Shipping weight, 160 lb.

Dimensions—

Ice chamber	20-in. o.d. x 20-in. height
Height to top of ice chamber	32 in.
Ice capacity	80 lb.

Prices—

As described, each	$80.00
No. 576 with one glass filler only, each	70.00

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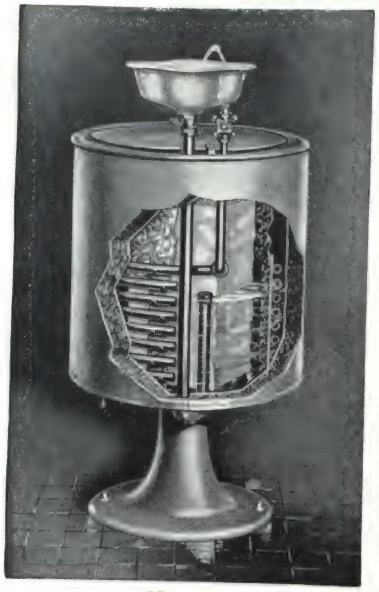
COMBINATION COOLER AND DRINKING FOUNTAINS

No. 570 Combination Cooler and Drinking Fountain



No. 570

Specification—Halsey Taylor No. 570 Combination Cooler and Drinking Fountain; cast iron vitreous enameled receptor; brass strainer; brass supply and cast iron trap mounted on cooler; with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator, *2-stream mound building projector;* ⅜-in. iron pipe supply and 1-in. iron pipe waste. Cover furnished so that padlock may be used to prevent removal of ice. All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 142 lb.

Dimensions—

Ice chamber.....20-in. o.d. x 20-in. height
Height to top of ice chamber.....32 in.
Height to top of receptor.....40 in.
Ice capacity .....80 lb.

Price—

As described, each.....$65.00

No. 573 Combination Cooler and Drinking Fountain

No. 573

Specification — Halsey Taylor No. 573 Combination Cooler and Drinking Fountain; heavy 9½-in. vitreous china receptor; brass strainer; brass supply and cast iron trap mounted on cooler, with cover, top, and base made of cast iron and pressed steel; body of tank and coil guard made from galvanized sheet iron; insulation: re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; supply pipe furnished with self-closing stop and volume regulator; furnished with No. 515 fountain head with *4-stream angle jet projector* and 4-in. guard ring; ⅜-in. iron pipe supply and 1-in. iron pipe waste. All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 150 lb.

Dimensions—

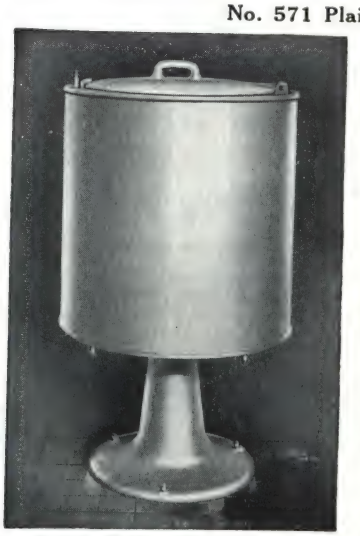
Ice chamber.....20-in. o.d. x 20-in. height
Height to top of ice chamber.....32 in.
Height to top of receptor.....40 in.
Ice capacity .....80 lb.

Price—

As described, each.....$65.00

PLAIN COOLERS

No. 571 Plain Cooler



No. 571

Specification — Halsey Taylor No. 571 Plain Cooler; brass supply and waste connections; cover, top and base made of cast iron and pressed steel; body of tank and coil guard made of galvanized sheet iron; insulation; re-granulated cork in side walls and pressed cork board in bottom and cover of cooler; cooling coil made from ½-in. outside diameter No. 20 gauge seamless brass tubing, tinned inside and outside; supply and waste pipes concealed between walls of cooler; ⅜-in. iron pipe supply and 1-in. iron pipe waste; ice capacity 80 lb. Dimensions of ice chamber 20-in. outside diameter x 20 in. high. Cover furnished so that padlock may be used to prevent removal of ice. Finished in gray.

This cooler designed for use in connection with drinking fountains already installed or where it is desired to conceal the cooler; also for installation in basement to supply fountains on floors above.

Shipping weight, 152 lb.

Dimensions—

Ice chamber.....20-in. o.d. x 20-in. height
Height to top of ice chamber.....32 in.
Ice capacity .....80 lb.

Price—

As described, each.....$50.00

No. 572 Plain Cooler

No. 572

Specification—Halsey Taylor No. 572 Plain Cooler; same as No. 571 illustrated and described at left; excepting ice capacity of 120 lb. and cooling coil of double length. Dimensions of ice chamber 20-in. outside diameter x 30 in. high; ⅜-in iron pipe supply and 1-in. iron pipe waste. Cover furnished so that padlock may be used to prevent removal of ice. Finished in gray.

Shipping weight, 170 lb.

Dimensions—

Ice chamber .....20-in. o.d. x 30-in. height
Height to top of ice chamber.....42 in.
Ice capacity ..... 120 lb.

Price—

As described, each.....$65.00

Continued on next page

NON-AUTOMATIC FOUNTAINS

No. 566 Cantonment Type Wall Fountain

Specification—Halsey Taylor No. 566 Cantonment Type Wall Fountain; cast iron vitreous enameled all over; self-closing stop; loose key volume regulator; brass strainer; 1¼-in. brass trap; ⅜-in. iron pipe supply; *2-stream mound building projector.* All exposed fittings *chromium plate.*

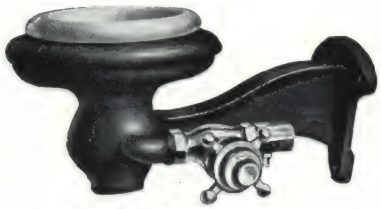
Shipping weight, 20 lb.

Dimensions—

Receptor	7½x9½ in.
Projection from wall	11½ in.
To center of drinking mound	8 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Prices—

As described, each	$23.00
Complete, less trap	20.50
With 1-in. male spud, less trap and tailpiece, each	20.00



No. 540 Wall Fountain

Specification—Halsey Taylor No. 540 Wall Fountain; heavy 6-in. vitreous china bowl mounted on cast iron bracket and bowl support; self-closing stop; loose key volume regulator; furnished with *4-stream angle jet projector;* ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.* Finished in gray.

Shipping weight, 20 lb.

Dimensions—

Projection from wall	12 in.
Diameter of bowl support	7 in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Price—

As described, each	$16.50

No. 542 Wall Fountain

Specification—Halsey Taylor No. 542 Wall Fountain; heavy 9½-in. vitreous china bowl mounted on cast iron bracket to wall; brass strainer; 3¾-in. guard ring; self-closing stop; loose key volume regulator; furnished with *4-stream angle jet projector;* ⅜-in. iron pipe supply and 1-in. waste. All exposed fittings *chromium plate.* Finished in gray.

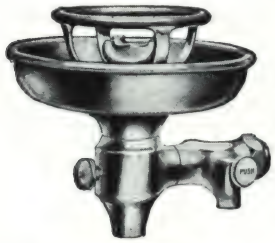
Shipping weight, 25 lb.

Dimensions—

Projection from wall	13 in.
Diameter of bowl	9½ in.
Supply	⅜-in. I.P.
Waste	1-in. I.P.

Price—

As described, each	$22.00



No. 505 Fountain

With 6-in. nickel plated spun brass bowl; guard ring; self-closing push button valve; volume regulator; *4-stream angle jet projector;* self-closing push button valve on side for filling glass; ½-in. supply; ⅜-in. outlet iron pipe threads.

Shipping weight, 3½ lb.

Price—

As described, each	$12.00

No. 506 Fountain

Nickel plated brass self-closing lever handle stop; volume regulator; 4-in. vitreous china bowl; *4-stream angle jet projector;* ¼-in. iron pipe supply.

Shipping weight, 4 lb.

Price—

As described, each	$10.50

No. 508 Fountain

Nickel plated brass; self-closing stop; volume regulator; 3¾-in. guard ring; *4-stream angle jet projector;* ⅜-in. iron pipe supply.

Shipping weight, 2 lb.

Price—

As described, each	$9.00

No. 501 Fountain

With 4-in. nickel plated spun brass or vitreous china bowl; self-closing push button valve; volume regulator; *4-stream angle jet projector;* ½-in. supply; ⅜-in. outlet, iron pipe threads.

Shipping weight, 2 lb.

Prices—

As described, each	$6.00
With 6-in. nickel plated cup and 4-in. guard ring	9.50

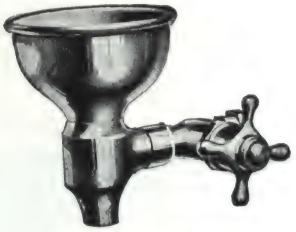
No. 502 Fountain

Same as No. 501, but has self-closing push button valve on side for filling glass; ½-in. supply; ⅜-in. outlet, iron pipe threads.

Shipping weight, 2½ lb.

Price—

As described, each	$8.50



No. 504 Fountain

With 4-in. nickel plated spun brass or vitreous china bowl; self-closing stop; volume regulator; *4-stream angle jet projector;* ⅜-in. supply; ⅜-in. outlet, iron pipe threads.

Shipping weight, 3 lb.

Price—

As described, each	$ 9.00
With 6-in. nickel plated brass bowl and guard ring	12.50

FOUNTAIN HEADS

No. 575 Fountain Head

Specification—Halsey Taylor No. 575 Fountain Head; cast iron vitreous enamel 7½x9½-in. receptor; self-closing stop and volume regulator; waste outlet 1½ or 2-in. iron pipe; ⅜-in. iron pipe supply; *2-stream mound building projector.* All exposed fittings *chromium plate.*

Used to replace present unsanitary heads on coolers and pedestal fountains.

Shipping weight, 13 lb.

Prices—

As described, each	$17.00
Less self-closing stop and regulator, each	12.00

No. 586 Fountain Head

Specification—Halsey Taylor No. 586 Fountain Head; vitreous china 7½x10-in. receptor; brass strainer; ⅜-in. iron pipe supply; waste outlet 1¼ or 1½-in. iron pipe; self-closing stop with regulator and union connection; *2-stream mound building projector and Taylor automatic stream control.* All exposed fittings *chromium plate.*

Used to replace present unsanitary heads on coolers and pedestal fountains.

Shipping weight, 20 lb.

Price—

As described, each	$22.00

No. 514 Fountain Head

With nickel plated brass base and 4-in. vitreous china bowl; loose key volume regulator; furnished with *4-stream angle jet projector;* height 4¼ in.; ⅜-in. iron pipe supply.

Shipping weight, 2 lb.

Price—

As described, each	$4.50

No. 515 Fountain Head

Nickel plated brass; with 3¾-in. guard ring; loose key volume regulator; *4-stream angle jet projector;* height over all 3⅛ in.; furnished with either ⅜-in. iron pipe male or female thread.

Shipping weight, 2 lb.

Price—

As described, each	$4.50

No. 509 Fountain Head

Nickel plated brass; self-closing stop; volume regulator; 3¾-in. guard ring; *4-stream angle jet projector;* supply ⅜-in. iron pipe.

Shipping weight, 2 lb.

Price—

As described, each	$9.00

HALSEY TAYLOR
DRINKING FOUNTAINS

Sanitary Drinking Fountains with practical automatic stream control.

The Halsey W. Taylor Co.
Warren, Ohio

THE D. A. EBINGER SANITARY MFG. CO.

Manufacturers of "Ebco" Water Coolers

COLUMBUS, OHIO

AGENCIES IN ALL PRINCIPAL CITIES

Products

"Ebco" Drinking Fountains.
"Ebco" Electric Water Coolers; Ebco Iced Water Coolers.

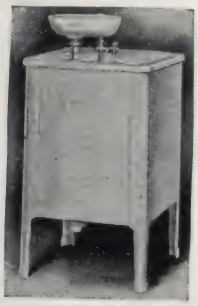
For "Ebco" Steel Enclosures for Toilet, Dressing and Shower Rooms, and Wash Sinks, see Manufacturers' Index.

"Ebco" Water Coolers and Fountains

The safe and sanitary circulation of cool, fresh drinking water is accomplished more economically and satisfactorily by means of "Ebco" Water Coolers and Fountains. Chief among the important features of the "Ebco," is the Angle Jet Bubbler and Automatic Stream Control Valve. They insure a drinking stream which is convenient to drink from and eliminate objectionable spurting and variation in volume due to differences in line pressure. The "Ebco" jet cannot be squirted, tampered with or touched by mouth or fingers; it is one of the most sanitary jets devised. "Ebco" Water Coolers and Fountains are made in all the desired styles. They are perfectly insulated with corkboard sealed with hydraline. Water coils are high grade seamless copper, tinned inside and outside. A complete catalogue of the entire line of iced and electrical type coolers will gladly be mailed on request.

C-271 "Ebco" Iced Water Cooler
With one C-1300 automatic stream control, self-closing valve and angle stream bubbler

C-1600 Glass Filler Valve
Self-closing with regulator and stop. Adjustable flange



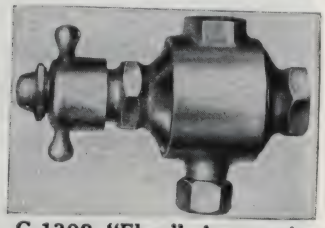
Left:
Model C-304 Angle Stream Bubbler
Condensation basin in top. Finish, white porcelain enameled.
Compressor unit may be placed adjacent to fountain in basement, or in adjoining room

C-581 "Ebco" Electrical Cooler for Bottled Water
Write for our catalogue describing water coolers for electrical refrigeration

C-209 "Ebco" Vitreous Enameled Pedestal Fountain
Furnished with angle stream bubbler, supply and waste to the floor, and C-1300 automatic stream control valve. Heights 30 and 36 in.

Right:
C-241 "Ebco" Vitreous China Wall Fountain
Furnished with angle stream bubbler, C-1400 automatic stream control valve and concealed trap

Automatic stream control regulating valves furnsihed with "Ebco" angle jet bubblers.
Produce a constant drinking stream regardless of varying pressures in water lines



C-1300 "Ebco" Automatic Pressure Regulating Valve
Over 90% efficient on pressure variations between 25 and 100 lb.

Eliminating Water Waste by Measured Water Flow

C-1500 Automatic Pressure Regulator
¼-in. iron pipe inlet, ⅜-in. outlet

C-228 "Ebco" Pedestal Fountain
Has vitreous enameled bowl, painted pedestal and adjustable base. C-295 bubbler and C-1300 automatic stream control valve. Heights 30, 36 and 42 in.

Left:
C-243 "Ebco" Vitreous Enameled Wall Fountain
Furnished with angle stream bubbler, C-1400 automatic stream control valve and nickel-plated "P" trap

OREGON BRASS WORKS

Manufacturers of Bronze Drinking Fountains

Second and Everett Streets
PORTLAND, ORE.

Bronze Drinking Fountains

We produce the very finest bronze rountains at from one-third to one-half the normal cost of manufacturing a single fountain of special design. This saving is effected by manufacturing in quantities and by thus eliminating the designing, modeling and pattern work necessary in producing fountains each of different design.

It is also possible, when a design is being reproduced, to work out the mechanical design and to improve patterns to give more satisfactory results.

Materials

Only the best statuary bronze castings, made from hand chased metal patterns, are used.

All coloring is done by chemical processes and not by the use of colored lacquers.

Finish

All standard hardware finishes can be matched. Sample of finish required should be furnished, if possible.

Special Designs

Though our experience is specializing in the manufacture of fountains, we are in the best position to execute orders for fountains of special design.

Installation

Bolts and special fittings are included where necessary so that these fountains can be installed by any plumber.

Guarantee

Our fountains are guaranteed in every respect. If not entirely satisfactory, they may be returned at our expense.

Prices

Quotations given upon application. Specify finish desired when requesting quotation.

Ornamental Metal Work

We manufacture Ornamental Bronze, Aluminum and White Metal Work and shall be pleased to quote on your requirements in this line.

Design 195

Design 125

Continued on next page

Design 110

Design 140

Design 115

Design 150

Continued on next page

Design 60

Design 160

Design 170

Design 205

Continued on next page

Design 215

Design 255

Design 130

Design 120

INDIVIDUAL DRINKING CUP COMPANY, INC.

Original Makers of the Paper Cup
Manufacturers of Dixie Drinking Cups and Dispensers,
Containers, Carriers, Dishes and Holders
EASTON, PA.

Products

DIXIE DRINKING CUPS and DISPENSERS.

Also Containers and Carriers of various sizes and for various purposes, Dixie Dishes and Holders.

The Architect and the Individual Drinking Cup

In railroad stations, theaters, hotels, banks, office buildings, department stores and, in fact, wherever public drinking outlets are provided, the architect is now making provision for the installation of Dixie Drinking Service as a part of the standard equipment of the structure. The individual cup has been universally recognized as the most satisfactory as well as the safest method.

In some cases, the architect has found it possible to inset the dispenser in the wall. This may be desirable when a flush surface is required but care should be taken that the dispenser can be serviced without difficulty. This can be done either through a panel in the wall back of the fixture or by allowing adequate space for inserting a supply of cups at the opening in the face.

However, since the exposed dispenser is in far more common use at the present time the sizes of the various types are given below, together with a brief description which will enable the architect to select the style best suited to his design.

Dixie Individual Paper Cup

Dixies are shaped round like a glass, with rolled brims and smooth sides. Dixies are sturdy, of two-piece construction without folds, tucks or corrugations and have a raised bottom for proper spacing when nested. Dixies are decorated with an Adam Period design in blue. They are inviting in appearance as well as most pleasant to use.

Dixies Dispensers

No. 18 Dispenser—For use with No. 44 Dixies holding approximately 4 oz. Complete with decorated glass tube. Over-all height 19½ in., width of base 2⅛ in. and depth of base 4⅞ in. Color, mahogany duco. Attach to wall by screws enclosed in envelope inside dispenser.

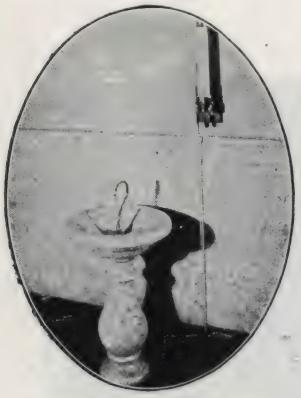
No. 15 Dispenser—For use with No. 44 Dixies, holding approximately 4 oz. Complete with decorated glass tube. Over-all height 23 in., width of base 4 in., depth 5 in. Color, mahogany duco. Attach to wall by special wall plate and screws enclosed in envelope inside dispenser.

No. 31 Penny Vendor for Dixies—For use with No. 5 Dixies, holding approximately 5 oz. Complete with decorated glass tube. Over-all height 33 in., width of base 5 in., depth of base 5¼ in. Color, green duco. Attach to wall by back plate and screws enclosed with vendor.

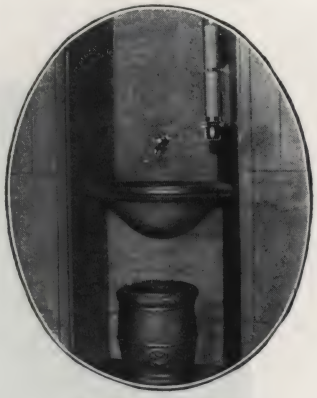
No. 33 "Tower" Penny Vendor for Dixies—For use with No. 5 Dixies, holding approximately 5 oz. Complete with decorated glass tube. Over-all height 36 in., width of base 5½ in., depth of base 6 in. Color, silver poplar. Attach to wall by back plate and screws enclosed with vendor.

Service

Dixies' representatives will submit details on request, and the Dixies' Service Department is prepared to develop special installations under architects' instructions.

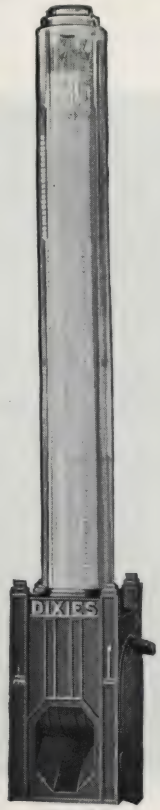


69th Street Theater



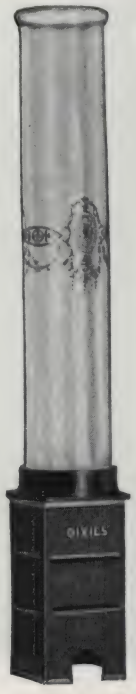
Hotel Cleveland

Bank of Pittsburgh



No. 33
Height, 36 in.
Width, 5½ in.
Depth, 6 in.

No. 15
Height, 23 in.
Width, 4 in.
Depth, 5 in.



No. 18
Height, 19½ in.
Width, 2⅛ in.
Depth, 4⅞ in.

Dispensers for Dixies

Pennsylvania Station, New York

BATHROOM ACCESSORIES

Albatross Steel Furniture Co., Ltd.....D5008–5009
A. P. W. Paper Co.....D5092
Autoyre Co. D5093
Bobrick Mfg. Corp.....D5102
Chicago Hardware Foundry Co.....D5099–5101
Columbia Metal Box Co.....D5010
Corcoran Mfg. Co.....D5011
Equipment & Supply Co., Inc.....D5094
Eustis, J. P., Mfg. Co.....D5012–5019
Fairfacts Co., Inc.....D5021–5038
Gerson-Stewart Corp. D5103
Henkel "Edge-Lite" Corp.....D5039
Hess Warming & Ventilating Co.....D5040–5041
Hoegger, Inc. D5042–5059
Ideal Cabinet Corp., Div. of Deslauriers Metal Products Co., Inc. D5020
Imperial Brass Mfg. Co.....D5104
Lawson, F. H., Co.....D5060
Miami Cabinet Co.....D5061–5063
Morgan Paper Co. Div., United States Envelope Co.....D5095
Morton Mfg. Co.....D5064–5065
Northern Paper Mills.....D5097–5098
Palmer Products, Inc.—
Liquid Soap Dispensers.....D5105
Toilet Paper and Paper Towel Fixtures.....D5096
Parker, Charles, Co.....D5067–5086
Procter & Gamble Co.....D5106
Quaker Metal Products Co.....D5066
Steel & Wike Co.....D5088–5089
United Metal Box Co., Inc.....D5087
U. S. Sanitary Specialties Corp.....D5110–5111
Welded Products Corp.....D5090
West Disinfecting Co.....D5107–5109
"White-Steel" Sanitary Furniture Co.....D5091

ALBATROSS STEEL FURNITURE CO., LTD.

Manufacturers of Bathroom Cabinets and Vanity Mirrors

GENERAL OFFICES AND PLANT
WEST LOS ANGELES, CALIF.

BRANCH OFFICES: SAN FRANCISCO and OAKLAND, CALIF.; SEATTLE, WASH.

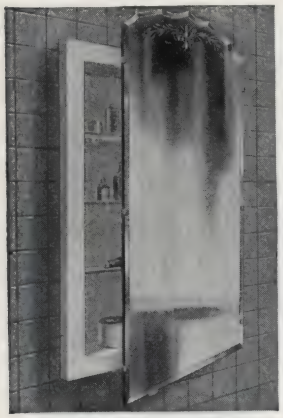
For our pages on Hospital and Fire Hose Cabinets, Steel Toilet, Shower and Dressing Room Partitions, see Manufacturers' Index

ALBATROSS STEEL BATHROOM CABINETS FOR EVERY PURPOSE

Albatross Steel Bathroom Cabinets are for every taste and purse, from conservative rectangular types to new ornate Venetians, made in both the highest quality materials and in regular commercial grades.

All Albatross Cabinets are carefully manufactured and finely finished. Architects may be assured of the best, whatever type or grade is specified.

The Classic
Chromium plated Monel metal frame
No. 2202—Mirror 20x30 in.
No. 2302—Mirror 18x26 in.



The Venetian—Fancy
No. 2822—Mirror 20x32 in.
No. 2832—Mirror 18x28 in.

Razor Blade Slot

All cabinets are now provided with a slot in back for safe, convenient disposal of used razor blades. No more clogged plumbing or cut hands.

Highest Quality Venetian Line

These cabinets are among the finest manufactured at moderate prices. Cases are pressed from highest grade, copper-bearing, specially coated, rust-resisting one piece of sheet steel. There are no seams or crevices.

Doors — One-piece heavy steel reinforced. An ingenious door check bringing door to a cushionlike stop at an angle not to exceed 110°.

Hinges — Special Albatross design, permits instant removal of door without use of loose pin. Invisible and extra heavy.

Shelves—Heavy glass with rolled front edge.

Mirrors—High grade specially selected plate glass, heavily silvered, backs waterproofed. All etching wheel cut. Furnished without if specified. Mirrors attached to doors by Monel metal clips, eliminating drilling of holes into mirrors. Knobs eliminated from all Venetian, Commercial Venetian, and Albanetian models; doors opened by Monel metal attachment on edge of door.

Finish—Finest white enamel, baked on by electric process.

Commercial Venetian Line

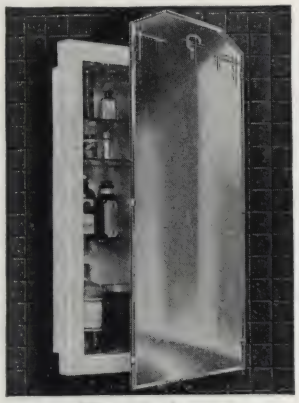
Embody same beauty of design and identical with Venetian line, except lighter cases and highest quality commercial plate glass mirrors. Doors provided with stop hinges of special design. They are developed to provide income properties with same modern bathroom equipment as the finest residences. Our facilities for mass production of this line assure immediate deliveries in any quantity at attractive prices.

Ione Line for Hotels and Institutions

Always the most popular in our entire comprehensive line for hotels, institutions, and similar public buildings.

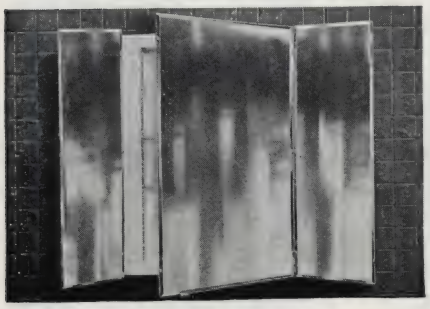
Cases are made same as Venetian line. Doors are hollow metal construction set flush. Hinges, shelves, mirrors and finish are same as highest quality Venetian cabinets.

Access Type Cabinets—Furnished in quantities of 25 or more, all Ione line models mounted in hinged frame to permit quick access to plumbing pipes. Write for details and state quantity.



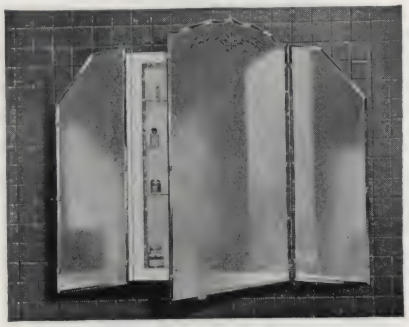
The Moderne
Styled exclusively for Albatross by Robert M. Shipley
No. 2823—Mirror 20x32 in.
No. 2833—Mirror 18x28 in.

The Venetian—Plain
No. 2402—Mirror 20x30 in.
No. 2502—Mirror 18x26 in.



The Patrician—Plain
No. 2413—Mirror 20x30 in. Wings 10 in.
No. 2515—Mirror 18x26 in. Wings 8 in.
Vanity type mirrors as above, mounted on metal backs, without cabinets available

The Sovereign
No. 2842
Mirror 19x32 in.



The Patrician—Fancy
No. 2813—Mirror 20x32 in. Wings 10 in.
No. 2815—Mirror 18x28 in. Wings 8 in.
Vanity type mirrors as above, mounted on metal backs, without cabinets, available

The Patrician—Moderne
Styled exclusively for Albatross by Robert M. Shipley.
Patrician models also supplied, using "The Moderne" mirror design and shape

Write for Complete Catalogue with detailed roughing-in information

Continued on next page

Commercial Venetian
No. 2992—Mirror 14x26 in.

Commercial Venetian
No. 2962—Mirror 14x24 in.
Suitable also for kitchen spice cabinet

Commercial Venetian
No. 2952—Mirror 14x20 in.
Metal frame on sides and bottom.
Recommended for hotel baths

Commercial Venetian
No. 2972—Mirror 14x26 in.
Metal frame on sides and bottom

Mirrors for Numbers 2992, 2952, 2972, and 2982, styled exclusively for Albatross by Robert M. Shipley

SIZES AND DIMENSIONS

Cat. No.	Over-all dimensions, in.	Wall opening, in.			Mirror, in.	Opening from bottom of floor, in.
		Width	Height	Depth		
2202	20 x30	16¾	26¾	3½	20x30 plain	47
2302	18 x26	14⅝	22⅝	3½	18x26 plain	49
2402	20 x30	16¾	26¾	3½	20x30—⅜ bev.	47
2413	41 x30	16¾	26¾	3½	See cut	47
2502	18 x26	14⅝	22⅝	3½	18x26—⅜ bev.	49
2515	35 x26	14⅝	22⅝	3½	See cut	49
2602	19¾x29¾	16¾	26¾	3½	18x28—¾ bev.	47
2702	17¾x25¾	14⅝	22⅝	3½	16x24—¾ bev.	49
2813	41 x32	16¾	26¾	3½	See cut	47
2815	35 x28	14⅝	22⅝	3½	See cut	49
2822	20 x32	16¾	26¾	3½	20x32—⅜ bev.	47
2823	20 x32	16¾	26¾	3½	20x32—⅜ bev.	47
2832	18 x28	14⅝	22⅝	3½	18x28—⅜ bev.	49
2833	18 x28	14⅝	22⅝	3½	18x28—⅜ bev.	49
2842	19 x32	16½	29½	5½	19x32—⅜ bev.	47
2952	14⅜x25½	12¼	22⅜	3½	14x20 bev.	48
2962	14 x24	12¼	22⅜	3½	14x24 plain	51
2972	14⅜x26	12¼	22⅜	3½	14x26 bev.	51
2982	16 x24	14⅛	20¼	3½	16x24 plain	51
2992	14 x26	12¼	22⅜	3½	14x26 plain	51
3072	17 x26	14⅝	23⅝	3½	12x16—¾ bev.	47
3092	19 x29½	16¾	27¼	3½	14x18—¾ bev.	46
3170	17 x21	14⅝	18⅝	3½	12x16—¾ bev.	53
3192	19 x23	16¾	20¾	3½	14x18—¾ bev.	52
3182	21 x25	18¾	22¾	3½	16x20—¾ bev.	51

Access Models—Write for blue print indicating Ione size desired.

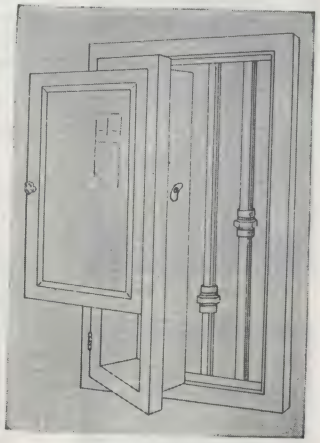
(1) Bevel may be omitted on Ione models, surface cabinets, and wall mirrors, at substantial saving in cost.
(2) Standard hinging is right hand. Left-hand hinge supplied at extra cost.
(3) Plate glass in bottom may be specified at extra cost.
(4) All models, except Commercial Venetian may be set in bucks before tiling or plastering, if desired. Commercial Venetian models must overlap tile or plaster.
(5) All models, except Commercial Venetian and Ione are carried in stock with 6-in. depth at slight extra cost. 4-in. depth is standard, except for The Sovereign, which is 6 in.

Commercial Venetian
No. 2982—Mirror 16x24 in.

The Albanetian
Metal frame around mirror
No. 2602—Mirror 18x28 in.
No. 2702—Mirror 16x24 in.

The Ione—Open Shelf
No. 3072—Mirror 12x16 in.
No. 3092—Mirror 14x18 in.

The Ione—Full Closed
No. 3170—Mirror 12x16 in.
No. 3192—Mirror 14x18 in.
No. 3182—Mirror 16x20 in.



Access Type Cabinets
Any Ione Model built into backless frame to which it is hinged, allowing access to plumbing. Not carried in stock. No orders accepted for less than 25.
No. 3072—Access.
No. 3092—Access.
No. 3170—Access.
No. 3192—Access.
No. 3182—Access

Complete catalogue shows comprehensive line of wall mirrors, wall mirrors with shelf, and surface cabinets for mounting on wall where recess cannot be provided

ESTABLISHED 1908

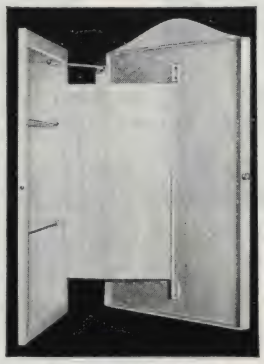
COLUMBIA METAL BOX CO.

TELEPHONE
MOTT HAVEN 4240-1-2-3-4-5

260 East 143rd Street
NEW YORK, N. Y.

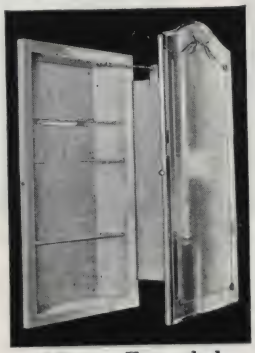
Perfectlite, the Medicine Cabinet with the Adjustable Mirror

Door Open Hinge Folded
The Perfectlite hinge lays snugly against back of door, out of the way, but ready for instant use



Hinge Unfolded
A slight pull, the hinge unfolds, bringing mirror forward. Here mirror is swung at a sharp angle but can be pivoted in the opposite direction

The accompanying illustrations show the construction of the Perfectlite Medicine Cabinet and illustrate the advantages of an *adjustable* mirror. Proper reflection cannot be had unless the mirror is in the correct position to pick up the light rays—artificial or natural. This, Perfectlite, *the adjustable mirror cabinet,* does with ease. Swinging to practically any angle, catching the best light, it adjusts itself to the convenience of the user. The extended hinge arrangement on which the mirror swings is concealed from view when the door is closed, is sturdily built and cannot get out of alignment

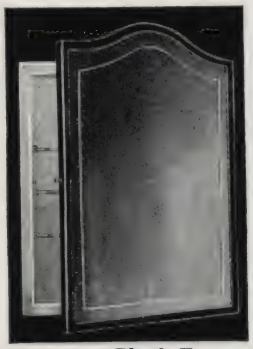


Mirror Extended
Here the mirror is extended straight out from the cabinet and is in position to be turned either right or left to catch the best light reflection

The Perfectlite Cabinet in Use
Convenient access to the contents of the cabinet is obtained with the mirror in use at the same time

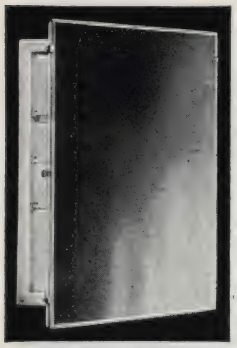
Chromium Frame

Venetian



Venetian, Black Frame

Venetian



All-Mirror Front

Columbia No. 11 or 21

Structural Features of Columbia-Quality Steel Cabinets

Made of heavy gauge furniture sheet steel, electrically spot-welded. Doors are hung on unusually strong hinges. When closed the door presents a solid front. No cracks or crevices in which dust can collect. Shelves are bulb edge clear glass; shelf clips channel type. Knobs are ornamental glass, except on the Venetian mirror and chromium frame cabinets; on these, small nickel knobs are used. Catch is of bullet type to close door securely. All exposed parts finished with a permanent smooth white enamel finish. Other standard colors furnished in quantity.

COLUMBIA-QUALITY STEEL CABINETS

Cat. No.	Over all size, in.	Wall opening, in.	Mirror size, in.	Cat. No.	Overall size, in.	Wall opening, in.	Mirror size, in.
11628V	16 x28	14 x24	16x28	†10A	16⅝x20⅝	14½x18½	12x16
21830V	18 x30	16 x26	18x30	10B	16⅝x20⅝	14½x18½	12x16
32032V	20 x32	18 x28	20x32	*10P	16⅝x20⅝	14½x18½	12x16
01624V	16 x24	14 x20	16x24	†20A	18⅝x22⅝	16½x20½	12x16
01628V	16 x28	14 x24	16x28	20B	18⅝x22⅝	16½x20½	12x16
11622BV	16 x22	14½x18½	16x22	20C	18⅝x22⅝	16½x20½	14x18
21824BV	18 x24	16½x20½	18x24	30B	20⅝x26⅝	18½x24½	16x22
32028BV	20 x28	18½x24½	20x28	†11A	16⅝x26⅝	14½x24½	12x16
11622CV	16 x22	14½x18½	16x22	11B	16⅝x26⅝	14½x24½	12x16
21824CV	18 x24	16½x20½	18x24	21B	18⅝x28⅝	16½x26½	12x16
32028CV	20 x28	18½x24½	20x28	21C	18⅝x28⅝	16½x26½	14x18
11620CF	16½x20½	14½x18½	16x20	†10AW	16 x20	Surface mounting	12x16
21822CF	18½x22½	16½x20½	18x22	10BW	16 x20		12x16
32026CF	20½x26½	18½x24½	20x26	†01216AW	14 x18		12x16
01622AM	16 x22	14 x20	16x22	11216AW	16 x20		12x16

Depth of all cabinets: 4¾ in.
Key explanation: V—Venetian; BV—Black frame Venetian; CV—Chromium Venetian; CF—Chromium frame; AM—All-mirror front.

Depth of all cabinets: 4¾ in.
*Plain plate glass mirror.
†Plain mirrors: not plate glass.
Key explanation: A, plain mirror; B and C, beveled mirror; W, surface mounting.

Note: All Columbia Cabinets can be equipped with the Perfectlite Adjustable Mirror feature.

All listings are for standard door cabinets. When the Perfectlite Adjustable mirror feature is desired, add letter "P" to catalogue number.

Venetian Chromium Frame

Columbia No. 10, 20 or 30

THE CORCORAN MANUFACTURING COMPANY

Manufacturers of Corcoran One-piece Steel Bathroom Cabinets

(PATENT PENDING)

CINCINNATI, OHIO

BRANCH OFFICES AND WAREHOUSES

CHICAGO, ILL., 1820 McCormick Building
PHILADELPHIA, PA., 1228 Locust Street
NEW YORK, N. Y., 11 West 42nd Street
BOSTON (CAMBRIDGE), MASS., 292 Main Street
BALTIMORE, MD., 2-423 West Baltimore
LOS ANGELES, CAL., 1318 So. Grand Avenue
SAN FRANCISCO (BERKELEY), CAL., 1760 Walnut Street
CANADA: G. MASON PRICE, 632 St. James Street, MONTREAL, QUE.

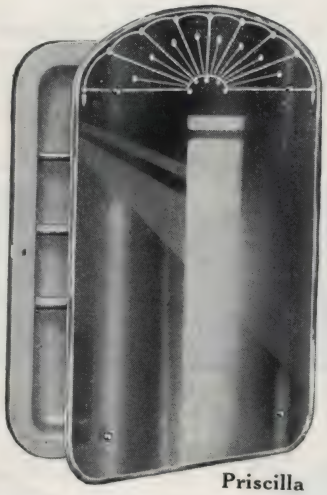
Products

CORCORAN BATHROOM CABINETS.

Also Corcoran Special Hotel Type Cabinets including all accessories, such as Towel Rack, Light Fixture, Hook for wet towel and razor strop, corkscrew opener, etc.; Corcoran Vanity Cabinets with side wings; Corcoran Wall Cabinets.

Corcoran One-piece Steel Bathroom Cabinets

The body and flanges of Corcoran Cabinets are drawn from one piece of heavy gauge extra deep drawing steel —not two or more pieces of lighter gauge steel welded or seamed together. There are *no welded joints—no lap seams —no cracks—no raw edges—no sharp corners.* Corcoran Cabinets present features of design and construction entirely new and of outstanding superiority. Our catalogue describes in detail each individual cabinet—write for your copy today.



Priscilla

Princeton

Distinctive Features of Corcoran One-piece Steel Bathroom Cabinets

(1) Entire cabinet body and flange drawn from one continuous piece of steel.

(2) Round corners—inside and outside—easy to clean and keep clean.

(3) Continuous piano type door hinge of brass—heavily nickel plated. Will not sag or warp.

(4) Three heavy bulb edge glass shelves notched in ends to prevent slipping—easily removed.

(5) Shelf supports of nickeled brass held in place with special type screws and double locking washers.

(6) *New automatic door opener.* Press nickel plated bolt on return flange and door opens. Positive in action. Latest improvement—a superior Corcoran feature.

(7) *The brass spring plunger* acting in conjunction with the door fastener also serves as cushion when closing the door, thus preventing mirror breakage.

(8) Nickel plated combination chain with heavy spring door stop.

(9) Four nickel plated bolts and nuts for fastening mirrors to doors.

(10) Finished with pyroxylin lacquer. The prime coat is baked on at a temperature of 360°. No cheap enamels used.

(1) Mirrors are guaranteed against defective silvering for six months.

Any defects will always show up long before this time.

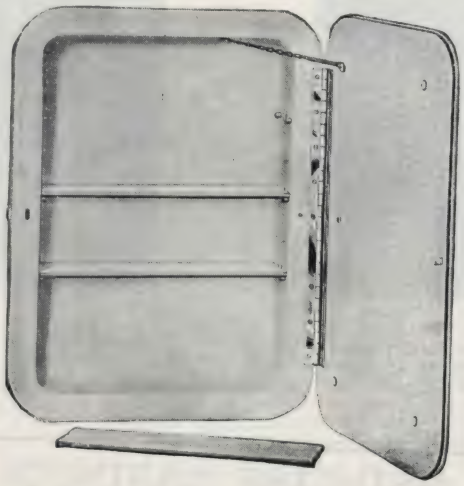
Little Aristocrat and Aristocrat and Autocrat

SIZES, WALL OPENINGS AND PRICES

Model	Mirror, size, in.	Wall opening, in.	List price, each
Venetian Mirror Type			
Avon	10x22	13¼x19¼x3¼	$18.00
Clifton	18x24	15¼x21¼x3¼	22.00
Melrose	21x27	18¼x24¼x3¼	27.00
Little Aristocrat	16x22	13¼x19¼x3¼	22.00
Aristocrat	18x24	15¼x21¼x3¼	26.50
Autocrat	21x27	18¼x24¼x3¼	30.00
Beechmont	16x24	13¼x19¼x3¼	20.00
Princeton	18x28	15¼x21¼x3¼	26.00
Tuxedo	21x30	18¼x24¼x3¼	32.00
Clovernook	16x24	13¼x19¼x3¼	21.00
Glendale	18x26	15¼x21¼x3¼	24.00
Priscilla	21x30	18¼x24¼x3¼	28.00
Cathedral	18x25	15¼x21¼x3¼	30.00
Alhambra Jr.	16x24	13¼x19¼x3¼	26.00
Alhambra	18x28	15¼x21¼x3¼	32.00
Moderne	18x26	15¼x21¼x3¼	34.00
Vogue	21x30	18¼x24¼x3¼	38.00
Peerless	21x30	18¼x24¼x3¼	28.00

Prices on all colored mirrors are based on furnishing standard colors. If other colors are desired, add $1.00 to list price.

All venetian mirror cabinets can be furnished with straight line etching only if so desired, at no additional cost. If furnished without etching, deduct $0.50 per cabinet.



SIZES, WALL OPENINGS AND PRICES

Model	Mirror, size, in.	Wall opening, in.	List price, each
Colonial Mirror Type			
20	13x19	13¼x19¼x3¼	$15.00
200	15x21	15¼x21¼x3¼	18.00
250	18x24	18¼x24¼x3¼	23.00
30	13x13	13¼x19¼x3¼	14.00
300	15x15	15¼x21¼x3¼	17.00
350	18x18	18¼x24¼x3¼	22.00
Regular Insert Type			
40	12x18	13¼x19¼x3¼	11.00
400	14x20	15¼x21¼x3¼	14.00
450	16x22	18¼x24¼x3¼	19.00
50	12x12	13¼x19¼x3¼	10.00
500	14x14	15¼x21¼x3¼	12.50
550	16x16	18¼x24¼x3¼	18.00
60	10x16	13¼x19¼x3¼	9.50
600	12x18	15¼x21¼x3¼	12.00
650	14x20	18¼x24¼x3¼	17.00
70	10x10	13¼x19¼x3¼	9.00
700	12x12	15¼x21¼x3¼	11.00
750	14x14	18¼x24¼x3¼	16.00

J. P. EUSTIS MFG. CO.

Manufacturers of "Brasscrafters" Bathroom Accessories

12-16 Ames Street, CAMBRIDGE "A" (BOSTON), MASS.

Products

BATHROOM ACCESSORIES, which The TRADE MARK Brasscrafters include:

"Evalast" Mirrors, Structural Mirrors, Pier Type Mirrors.

Mirrors for Institutions, School and Commercial Buildings.

One-piece Steel Medicine Cabinets, Recess and Wall Types.

Pier or Venetian Type "Evalast" Mirror-door Recess Medicine Cabinets.

Soap Dishes, Combinations, and Sponge Holders.

Tumbler and Tooth Brush Holders.

Towel Bars and Hand Rails.

Shelves, Brackets and Shelf Rails.

Glass Shelf Combinations.

Towel Baskets and Toilet Paper Holders.

Installations

Accessories with the trade-mark "The Brasscrafters" indented in the metal have been specified by architects for thirty years for homes, hotels, hospitals, institutions, schools and public buildings, and instances of special achievements make a long list of satisfied architects and owners alike.

Catalogue

Hand Book "O"—presenting the complete line—will be mailed on request.

BRASSCRAFTERS' "EVALAST" MEDICINE CABINETS AND MIRRORS

Mirror plates scientifically silvered by the "Evalast" process—brilliant, permanent. Guaranteed to withstand climatic and atmospheric moisture; also contact with water, steam and direct sunlight.

No dull, streaked or discolored plates.

No trace of corrosion or oxidation.

The "Evalast" process is invaluable in Mirrors ornamented in gold, silver, gunmetal or color, or in combinations of these finishes.

These illustrations below, made from actual photographs (without retouching) of specimens of mirror plates which were submerged constantly in water for over eight months, except for occasional inspection, demonstrate graphically the action of silver under atmospheric moisture when applied by the usual process and by the "Evalast" Process.

Usual Process

Plate I—The deterioration, so apparent in the streaks, crazes, and dullness, is common in mirrors silvered by the usual process. Mirrors so affected may be found everywhere—in homes, on ships, institutions, and public building installations.

"Evalast" Process

Plate II—Shows, in comparison with Plate I, much better than word description can, the perfection and freedom from the usual deterioration which are guaranteed to you when you buy and install the Brasscrafters' "Evalast" Mirrors and Medicine Cabinets.

The TRADE MARK Brasscrafters | MEDICINE CABINETS | PLATE 1

Continued on next page

VENETIAN-TYPE "EVALAST" MIRROR-DOOR, RECESS MEDICINE CABINETS

The New "Evalast" Silvering Process Adds Brilliance and Permanence to the All-mirror Door of French Plate Glass

Body—The body of the cabinet is entirely concealed behind the mirror door of "Evalast" French plate glass and finished *white*. Ample capacity is made possible by the smooth, seamless interior. Adjustable shelves of white vitrolite glass; shelf-rest support is out of view.

Door—The all-mirror door of French plate glass is silvered by the new "Evalast" oxidation-proof process. This is in contrast to the usual processes, which are subject to deterioration on exposure to steam and moisture in the bathroom. The mirror, in frameless type, is mounted on an invisible angular, non-ferrous metal back with the lateral sides finished in chromium, which harmonizes with any decorative scheme regardless of color or combinations of color in the bathroom.

Catch—The catch is made positive by the two-sided friction principle. It remains out of view, releases with a slight pull, yet will not become unfastened of its own accord.

Hinges—Simple, sturdy hinges are used. They keep the door well balanced until checked by a mechanical stop. These hinges give strength where strength is needed.

Designs—"The Brasscrafters" mirror designs are *cut*, not etched, in the French mirror plate. They are not mere decorations, but authentic motifs derived from the famous Roman Baths of antiquity, and they preserve for the modern bathroom all the beauty and harmony of their classic lineage.

No. 82. Pompeian Design
Adapted from a Pompeian wall decoration now preserved in the Naples museum

No. 83. Cornucopia Design
Motif from the famous baths of Titus

Flambeau Design
From the baths of Titus, used by Raphael in building decorations

SPECIFICATIONS AND ROUGHING-IN MEASUREMENTS

Glass dim., in.	Extr. dim., in.	Frame width, in.	Body, in.	Openings for installations all sides straight, in.			Shelves in each
				Wide	High	Deep	
20x28	22x30	1½	19x25	19⅝	25¼	4⅜	3

DESIGNS AND FINISHES

Design casting	Chromium finish, No.	White finish, No.
Plain	6080CP	16080
Flambeau	6081CP	16081
Pompeian	6082CP	16082
Cornucopia	6083CP	16083
Dolphin	6084CP	16084

No. 62054. Dolphin Design
From a frieze in the baths of Agrippa

SPECIFICATIONS AND ROUGHING-IN MEASUREMENTS

No.	Extreme and glass dim., in.	Body, in.	Openings for installations, all sides straight, in.			Shelves in each
			Wide	High	Deep	
62011	18x26 ¾	15x21	15⅝	21¼	4⅜	2
62023	20x28 ¾	17x23	17⅝	23¼	4⅜	3
62054	22x30 ¾	19x25	19⅝	25¼	4⅜	3

Design Cuttings

No. 81 Flambeau, No. 82 Pompeian, No. 83 Cornucopia, No. 84 Dolphin. (Specify which.)
Lateral edges of metal angular back are finished chromium.

Continued on next page

VENETIAN "EVALAST" MIRRORS

Angular Metal Back with Lateral Sides Chromium Finish

No. 7184. Dolphin Design

SIZES AND OTHER DATA

No.	Dimensions, in.	Design
Square Top		
2019	18x24	Plain or V-mitre cut
2029	20x26	Plain or V-mitre cut
2059	22x28	Plain or V-mitre cut
Art-Moderne or Semi-Hex Top		
2016	18x30¾	Plain or V-mitre cut
2026	20x32¾	Plain or V-mitre cut
2056	22x34¾	Plain or V-mitre cut
Colonial Top		
2018	18x28	Plain or V-mitre cut
2028	20x32	Plain or V-mitre cut
2058	22x34	Plain or V-mitre cut
Semi-Colonial Top		
7181	18x28¾	No. 81 Flambeau
7183	20x28¾	No. 83 Cornucopia
7184	22x30¾	No. 84 Dolphin

The mirror plates are fastened with concha button head machine screws and tension washers on an invisible angular metal frame with its lateral edges finished in chromium. The devices for mounting mirrors on wall are housed in angular frame, independent of mirror plate fastenings, which eliminate the stress inherent in the usual method of mounting Venetian mirrors.

Gold, silver, gunmetal or color, or in combinations of these finishes—plain, beveled,, V-cut, etched or otherwise ornamented.

"EVALAST" MIRRORS FOR THE HOME, INSTITUTIONS, AND COMMERCIAL BUILDINGS

Types
Venetian, Rectangular, Colonial and Oval.

Mirror Plates
"Evalast" Commercial French, Selected French and American Plate Glass.

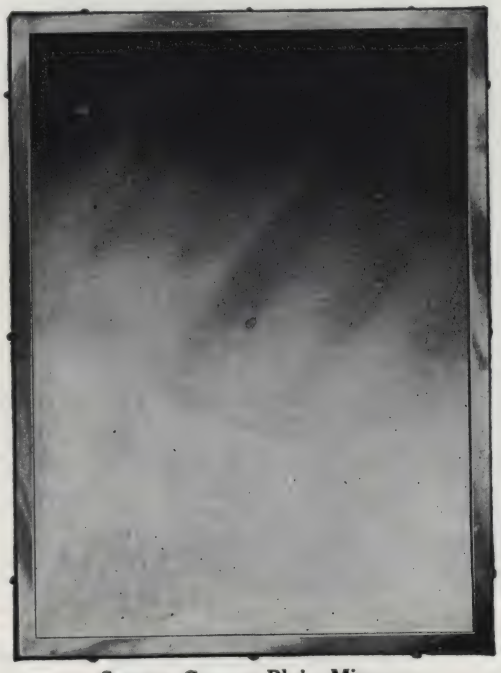
Frames
Seamless metal frames in a choice of materials.

Finishes
Chromium, nickel silver, gold, white and colors.

Dimensions
7500 Series—
Frame ½ in.; 10x16, 12x18, 12x20, 14x18 and 14x24 in.
Frame ¾ in.; 14x20, 16x24, 18x24, 18x30 and 18x36 in.
Frame ¾ or 1 in.; 20x30, 24x30 and 24x36 in.

Facilities
Permit the manufacture of special sizes in the various types and finishes.

Specify Complete
Dimensions; mirror plate grade; plain or bevel; finish on frame; if rectangular, round or square corner; concealed or visible mounting.



Square Corner Plain Mirror

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VENETIAN TYPE "EVALAST" MIRROR DOOR RECESS MEDICINE CABINETS

SPECIFICATIONS AND ROUGHING-IN MEASUREMENTS

Chromium finish Lateral edges of back of door	Colonial Top		
	No. 62018	No. 62028	No. 62058
Extreme of mirror plate.in.	18 x28	20 x32	22 x34
Extreme of body flange.in.	17¼x23¼	19¼x25¼	21¼x27¼
Body .....in.	15 x21	17 x23	19 x25
Wall line to back.....in.	4⅜	4⅜	4⅜
Opening required for installation			
Wide .....in.	15⅝	17⅝	19⅝
High .....in.	21¼	23¼	25¼
Deep .....in.	4⅜	4⅜	4⅜
White vitrolite glass shelves in each.....	2	3	3

The plate numbers apply to frameless and miter lines as shown.

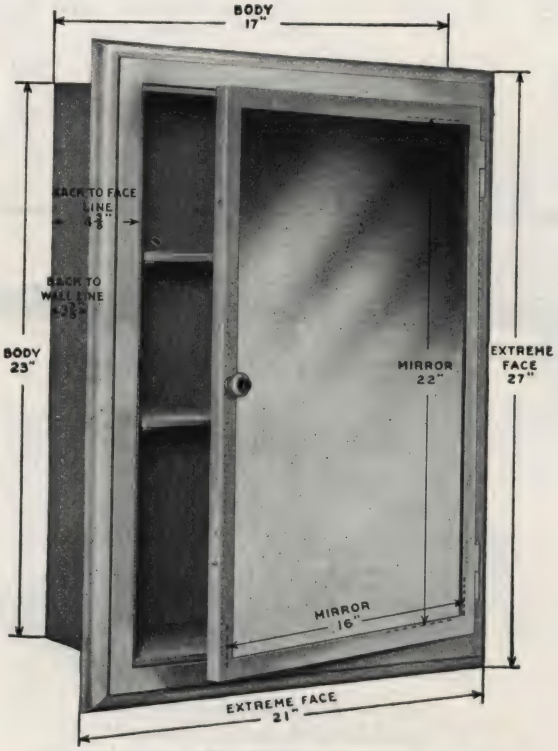
Manufactured without miter lines and with doors framed ½ in. wide with or without miter lines.

Gold, silver, gunmetal or color, or in combinations of these finishes—plain, beveled, V-cut, etched, or otherwise ornamented.

ONE-PIECE STEEL RECESS MEDICINE CABINETS

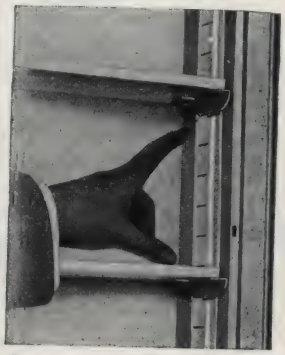
SPECIFICATIONS AND ROUGHING-IN MEASUREMENTS

Full Mirror Door	No.16010	No.16020	No.16025
Extreme of moulded edges.....in.	19x25	21x27	23x29
Body .....in.	15x21	17x23	19x25
Mirror without bevel .....in.	14x20	16x22	18x24
Wall line to face .....in.	1	1	1
Wall line to back .....in.	3⅜	3⅜	3⅜
Opening required for installation			
Wide .....in.	15¼	17¼	19¼
High.....in.	21¼	23¼	25¼
Deep .....in.	3⅜	3⅜	3⅜
Vitrolite glass shelves in each	2	2	3
Part Mirror Door and Open Shelf	**No.16015**	**No.16030**	**No.16035**
Extreme of moulded edges.....in.	19x25	21x27	23x29
Body .....in.	15x21	17x23	19x25
Mirror in door without bevel .....in.	14x14	16x16	18x18
Open shelf under door .....in.	14¾x5¾	16¾x5¾	18¾x5¾
Wall line to face.....in.	1	1	1
Wall line to back.....in.	3⅜	3⅜	3⅜
Opening required for installation			
Wide .....in.	15¼	17¼	19¼
High.....in.	21¼	23¼	25¼
Deep .....in.	3⅜	3⅜	3⅜
Vitrolite glass shelves in each	3	3	3



No 16020
Full Mirror Door Type

Nos. 16015, 16030 and 16035
Part Mirror Door and Open Shelf Type



Sectional View of Cabinet Showing Adjustable Shelf Rests

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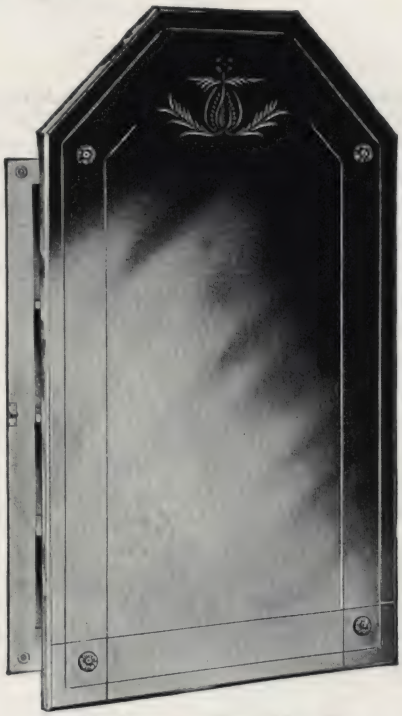
VENETIAN TYPE "EVALAST" MIRROR DOOR RECESS MEDICINE CABINET

The "Evalast" process is invaluable in mirrors ornamented in gold, silver, gunmetal or color, or in combinations of these finishes.

Square Top



Art-Moderne or Semi-Hex Top

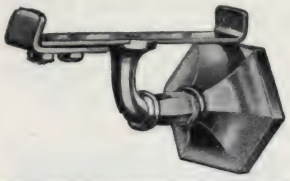
SPECIFICATIONS AND ROUGHING-IN MEASUREMENTS

Chromium finish Lateral edges of back of door	Square Top			Art-Moderne or Semi-Hex Top Design No. 81		
	No. 62019	No. 62029	No. 62059	No. 62016	No. 62026	No. 62056
Extreme of mirror plate....in.	18 x24	20 x26	22 x28	18 x30¾	20 x32¾	22 x34¾
Extreme of body flange....in.	17¼x23¼	19¼x25¼	21¼x27¼	17¼x23¼	19¼x25¼	21¼x27¼
Body....in.	15 x21	17 x23	19 x25	15 x21	17 x23	19 x25
Wall line to back....in.	4⅜	4⅜	4⅜	4⅜	4⅜	4⅜
Opening required for installation						
Wide....in.	15⅝	17⅝	19⅝	15⅝	17⅝	19⅝
High....in.	21¼	23¼	25¼	21¼	23¼	25¼
Deep....in.	4⅜	4⅜	4⅜	4⅜	4⅜	4⅜
White vitrolite glass shelves in each....in.	2	3	3	2	3	3

The plate numbers apply to frameless doors and miter lines as shown.
Manufactured without miter lines and with door framed ½ in. wide with or without miter lines.

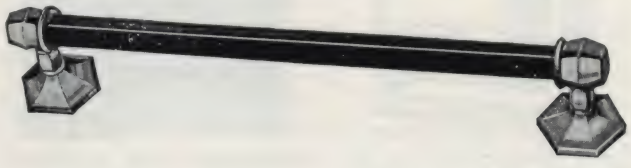
ART-MODERNE FIXTURES

Patent Nos. 79771, 79772, 79773, 79774



DIMENSIONS AND PRICE LIST

Shelf length, in.	Chromium finish	Black glass 3/16 in. thick		Polished plate glass ½ in. thick	
		5 in. wide	6 in. wide	5 in. wide	6 in. wide
18	680CP	.....	.....	.....	.....
24	682CP	.....	.....	.....	.....
30	684CP	.....	.....	.....	.....



Glass Towel Bars

No. 618, length, 18 in. No. 630, length, 30 in.
No. 624, length, 24 in. No. 636, length, 36 in.
Black or crystal square bars, ⅞-in. sides
Black or crystal round bars, 1 in. diam.

Hand Rails

No. 609, length, 9 in.; diameter, 1¼ in.
Black round, crystal round, all-metal round

Available in gold plate and silver plate

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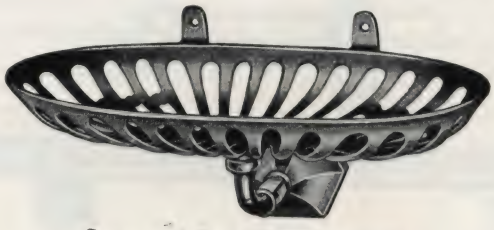
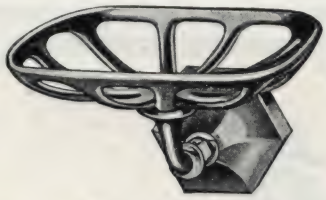
ART-MODERNE FIXTURES

(Patent Nos. 79771, 79772, 79773, 79774)

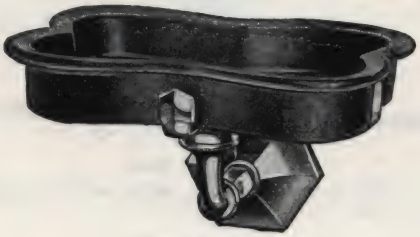


Soap and Bath Brush Holder
No. 641CP. Chromium Finish
10½x4¼x2 in. deep



Soap Holder
No. 643CP. Chromium Finish
5x3¾ in.

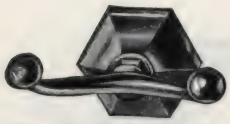
Tumbler Holder and Tumbler
No. 651CP. Chromium Finish
Black or crystal tumbler



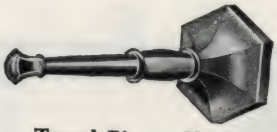
Soap Holder
No. 649CP. Chromium Finish
Black or crystal insert, 6x4½ in.

Tumbler Holder, Tumbler, and Tooth Brush Spreader
No. 652CP. Chromium Finish
Black or crystal tumbler

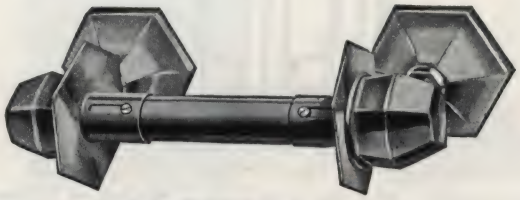
Robe Hook
No. 656CP. Chromium Finish
Projects 2½ in.



Double Robe Hook
No. 657CP. Chromium Finish
Projects 2½ in. Spread 3¼ in.



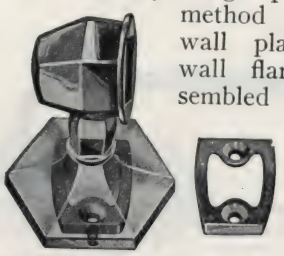
Towel Pin or Hook
No. 655CP. Chromium Finish
Projects 6 in.



Lock Roll Toilet Paper Holder
No. 635. Chromium Finish

Key-wedge Principle for Concealed Mounting

The key-wedge principle for concealing the method of mounting consists of wall plate for engaging base of wall flange, functioning when assembled much the same as the keystone in arch construction. Locate the wall plate or wedge on wall, engage the wall flange bars, tighten setscrew, and the fixture is held in place rigid and secure.



Wall Flange Base **Key-wedge or Plate**
Graphic illustration

Available in gold plate and silver plate

Continued on next page

A LISTING OF TYPICAL BRASSCRAFTERS' ACCESSORIES

Concha Head Screw and Concealed Screw Types—Out of the records of architects' specifications comes the fact that a complete presentation of the items in our general catalogue makes for confusion in writing specification and that this listing of typical items dependable represents approximately 80% of what the public demands in bathroom and lavatory accessories.

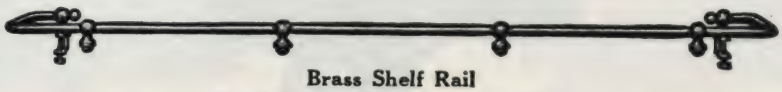
Type 5600, 5615, 5700

Type 5610, 5625, 5710

Type 5605, 5620, 5705

DIMENSIONS OF SHELVES AND BRACKETS

Type	Thick, in.	Glass	Width, in.	Length, in.
5600	3/8	Polished plate	5 and 6	18, 20, 24, 27, 30
5615	1/2	Polished plate	5 and 6	20, 24, 27, 30, 33
5700	7/16	White vitrolite	5 and 6	18, 20, 24, 27, 30
5605	3/8	Polished plate	5 and 6	18, 20, 24, 27, 30
5620	1/2	Polished plate	5 and 6	20, 24, 27, 30, 33
5705	7/16	White vitrolite	5 and 6	18, 20, 24, 27, 30
5610	3/8	Polished plate	5 and 6	18, 20, 24, 27, 30
5625	1/2	Polished plate	5 and 6	20, 24, 27, 30, 33
5710	7/16	White vitrolite	5 and 6	18, 20, 24, 27, 30



Brass Shelf Rail

For shelves 1/4, 3/8, 7/16 and 1/2 in. thick
Widths, 5 and 6 in. Lengths, 18, 20, 24, 27, 30 and 33 in.

Glass Towel Shelf; Annealed Glass Towel Bar
No. 5351. Finishes, Chromium, Nickel or White
Shelf, 24 in. long, 5 in. wide; bar, 18 in. long, 1 in. diam.

Brass Towel Shelf
No. 4751. Finishes, Chromium, Nickel or White
Shelf, 24 in. long, 8 in. wide; 5-bar

DIMENSIONS OF TOWEL BARS

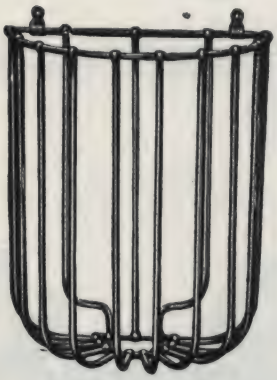
No.	Series	Diam., in.	Length, in.
1600	Metal	1	8, 12, 18, 24, 30, 36
2900	Glass	1	18, 24, 30, 36
1800	Metal	3/4	12, 18, 24, 30, 36
189	Glass	3/4	18, 24, 30, 36

Finishes: chromium, nickel or white.

DIMENSIONS OF TOWEL BARS

No.	Series	Diam., in.	Length, in.
2500	Metal	5/8	18, 24, 30, 36
1400	Metal	1/2	18, 24, 30, 36

Finishes: chromium, nickel or white.

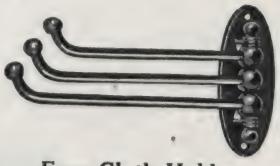


Wall Towel Basket
(Extra heavy)
No. 4502. Finishes, Chromium, Nickel or White
Indestructible joint construction, 16 in. high, 12½ in. wide, 7 in. back to front

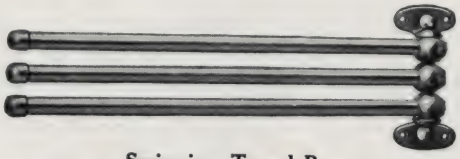
Available in gold plate and silver plate

Continued on next page

A LISTING OF TYPICAL BRASSCRAFTERS' ACCESSORIES



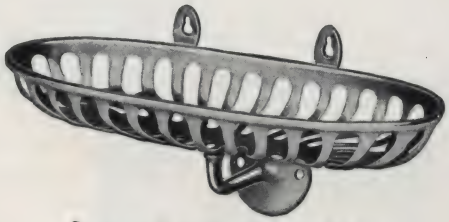
Face Cloth Holder
No. 2306. Finishes, Chromium, Nickel or White
Three-bar, 6 in. long, ¼ in. diam.



Swinging Towel Bar
No. 2103. Finishes, Chromium, Nickel or White
Three-bar, 14 in. long, ½ in. diam.

Tumbler Holder
No. 5191—Finishes, Chromium, Nickel or White

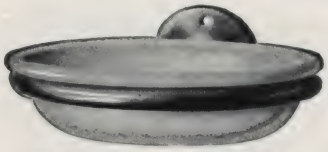
Tooth Brush Holder
No. 5192. Finishes, Chromium, Nickel or White



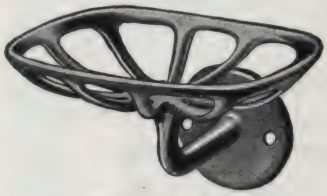
Soap and Bath Brush Holder
No. 4801. Finishes, Chromium, Nickel or White

Soap Holders—Finishes, Chromium, Nickel or White

No. 4039. Soap Holder



No. 4077. Soap Holder
Removable glass lining 6x4 in.



No. 4043. Soap Holder
Heavy radial design 5x3¾ in.

Coat and Robe Hooks and Toilet Paper Holders—Finishes, Chromium, Nickel or White

No. 5510
Projects 1 in., wall base 1¼ in.

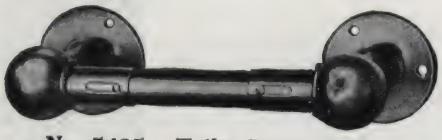
No. 5513
Single. Projects 2½ in., wall base 2 in.

No. 5532
Double. Projects 1¼ in., wall base 2 in. Spread 3¼ in.
No. 5534—Triple. Projects 2 in., wall base 2 in., diameter spread 4¼ in.

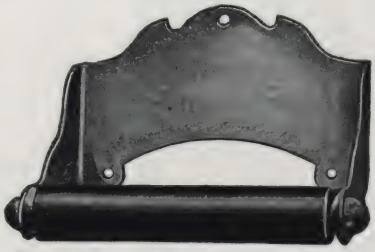
No. 5545
Projects 3½ in., wall base 1¾ in., height 4 in.

No. 5555
Projects 4 in., wall base 2½ in., height 3½ in.

No. 5451. Toilet Paper Box
Plain solid reinforced edge



No. 5435. Toilet Paper Holder
Lock roll. Extra heavy, three-piece



No. 5420. Toilet Paper Holder
Extra heavy plain design. Black rubber enamel roll springs into ball sockets

Available in gold plate and silver plate

IDEAL CABINET CORP.

DIVISION OF DESLAURIERS METAL PRODUCTS COMPANY, INC.
FACTORY AND MAIN OFFICE
8835 Central Avenue, DETROIT, MICH.
BRANCH OFFICES
CHICAGO, ILL. ST. PAUL, MINN. LOS ANGELES, CAL. OAKLAND, CAL.

Products

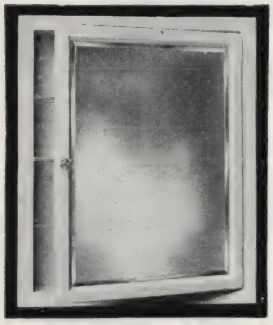
MEDICINE CABINETS of die-stamped and die-folded steel; UTILITY CABINETS; STEEL PACKAGE and MILK RECEIVERS; METAL COLUMN FORMS for casting round, octagon and rectangular columns with rounded ends.

Also Metal Clothes Chute Doors.

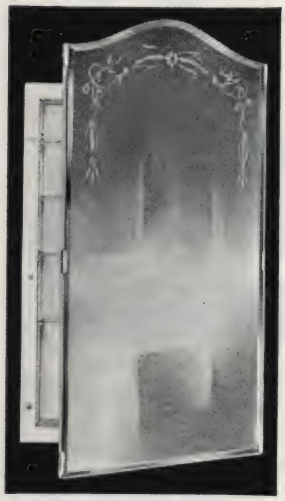
The Steel Medicine Cabinet Line

Standardization and quantity production on a quality basis have made it possible to offer the architect and builder four different models of regular recessed cabinets and five various models of Venetian type Cabinets.

Model "J" Cabinet



Model "C" Cabinet



Venetian Cabinet
Model "G"

Models "A", "B" and "J" hotel type cabinets have die-stamped moulded frames. All other models have ¼-in. narrow frame die-folded.

Models "A" and "C" are universal, as doors may be swung right or left hand by simply turning the cabinet upside down. Shelves rest on either side of shelf brackets.

All cabinets are equipped with sturdy, adjustable, brass, friction bullet catches.

All mirrors are select quality ¼-in. plate glass.

Cabinets have snow-white baked enamel finish.

Models "C" and "L" have concealed hinges.

Model "C" — Narrow frame 1¼ in., closed type cabinet.

Model "D" — Narrow frame 1¼ in., open shelf type cabinet.

Model "E"—Wall hung cabinet.

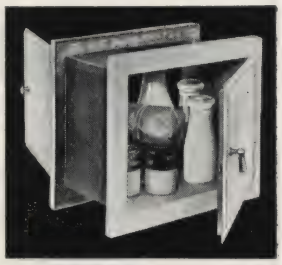
Model "F" — Venetian, one compartment, 18x26-in. mirror.

Model "G" — Venetian, one compartment, 18x32-in. mirror.

Special for hotels: Access cabinets, with open backs, may be had for special purposes such as steam pipes, valves, etc.

Finish—The snow white baked enamel, a tough, elastic finish, will give indefinite and satisfactory wear under the exacting conditions of the bathroom.

Installation — Cabinets complete; no assembling is necessary. Cabinet frame extends beyond the box sufficiently to cover all rough edges left around wall opening by the plastering contractor.



Package and Milk Receiver

The outside door is equipped with a locking feature which, by opening the inside door, releases the lock of the outside door and permits it to be opened for re-use.

FRAMING-IN MEASUREMENTS

Model	Type	Wall opening and recess, in.	Inside depth, in.	Outside, in.	Mirror, in.	Door fr., in.	Shelves
P	Venetian	12½x16½x3¾	5	13½x17½	14 x18		2
O	Venetian	12½x16½x3¾	5	13½x17½	14 x20		2
A	Regular closed	15 x19 x3¾	4½	21¼x25¼	12 x16	1¾	2
B	Regular open shelf	16 x25 x3¾	4½	21¼x31¼	12 x16	1¾	3
C	Narrow frame closed	15½x19½x3¾	4½	18 x22	12 x16	1¾	2
E	Wall hung		4½	18 x22	12 x16	1¾	2
L	Narrow frame open shelf	15½x25¼x3¾	4½	17½x27¼	12 x16	1¾	4
F	Venetian	15½x19½x3¾	5½	18 x22	18 x26		2
G	Venetian	15½x25¼x3¾	5	17½x27¼	18 x32		3
K	Venetian	15½x19½x3¾	5½	18 x22	16 x20		2
M	Venetian	15½x19½x3¾	5½	18 x22	18 x22		2
J	Hotel Mirror	16 x 5 x3¾	4½	21½x31½	15¼x19¾		1

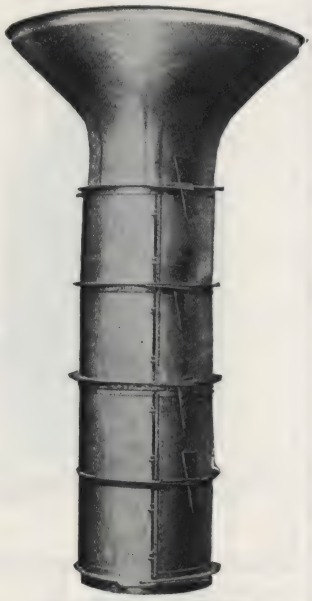
Note: Models "A," "B," "C," "L," and "E" may be had with mirror 14x18 in., door frame 1⅛ in.; other measurements same as shown. This size takes slightly higher price. Unless otherwise specified, mirror 12x16 in., door frame 1¾ in. will be shipped. Triple mirror, wing type, may also be had in Models "G," "F" and "P."

Metal Column Forms

We are prepared to supply metal column forms for casting round, octagonal, also rectangular columns with round ends designed especially for *ramp garage buildings.* Our forms make possible a smooth-surfaced column and eliminate all easily disfigured corners.

Architects, contractors and builders are invited to submit their plans to our Estimating Department for our rental or erection propositions—write for catalogue.

Rectangular Form for Ramp Garages



Round Column Form

Deslauriers Metal Column Forms

ROYAL LINE

DE LUXE

AND OTHER

BATHROOM ACCESSORIES

ELABORATION AND ORNAMENTATION

APPLIED FOR THE FIRST TIME TO

MODERN CHINA BATHROOM ACCESSORIES

FAIRFACTS SYMBOL

OF QUALITY

The Fairfacts Company

234-236 WEST FOURTEENTH ST.

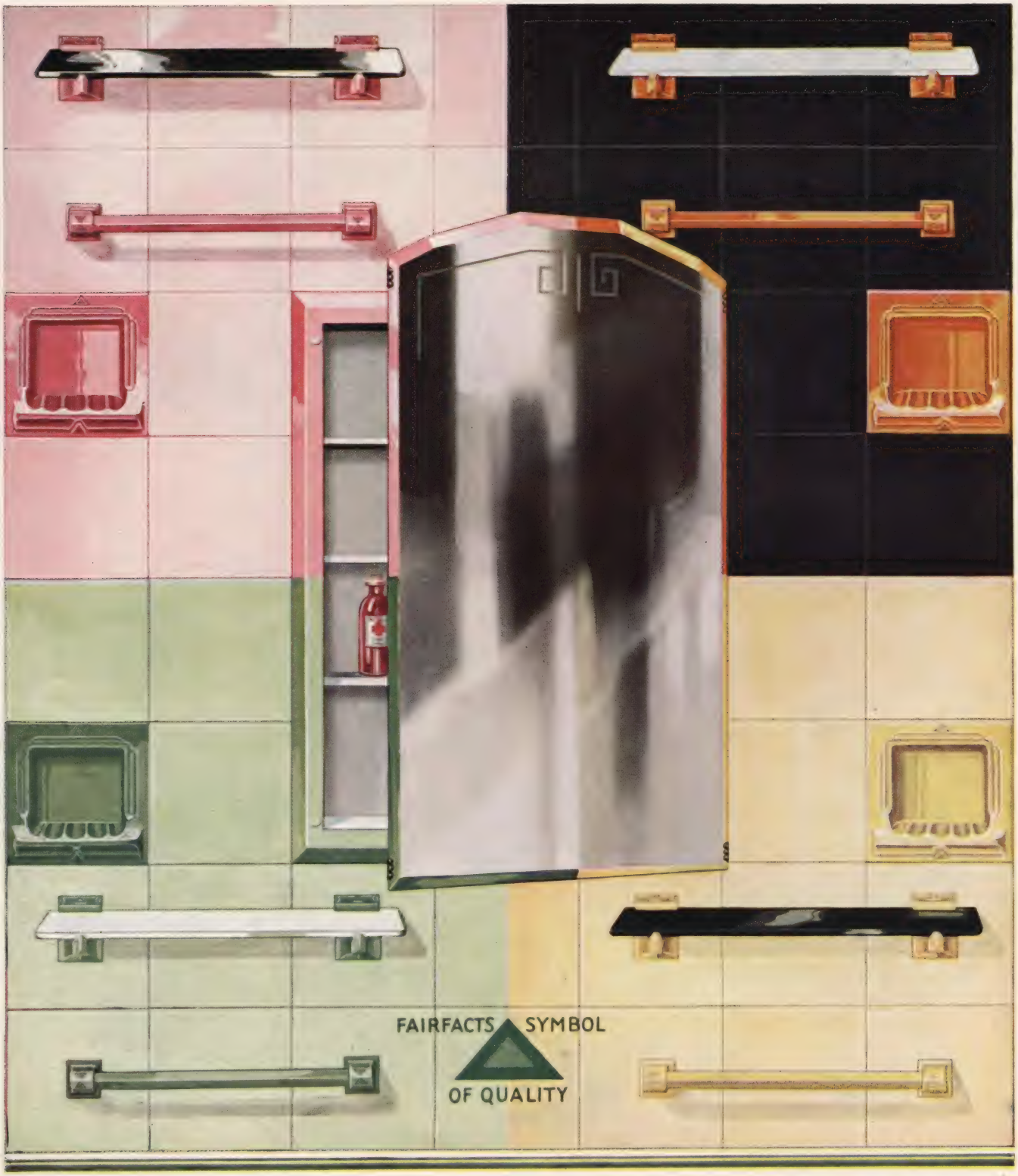
NEW YORK, U. S. A.

CABLE ADDRESS
FAIRFACTS
CODE: A.B.C. 6TH EDITION
AND BENTLEY'S

CATALOGUE 31

FAIRFACTS ACCESSORIES

AVAILABLE IN COLORS TO HARMONIZE
WITH TILE OR TRIM OR PLUMBING
FIXTURES TO ACCOMPLISH THE COLOR
EFFECTS DESIRED

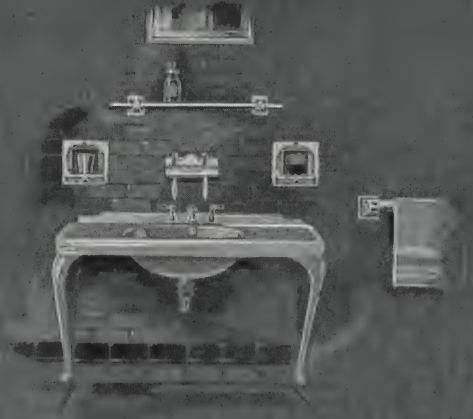


BILTIN TYPE

ROYAL LINE
DE LUXE
ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES

AVAILABLE IN
WHITE, BLACK, COLORS
AND SPECIAL FINISHES

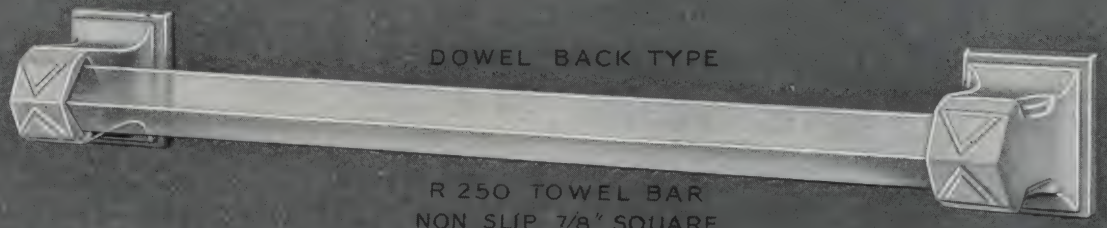
R 201 – 6 × 6
SOAP HOLDER



BILTIN TYPE

R 210 – 6 × 6
TUMBLER HOLDER

DOWEL BACK TYPE



R 250 TOWEL BAR
NON SLIP 7/8" SQUARE

FOR MORE DETAILS
SEE F 300 ON
ANOTHER PAGE

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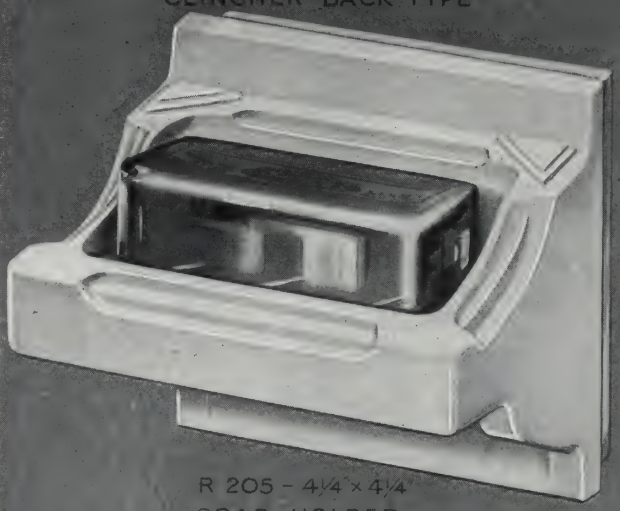
LOOK FOR THE DOUBLE TRIANGLE

PATENTS APPLIED FOR
MADE IN U.S.A.

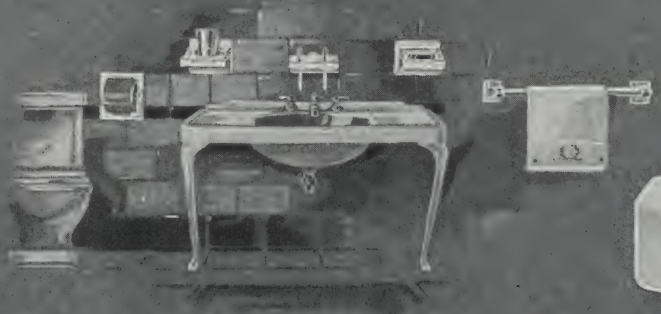
Continued on next page

CLINCHER BACK TYPE



ROYAL LINE
DE LUXE
ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES
AVAILABLE IN
WHITE, BLACK, COLORS
AND SPECIAL FINISHES

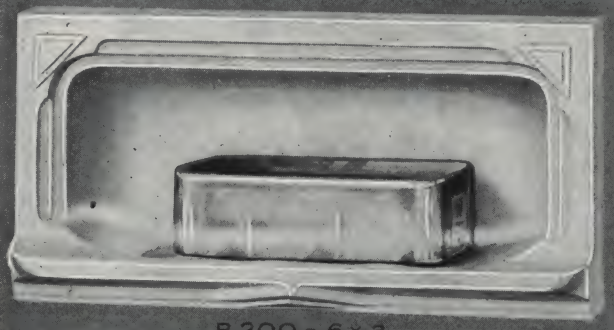
R 205 - 4¼ × 4¼
SOAP HOLDER



CLINCHER BACK TYPE

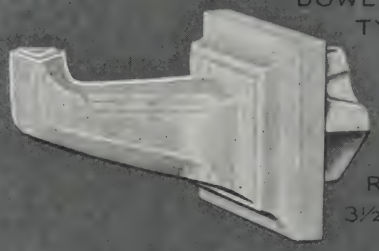
R 215 - 4¼ × 4¼
TUMBLER HOLDER

BILTIN TYPE



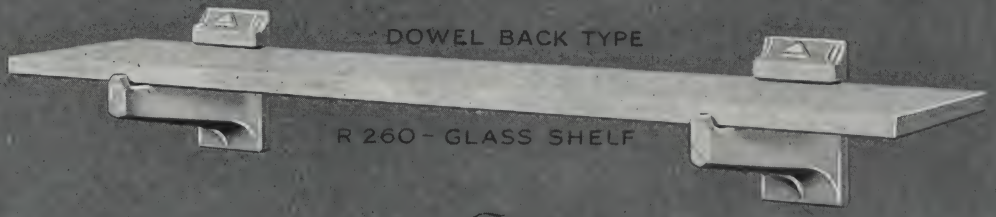
R 200 - 6 × 3
SOAP HOLDER

DOWEL BACK TYPE



R 280
3½" LONG

DOWEL BACK TYPE



R 260 - GLASS SHELF

SHELVES ARE
WHITE, BLACK OR CRYSTAL
7/16" THICK, 4½" WIDE
20"-24"-30"-36" LONG

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LOOK FOR THE DOUBLE TRIANGLE

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Continued on next page

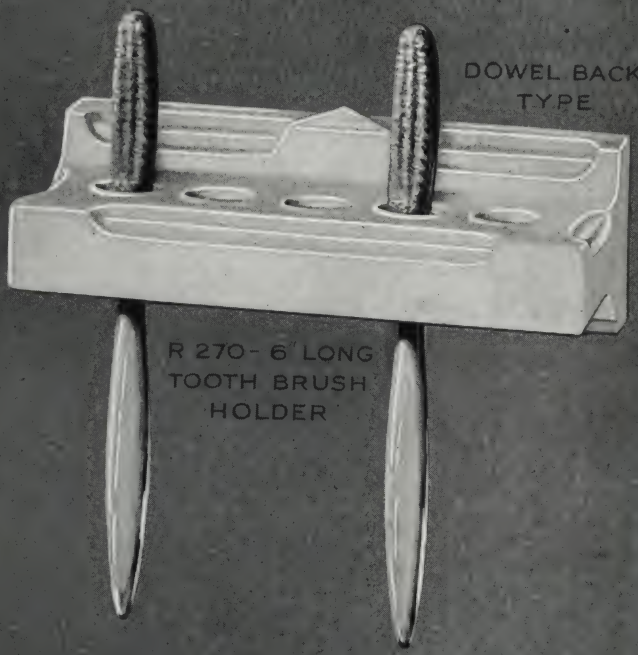
BILTIN TYPE

ROYAL LINE
DE LUXE
ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES

AVAILABLE IN
WHITE, BLACK COLORS
AND SPECIAL FINISHES

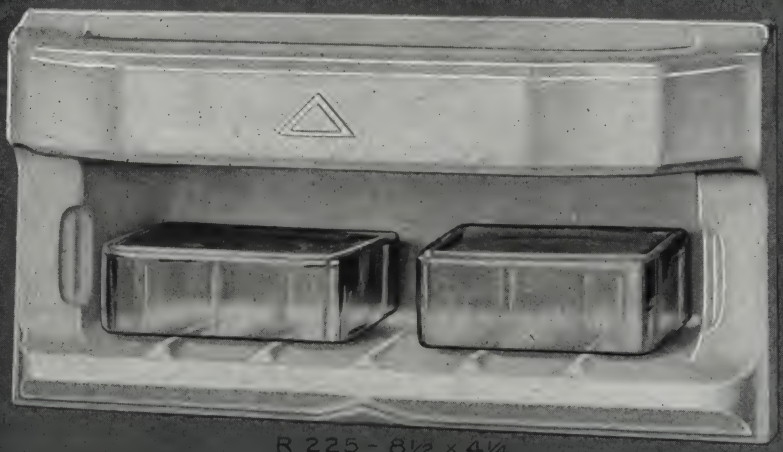
R 220 - 6 x 6
SOAP HOLDER AND GRIP COMBINATION
SELF DRAIN

DOWEL BACK
TYPE



R 270 - 6" LONG
TOOTH BRUSH
HOLDER

BILTIN TYPE



R 225 - 8½ x 4¼
SOAP HOLDER AND GRIP COMBINATION, SELF DRAIN

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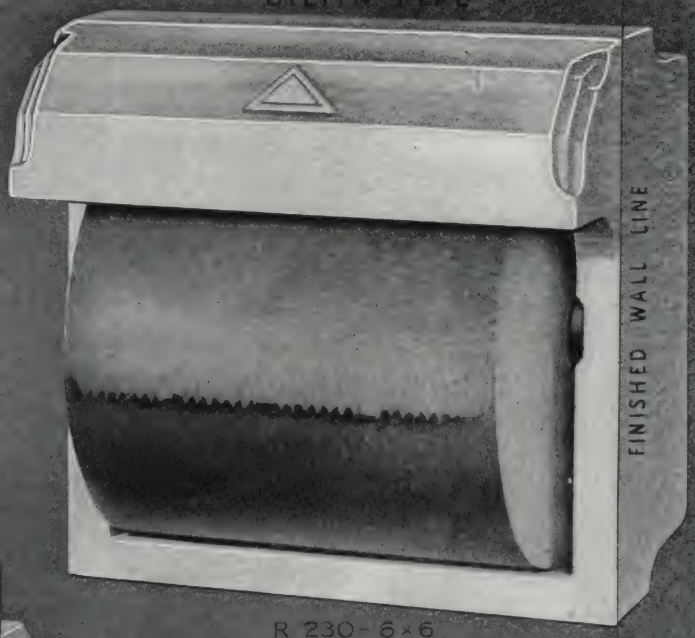
Continued on next page

ROYAL LINE
DE LUXE

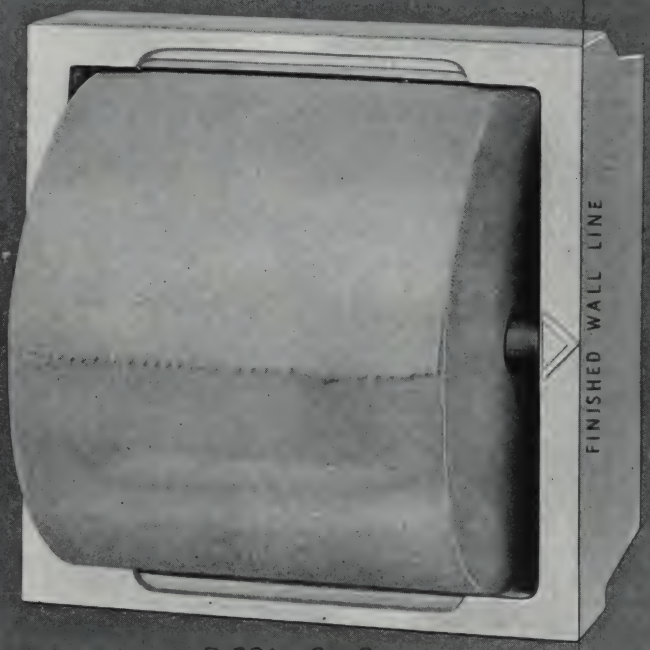
ELABORATE AND ORNAMENTAL
CHINA
BATHROOM ACCESSORIES

AVAILABLE IN
WHITE, BLACK, COLORS
AND SPECIAL FINISHES

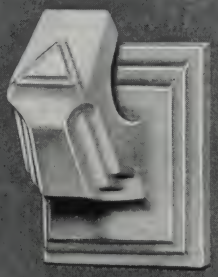
BILTIN TYPE



R 230 - 6 × 6
PAPER HOLDER WITH PATENTED
REWIND ROLLER



R 231 - 6 × 6
PAPER HOLDER WITH PLAIN ROLLER



DOWEL TYPE
R 281 - 2" LONG
DOUCH HOOK
OR STROP HOOK

BILTIN TYPE

R 240 - 6 × 6
SPONGE HOLDER

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LOOK FOR THE DOUBLE TRIANGLE

PATENTS APPLIED FOR
MADE IN U.S.A.

Continued on next page

Originators of Built-in or Recessed China Bathroom Accessories

Look for the ▲ *Double Triangle*

The Fairfacts line of china recessed bathroom accessories is one of the most extensive obtainable, is covered by many United States patents and was the first of this type ever manufactured.

Patented: Feb. 13, Aug. 21, Aug. 28, Sept. 11, Oct. 23, 1917; Feb. 12, May 28, July 16, 1918; and April 15, July 29, 1919.

THE FAIRFACTS COMPANY is probably the largest of its kind in the world, with all that it implies of experience, facilities and service.

That Fairfacts Bathroom Accessories have profoundly affected, have revolutionized the equipment of the modern bathroom, is demonstrated on every hand.

They are of high-grade china. The special process of manufacture, developed after many years, results in a body and surface finish of the finest quality that is also practically everlasting.

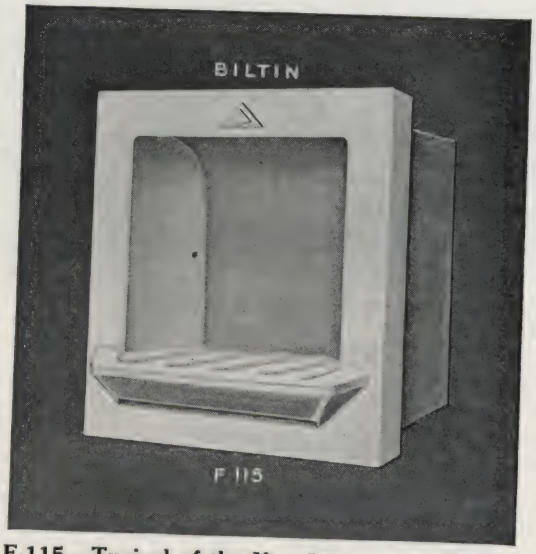
The expansion and contraction of the body and surface finish is so nearly equal that no surface cracks or fractures occur.

Sanitary engineers call china the best and most sanitary material known for bathroom uses.

Fairfacts Fixtures are made of high grade china. There is no nickel to polish, no applied coating to wear off or chip off. They always retain their spotless appearance, maintaining the high standard of cleanliness now demanded.

The same straight, dignified lines, the same design has been carried out in the various fixtures, as with a fine dinner set; harmonizing with the plumbing fixtures and the straight lines of the tile wall.

These accessories have been widely imitated, but like most imitations, many are of poor quality, and purchasers should protect themselves by insisting upon having genuine Fairfacts Fixtures with the double triangle.



F-115—Typical of the New Designs of the Fairfacts Regular "F" Line 1931

See these new designs on pages devoted to "F" Line; soap holders, sponge holders, etc., etc.

General Information

Self-drain soap holders are used with showers, when in compartments or over bathtubs. F-129, F-149 recess with spout drain, and F-0125x and F-0152x semi-recess extended drain we believe are the only fixtures of these types made which keep the dripping water away from the walls.

F-150 Soap Holder and Wall Grip, new pattern is entirely recessed flush with the finished wall and is desirable in close quarters.

F-140 is specially suited for swimming pools, where a substantial grip is needed.

F-640 Utility Shelf is all-china.

When placed to the right and left of the lavatory, they are out of the way, but convenient for various toilet accessories.

F-850 is a high class hotel towel supply shelf, having glass shelf and china brackets that screw to wall.

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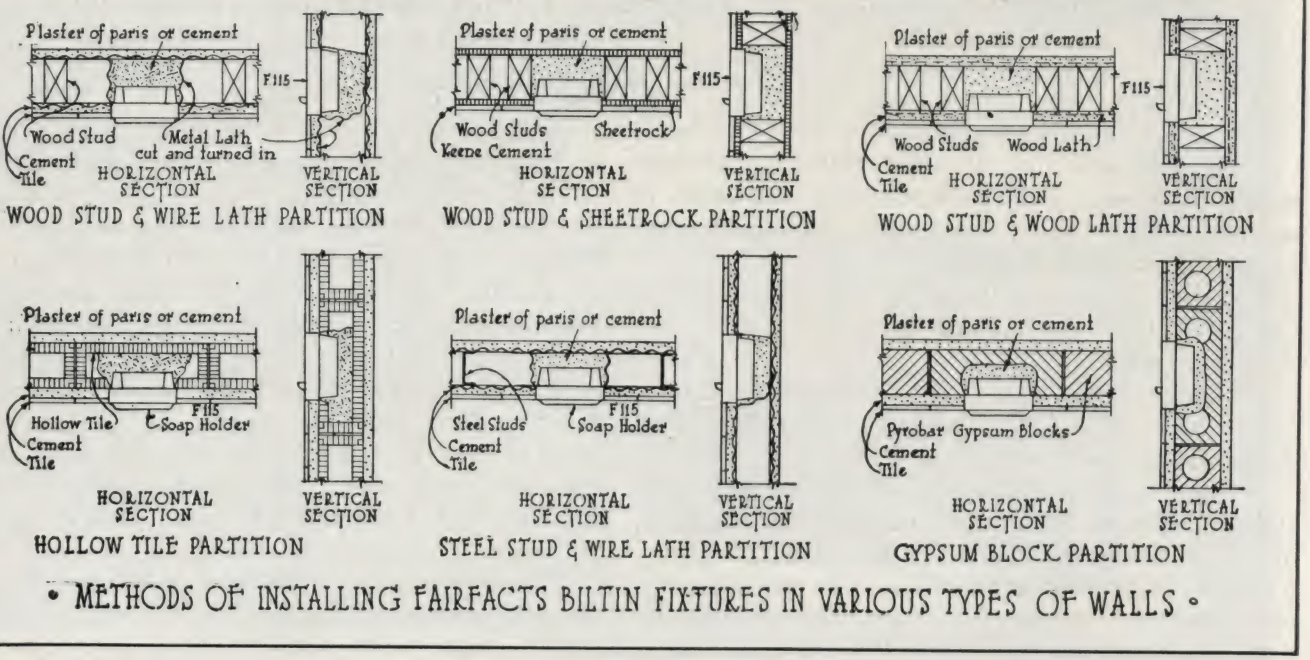


• METHODS OF INSTALLING FAIRFACTS BILTIN FIXTURES IN VARIOUS TYPES OF WALLS •

Fairfacts Fixtures Should Be Included in the Construction Work and Mentioned in the Tile Specifications

Used with Any Type of Wall Construction or Surface Finish

Interior Construction	Bond	Wall Finish
Wood stud	Metal lath	Tile
Terra cotta or hollow tile	Wood lath	Plaster
Brick	Plaster board	Keene's cement
Gypsum block	Sheetrock	
Metal stud walls (thin)		

Made in tile sizes—select proper size to fit the tile.

Fairfacts Accessories are made to fit these unit sizes or their multiples, namely, 6x3, 6x6 and 4¼x4¼ in.

Types of Fairfacts Fixtures and Methods of Installation

Biltin or Recessed Type—These are recessed almost entirely into the walls, and cemented in place when the tile or other wall finish is put on. Greatest depth required in the wall is 3¼ in., except F-180 radiator, which needs 5 in. When used on tiled walls they should be included in the tile contract.

Recessed fixtures that are 6x3, 6x6, 6x9 and 6x12-in. require little cutting of tile when set in 6x3 or 6x6-in. tile. These fixtures can be set in 4¼x4¼-in. tile, but require more cutting. All 4¼x4¼, 6x4¼ and 8½x4¼-in. recessed fixtures are used with 4¼x4¼-in. tile.

Semi-recess Type—Recessed into the wall but 1 in. Are set like recess type and are used in thin partition, or where piping or other obstructions are found in walls. Are cemented in place and have a flange that overlaps the aperture.

Projecting Types—Have special backs or wall attachments cementing to wall.

These backs are of two kinds: "Dowel Back Type" and "Clincher Back Type."

Dowel Back Fixtures—Depth required in wall is 1 in. Dowels are heavy and strong and make a substantial wall attachment.

When Set in Tile Walls—Usually set after the tile is in place. A hole of size and depth of dowel, but slightly larger, is made in wall. Dowel is covered with rich cement or plaster of paris and fixture pushed into place.

Note: Make holes in tile preferably at intersection of tile joints. Be sure hole is not too large to be concealed by fixture.

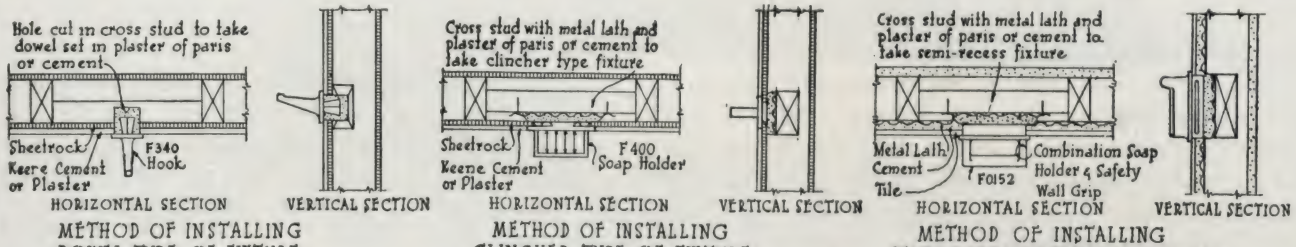
When Set in Keene's Cement or Plaster Walls—Hole is cut in wall and fixture pushed into place as for tile wall, but it is desirable that pieces of studding with their wide sides towards front be nailed to studs (flush with face of studs) and hole cut in the pieces of studding (see illustration).

Clincher Back Fixtures—Made in tile sizes to avoid cutting the tile. Depth needed in wall is ¾ in.

When Set in Tile Walls—Installed when setting tile or opening of right size is left in tile work and fixtures set later. Make openings deep enough for liberal quantity of rich cement or plaster of paris and also cover the back of fixtures and fill the clinchers with the cement. Then tamp fixtures into place until glazed surface is flush with the finished wall.

When Set in Keene's Cement or Plaster Walls—Set fixtures before applying finish coat to wall. Expose the lath where fixtures are to go and set as for tile walls.

Note: For walls with wood stud interior and sheetrock or plaster board bond, see illustration for method of preparing opening. After opening is prepared set fixtures as described for "When set in Tile Walls." See page 10 for more installation data.



• INSTALLATION OF DOWEL, CLINCHER & SEMI-RECESS TYPE OF FIXTURE •

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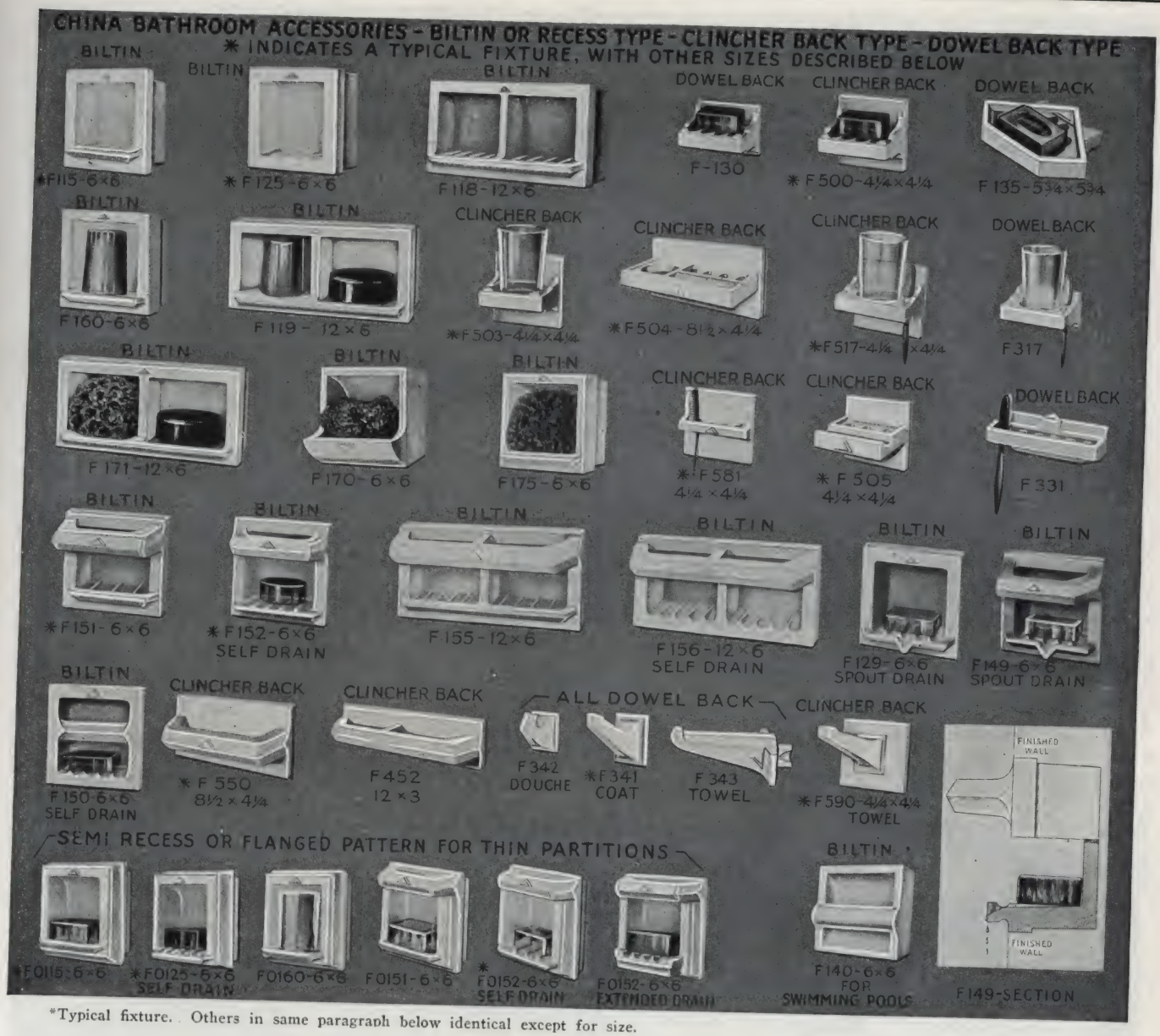

*Typical fixture. Others in same paragraph below identical except for size.

To simplify the selection of fixtures we illustrate only the key patterns or types of fixtures. The typical fixture is first noted in the text and others like it follow in the same paragraph. The other fixtures illustrated need no other description.

F-115—6x6 Recess Soap Holder (typical), F-100—6x3, F-105—4¼x4¼, F-110—6x4¼, F-112—8½x4¼, F-116—9x6, F-117—12x6.

F-125—6x6 Recess Soap Holder Self-drain (typical), F-120—6x3, F-121—4¼x4¼, F-122—6x4¼, F-123—8½x4¼, F-126—9x6, F-127—12x6, F-128—12x6 Double.

F-500—4¼x4¼ Clincher Back Soap Holder (typical), F-400—6x3.

F-503—4¼x4¼ Clincher Back Tumbler Holder (typical), F403—6x3.

F-504—8½x4¼ Clincher Back Tumbler, Tooth Brush, and Paste Holder (typical), F-404—9x3.

F-517—4¼x4¼ Clincher Back Tumbler Tooth Brush (typical), F-417—6x3.

F-505—4¼x4¼ Clincher Back Tooth Brush and Paste, (typical), F-405—6x3.

F-151—6x6 Recess Combination Soap and Grip (typical), F-190—6x4¼, F-191—8½x4¼, F-153—9x6.

F-152—6x6 Recess Combination Soap and Grip (typical), F-158—6x3, F-195—6x4¼, F-196—8½x4¼, F-154—9x6, F-172—12x6 Double.

F-581—4¼x4¼ Clincher Back Tooth Brush Holder (typical), F-481—6x3.

F-550—8½x4¼ Clincher Back Wall Grip (typical), F-450—6x3, F-451—9x3.

F-590—4¼x4¼x4 long Clincher Back Towel Hook (typical), F-490—3x3x4 long, F-491—3x3x6 long.

F-341—3½ long Dowel Back Towel Hook (typical), F-340—4 long.

F-0115—6x6 Semi-recess Soap Holder (typical), F-0100—6x3.

F-0125—6x6 Semi-recess Soap Holder, Self-drain (typical), F-0120—6x3, F-0125x—6x6 Extended Drain.

F-0152—6x6 Semi-recess Soap and Grip (typical), F-0158—6x3.

Look for the *Double Triangle*

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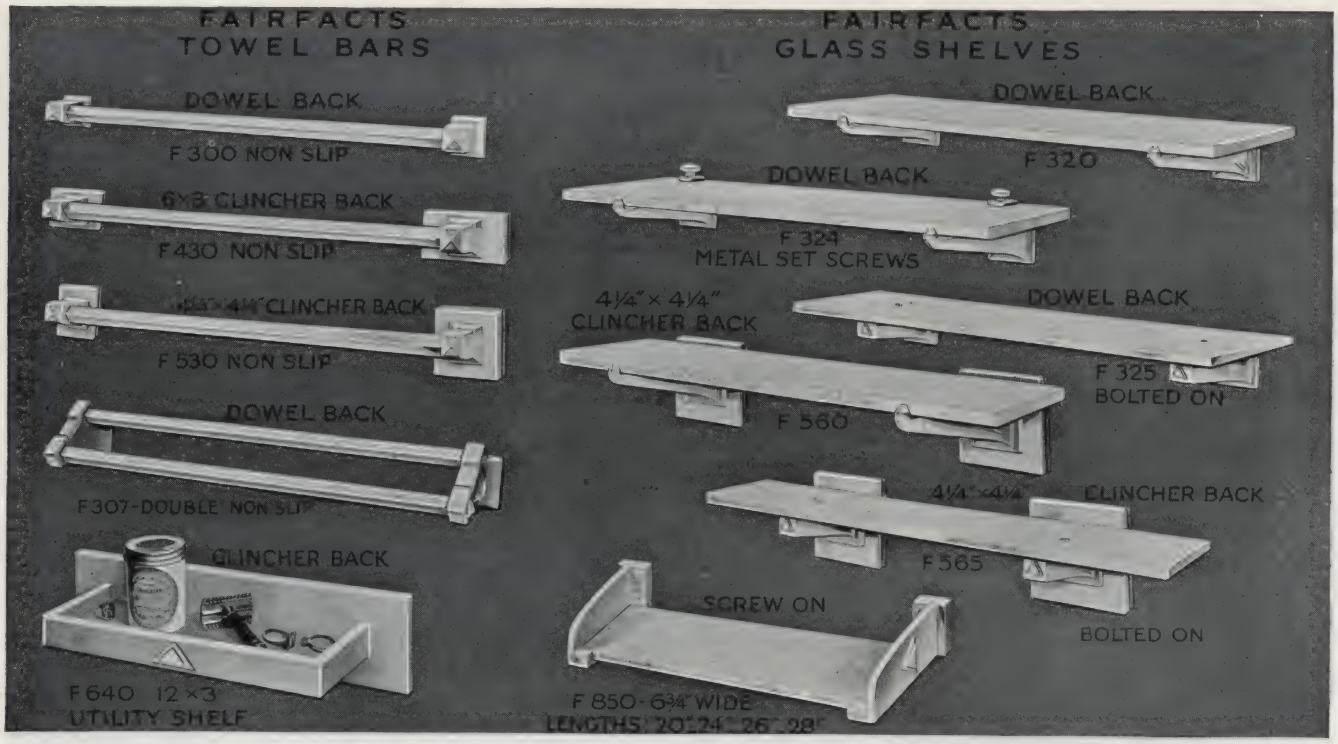

Fairfacts Towel Bars with China Posts

Bars are of several kinds, i.e.: ⅞ in. square set edge up, called non-slip because towels do not slip off.

These are made in pyralin finish, white, black and colors and in glass white, black and crystal.

Bars 1 in. round are also furnished in pyralin and glass, otherwise as above mentioned.

Regular lengths center to center of posts are: 18, 24, 30, 36, 42 and 48 in., the last two having also a center post. Other lengths to order.

Below is a table of posts, all of substantially same design but with different wall attachments and having designating numbers. Specifications should include quantity, state number and type, length and color, thus: 24—F-300 non-slip pyralin bars, 18 in. long white, or 12—F-600 round glass bars 30 in. long crystal.

No. F-300—Dowel back type.
No. F-430—Clincher back type, 6x3 back.
No. F-530—Clincher back type, 4¼x4¼ back.
No. F-600—Clincher back type, 3x3 back.
No. F-307—Dowel back type has two ⅝-in. square bars, pyralin finish only, and in the same regular lengths up to 36 in.

Fairfacts Glass Shelves with China Brackets

Glass can be furnished in white, black and crystal.

Shelves are 5 in. wide. Those with serial number ending in 0 rest on the brackets. Those with serial number ending in 5 are bolted to brackets.

Length, in.	Dowel back type	Clincher back type		
		6x3	4¼x4¼	3x3
18, 24, 30, 36	F-320	F-460	F-560	F-620
20, 24, 30, 36	F-325	F-465	F-565	F-625

Note: F-324 is like F-320, except that shelf is held in place by metal clamps and set screws at back of shelf.

Fairfacts Toilet Paper Holders

F- 1—Has patented rewind roller, see section, keeps paper wound neatly. Is perhaps the best fixture of its type; shown in larger detail because of its unusual merit. Takes rolls of 1000 sheets pasteboard cores 1¼ in. diameter.
F- 31—Also has the patented rewind roller.
F-30 same as F-31, except with plain roller.
F- 2—Has plain roller, takes rolls of medium diameter.
F-411—Has patented rewind roller.
F-410—Same as F-411, has plain roller.
F- 03—Takes rolls of large diameter.
F- 25, F-26, F-27, F-28, F-025—All take patented folded paper. F-27 also has spring to keep tention on paper.
F- 60—Heavy cast metal, baked finish white, black or colors, takes largest sheet paper. Fixture shown in large detail because of its unusual merit.

Look for the *Double Triangle*

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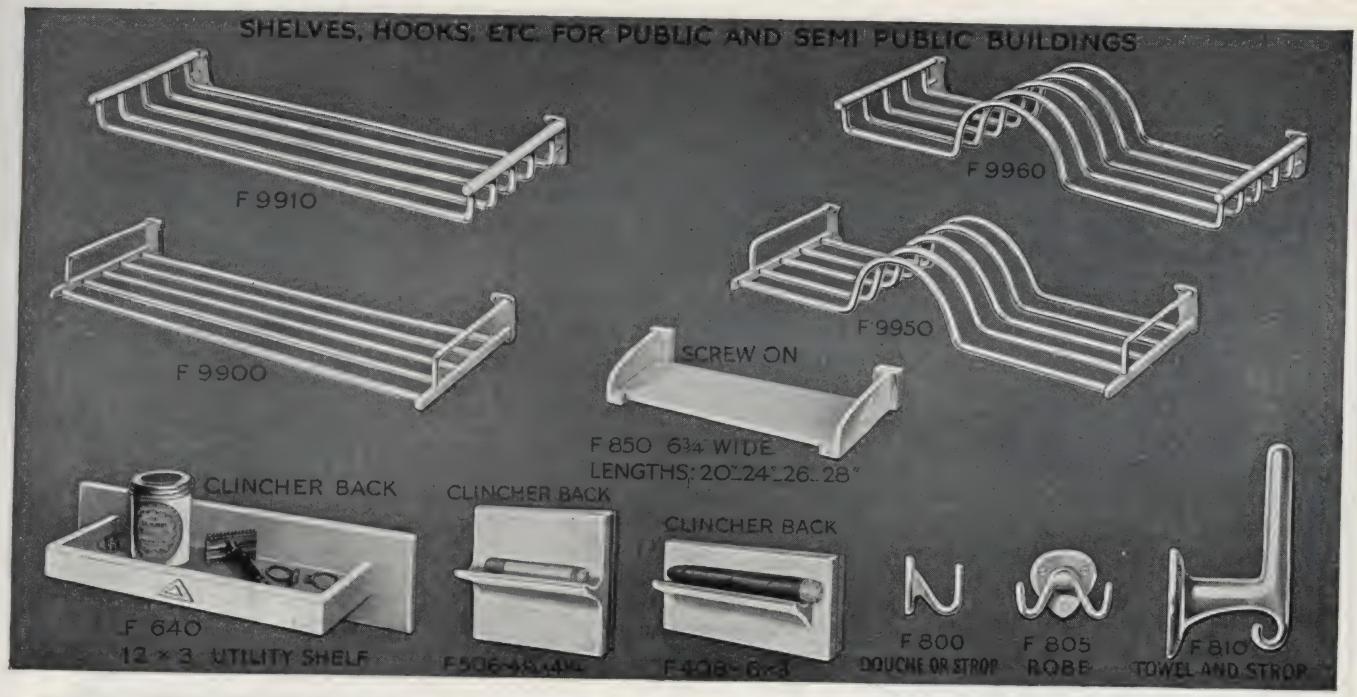


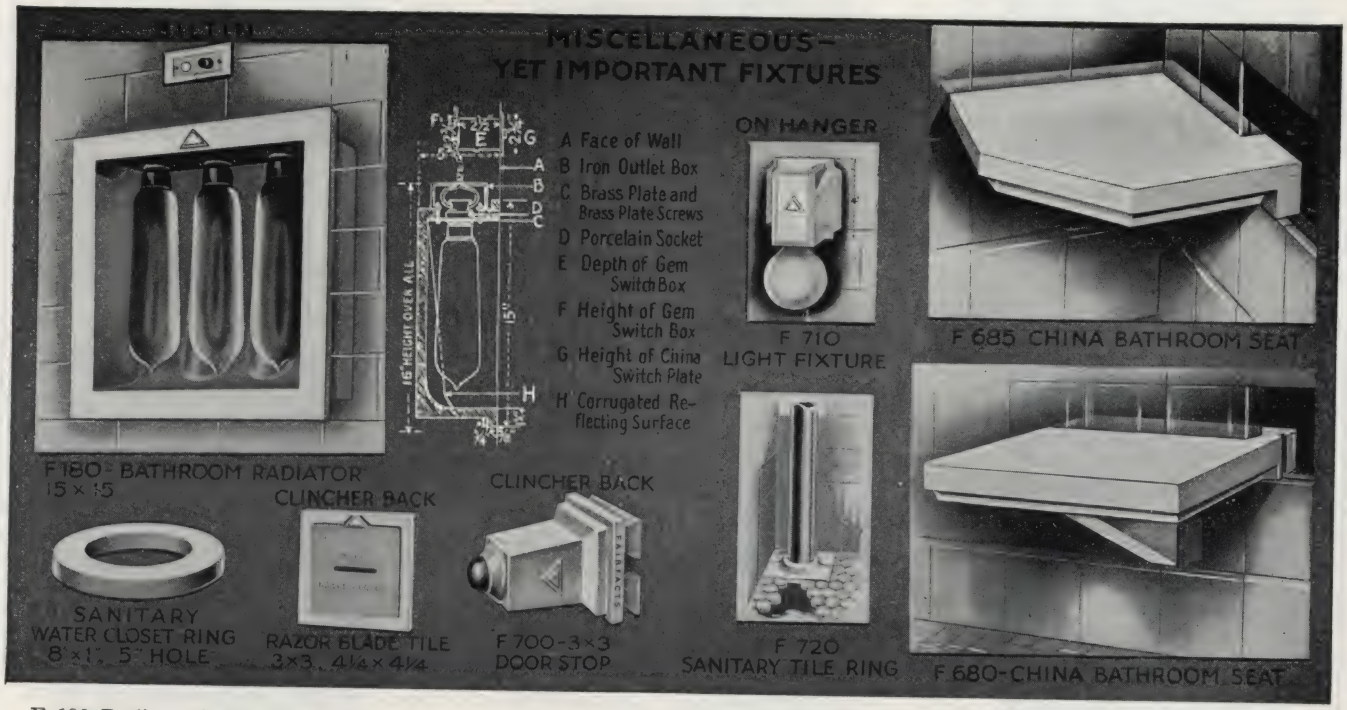
F 9900, F 9910, F 9950 and F 9960 are substantial and attractive metal towel supply shelves for hotels, etc. They screw to the wall and are regularly finished in baked white enamel, but can be furnished in black or colors.

The arched openings for electric light fixtures in F 9950 and F 9960 are 6⅝ in. wide and 4 in. high. All these shelves screw to wall.

F 640 Utility Tray is all-china, clincher back, and may be used in place of regular glass shelves, where less projection from wall is necessary.

F 800, F 805 and F 810 are metal hooks regularly finished in baked white enamel, but can be furnished in black or colors.

All these hooks screw to wall.



F 180 Radiator is furnished with all equipment illustrated; wiring only needed by contractor.

F 425 3x3 and F 525 4¼x4¼ Razor Blade Tiles are cemented to wall like any tile, but space back of them should be provided for the discarded blades.

F 710 Electric Lighting Fixture has wall hanger, chain-pull socket and china housing.

F 720 Sanitary Tile Ring is of china for ¾, 1, 1¼, 1½ and 2-in. iron pipe size pipes and prevents water on the bathroom floor from running down into the room below.

F 740 8x1x5-in. hole Sanitary Water Closet Ring is made of unglazed china and used on the water closet waste or outlet connection in fireproof buildings.

Look for the *Double Triangle*

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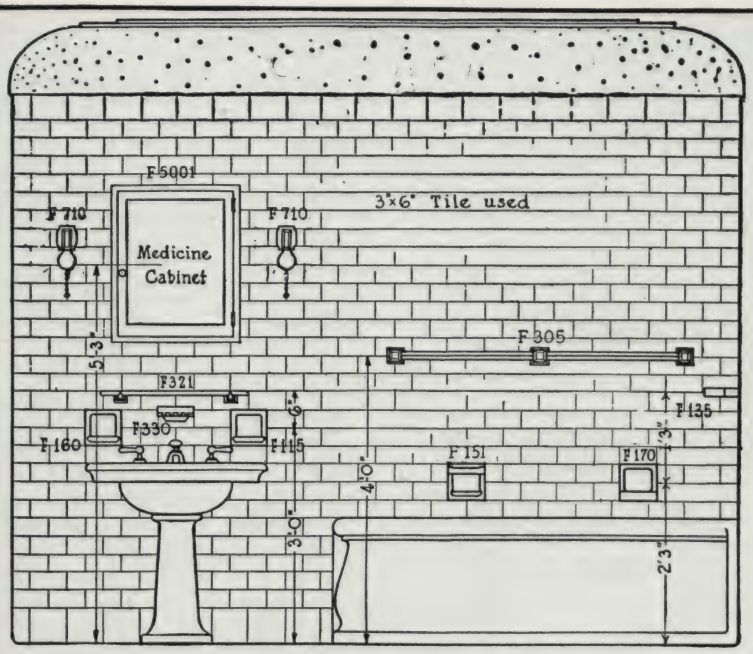
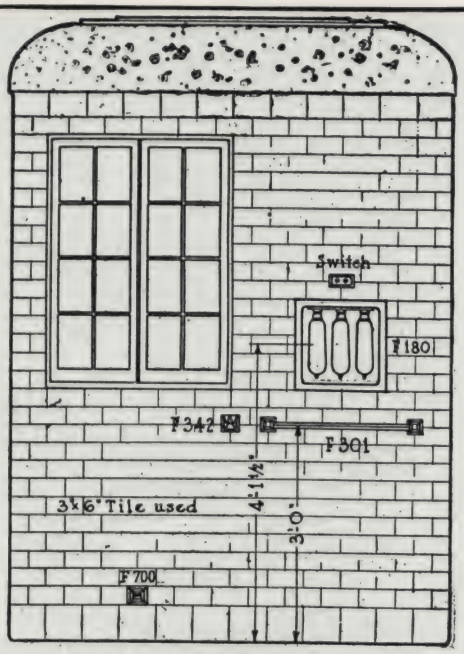
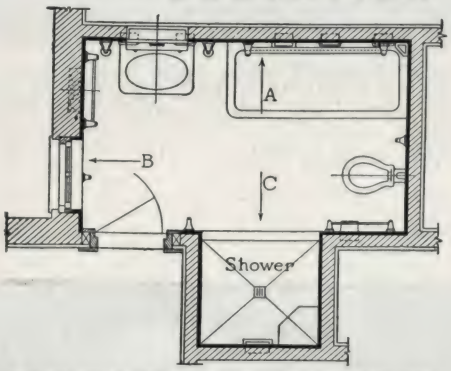
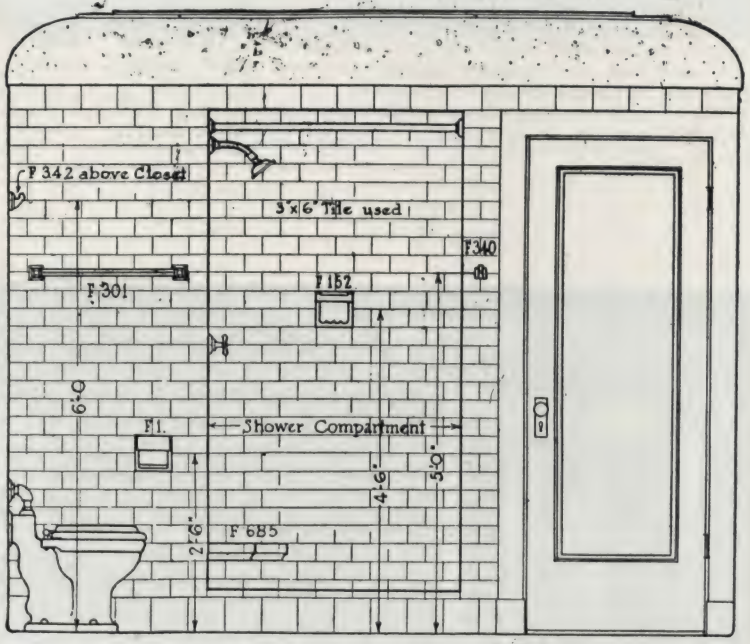


ELEVATION "A"



ELEVATION "B"





ELEVATION "C"

KEY TABLE TO FAIRFACTS ACCESSORIES

Cat. No.	Article
F-1	Biltin China Roll Paper Holder
F-115	Biltin China Soap Holder
F-135	China Soap, Sponge or Brush Holder
F-151	Biltin China Combination Soap Holder and Wall Grip
F-152	Biltin China Combination Soap Holder and Wall Grip
F-160	Biltin China Tumbler Holder
F-170	Biltin China Sponge Holder
F-180	Biltin China Electric Bathroom Radiator
F-301	Nonslip Towel Bar with China Posts (24 in. long)
F-305	Nonslip Towel Bar with China Posts (48 in. long)
F-321	White Glass Shelf with China Brackets (24 in. long)
F-330	China Tooth Brush Holder
F-340	China Hook for Robes, etc. (4½ in. long)
F-342	China Hook for Strop, Douche, etc. (2 in. long)
F-685	China Bathroom Seat
F-700	China Stop
F-710	China Light Fixture
F-5001	Medicine Cabinet

TYPICAL BATHROOM SHOWING FAIRFACTS ACCESSORIES

Suggested Standard Specification

Bathroom Accessories—(1) The tile contractor shall furnish and set China Bathroom Accessories as manufactured by The Fairfacts Co., Inc., New York, N. Y., in accordance with the subjoined specification and schedule of accessories.

(2) ***Setting Biltin (Recessed Type)***—(a) In stud and metal lath partitions, cut the metal lath across the top of the opening and down the two sides; bend the flap back to form a shelf and fill the space around the opening with excelsior bound together with plaster of paris to form a pocket; then set the piece in rich cement in the same manner that tile is set.

(b) In masonry partitions, cut pockets and fill up any openings to prevent the escape of cement when setting.

(3) ***Setting Semi-Recess Type and Projecting Fixtures***—Both clincher back and dowel back to be set while laying the tile or after it is laid. Cut hole of sufficient size to receive the back and set in rich cement mortar.

(4) ***Location***—Accessories shall be set as shown on drawings or as will be directed by the architect. Care shall be taken to locate tile joints in such manner that accessories will center over fixtures without the unnecessary cutting of tile.

Note: In setting electric radiators, all wiring to be furnished and set by electrical contractor (see electrical wiring specifications).

Schedule of Bathroom Accessories—

Note: Architect to add here the specific list of fixtures. Suggestions covering various types of residences, apartments and hotels are given on the following pages.

Fairfacts	SUGGESTED STANDARD SPECIFICATIONS AND SETTING HEIGHTS **A Typical Bathroom Installation with Shower Compartment**	PLATE 2

Continued on next page

Other Standard Fairfacts Medicine Cabinets and Mirrors

Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves
F-1000	16x20	13½x17½	10x14	2
F-1001	18x22	15½x19½	12x16	2

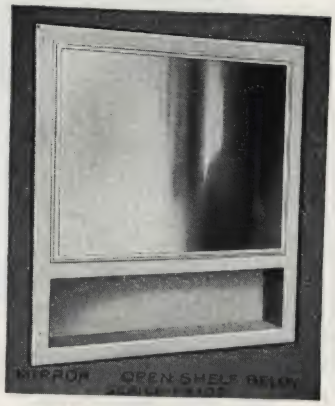
Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves, adj.
F-3000	18x22	15½x19½	12x16	2
F-3001	20x24	17½x21½	14x18	2
F-3002	20x26	17½x23½	14x20	3

Code No.	Over all, in.	Wall opening, in.	Bev. mirror, in.	Glass shelves, adj.
F-5000	18x24	15¼x21¼	14x20	2
F-5001	20x26	17¼x23¼	16x22	3
F-5002	22x28	19¼x25¼	18x24	3
F-5003	24x30	21¼x27¼	20x26	3

Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves
F-2000	18x24	15½x21½	12x12	2

Code No.	Over all, in.	Wall opening, in.	Plain mirror, in.	Glass shelves, adj.
F-4000	18x24	15½x21½	12x12	2
F-4001	18x28	15½x25½	12x16	3
F-4002	20x26	17½x23½	14x14	3

Code No.	Over all, in.	Wall opening, in.	Bev. mirror, in.	Glass shelves, adj.
F-6000	18x24	15¼x21¼	14x14	2
F-6001	20x26	17¼x23¼	16x16	3
F-6002	22x28	19¼x25¼	18x18	3
F-6003	24x30	21¼x27¼	20x20	3



Code No.	Over all, in.	Mirror, in.	Depth in wall, in.
F-9300	15⅜x26¾	12x16	3⅜
F-9301	19⅜x22¾	16x12	3⅜
F-9302	17⅜x28¾	14x18	3⅜
F-9303	21⅜x24¾	18x14	3⅜
F-9304	19⅜x20¾	16x20	3⅜
F-9305	23⅜x26¾	20x16	3⅜

Code No.	Over all, in.	Mirror, in.	Glass shelves, adj.
F-8000	17½x21½	12x16 Bev.	2
F-8001	19½x23½	14x18 Bev.	3

WHITE ENAMELED STEEL FRAMED BEVELLED MIRRORS

Code No.	Over all, in.	Mirror, in.	Hangers
F-9000	15¼x21¼	14x20 Bev.	Concealed
F-9001	17¼x23¼	16x22 Bev.	Concealed
F-9002	19¼x25¼	18x24 Bev.	Concealed
F-9003	21¼x27¼	20x26 Bev.	Concealed

Continued on next page

"Arcadian" Recess Medicine Cabinets

Frameless Mirror Doors—No Door Knobs—Waterproofed—Metal Backs

F-5800-V Series with Etched Mirror Doors

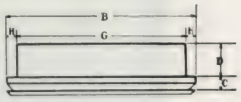
Angle designs of mirror and cabinet follow the present-day flair.

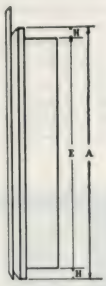
The *French Gray Bevel* adds a delicate suggestion of frame to the mirror and eliminates double imaging in the bevel.

Mirror Surface in this new design gives the greatest possible reflecting area in proportion to the cabinet box.

The *Angle Moulding Flange* on the cabinet box adds symmetrical beauty when the door is opened. The *Vertical* surface is ideal to butt the tile against and the *Reireating Angle* surface affords opportunity for a finger hold for opening door. Eliminates knobs. Preserves mirror effect.

The "Arcadian" Cabinet is a harmonious unit in design, construction and ornamentation.





Cat. No.	Mirror size, in., plain or etched	Sizes and dimensions as shown in diagrams, in. A	B	C	D	E	G	H	Wall opening, in.	Glass shelves, adj.
F-5800-V	14x22 etch	20	14	1¼	3	18⅛	12⅛	15/16	12¼x18¼x3¼	2
F-5801-V	16x24 etch	22	16	1¼	3	20⅛	14⅛	15/16	14¼x20¼x3¼	2
F-5802-V	18x26 etch	24	18	1¼	3	22⅛	16⅛	15/16	16¼x22¼x3¼	3
F-5803-V	18x28 etch	26	18	1¼	3	24⅛	16⅛	15/16	16¼x24¼x3¼	3
F-5804-V	20x30 etch	28	20	1¼	3	26⅛	18⅛	15/16	18¼x26¼x3¼	3
F-5820-V	14x22 plain	20	14	1¼	3	18⅛	12⅛	15/16	12¼x18¼x3¼	2
F-5821-V	16x24 plain	22	16	1¼	3	20⅛	14⅛	15/16	14¼x20¼x3¼	2
F-5822-V	18x26 plain	24	18	1¼	3	22⅛	16⅛	15/16	16¼x22¼x3¼	3
F-5823-V	18x28 plain	26	18	1¼	3	24⅛	16⅛	15/16	16¼x24¼x3¼	3
F-5824-V	20x30 plain	28	20	1¼	3	26⅛	18⅛	15/16	18¼x26¼x3¼	3

Note: Series F-5800-V and F-5820-V are the same except that F-5800-V has etched mirrors and F-5820-V, plain mirrors.

"Arcadian" Mirrors, Angle Top and Square Top

F-5880-V Series with Plain Mirror Doors

Etched Designs or Plain, New French Gray Bevel Waterproofed Metal Backs, Concealed Hangers, "Mirrors Mounted Like a Diamond."

(Mirrors only, not Cabinets.)

Code No.	Mirror size, in.	Code No.	Mirror size, in.
	Etched		Etched
F-9800-VB	14x22	F-9840-VB	14x20
F-9801-VB	16x24	F-9841-VB	16x22
F-9802-VB	18x26	F-9842-VB	18x24
F-9803-VB	18x28	F-9843-VB	18x26
F-9804-VB	20x30	F-9844-VB	20x28
	Plain		Plain
F-9820-VB	14x22	F-9880-VB	14x20
F-9821-VB	16x24	F-9881-VB	16x22
F-9822-VB	18x26	F-9882-VB	18x24
F-9823-VB	18x28	F-9883-VB	18x26
F-9824-VB	20x30	F-9884-VB	20x28

F-890-V Series with Plain Mirror Doors, Chromium Frame

Code No.	Size box over all, in.	Wall opening, in.	Mirror bevel, in.
			Plain
F-5880-V	14x20x4¼	12¼x18¼x3¼	14x20
F-5881-V	16x22x4¼	14¼x20¼x3¼	16x22
F-5882-V	18x24x4¼	16¼x22¼x3¼	18x24
F-5883-V	18x26x4¼	16¼x24¼x3¼	18x26
F-5884-V	20x28x4¼	18¼x26¼x3¼	20x28

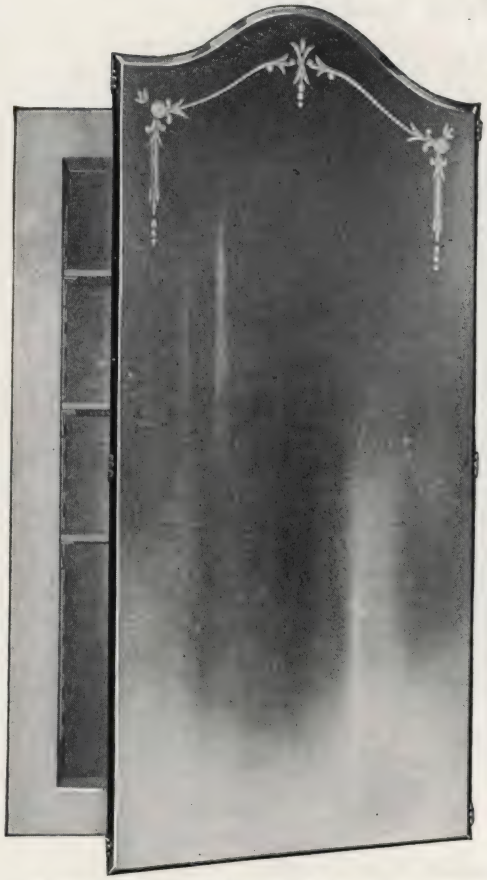
Look for the *Double Triangle*

Code No.	Size box over all, in.	Wall opening, in.	Mirror bevel, in.
			Plain
F-5890-V	14x20x4¼	12¼x18¼x3¼	14x20
F-5891-V	16x22x4¼	14¼x20¼x3¼	16x22
F-5892-V	18x24x4¼	16¼x22¼x3¼	18x24
F-5893-V	18x26x4¼	16¼x24¼x3¼	18x26
F-5894-V	20x28x4¼	18¼x26¼x3¼	20x28

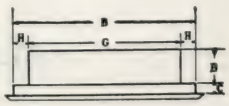
Continued on next page

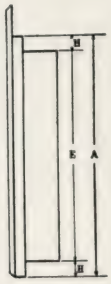
"Venetia" Recess Medicine Cabinets

Frameless Mirror Doors—No Door Knobs—Waterproofed—Metal Backs



F-5600-V Series "Venetia" Cabinets with Etched Beveled Mirrors





The "Venetia" cabinets have beveled plate glass mirrors with and without flower design *cut in the back of the mirror,* heavily silvered and waterproofed. A full size metal plate protects the back of the mirror and a sheet of insulating material is placed between the metal back and the mirror. The mirror door is protected from injury with a chain stop.

"Mirrors Mounted Like a Diamond."

Catalog No.	Mirror size, in. plain or etched	Sizes and dimensions as shown in diagrams, in.							Wall opening, in.	Glass shelves, adj.
		A	B	C	D	E	G	H		
F-5600-V	14x20 etch	17	13½	1	3¼	14⅛	10⅝	1⁷⁄₁₆	10¾x14¼x3⅜	2
F-5601-V	16x24 etch	21	15½	1	3¼	18⅛	12⅝	1⁷⁄₁₆	12¾x18¼x3⅜	2
F-5602-V	18x26 etch	23	17½	1	3¼	20⅛	14⅝	1⁷⁄₁₆	14¾x20¼x3⅜	2
F-5603-V	18x32 etch	29	17½	1	3¼	26⅛	14⅝	1⁷⁄₁₆	14¾x26¼x3⅜	3
F-5604-V	20x34 etch	31	19½	1	3¼	28⅛	16⅝	1⁷⁄₁₆	16¾x28¼x3⅜	3
F-5620-V	14x20 plain	17	13½	1	3¼	14⅛	10⅝	1⁷⁄₁₆	10¾x14¼x3⅜	2
F-5621-V	16x24 plain	21	15½	1	3¼	18⅛	12⅝	1⁷⁄₁₆	12¾x18¼x3⅜	2
F-5622-V	18x26 plain	23	17½	1	3¼	20⅛	14⅝	1⁷⁄₁₆	14¾x20¼x3⅜	2
F-5623-V	18x32 plain	29	17½	1	3¼	26⅛	14⅝	1⁷⁄₁₆	14¾x26¼x3⅜	3
F-5624-V	20x34 plain	31	19½	1	3¼	28⅛	16⅝	1⁷⁄₁₆	16¾x28¼x3⅜	3

Mirrors Only (not cabinets)

"Venetia" Mirrors only in table below. Etched or plain. Polished beveled edges. Waterproofed metal backs. Concealed hangers.

Code No.	Center mirror, in.
	Etched
F-9600-VB	14x20
F-9601-VB	16x24
F-9602-VB	18x26
F-9603-VB	18x32
F-9604-VB	20x34
	Plain
F-9620-VB	14x20
F-9621-VB	16x24
F-9622-VB	18x26
F-9623-VB	18x32
F-9624-VB	20x34

"Venetia" Mirrors only, with adjustable wings, in table below. Etched. Polished beveled edges. Waterproofed metal backs. Concealed hangers. "Mirrors Mounted Like a Diamond."

Code No.	Center mirror, in.	Wings each, in.
	Etched	
F-9700-VB	14x20	6x17
F-9701-VB	16x24	6x21
F-9702-VB	18x26	6x23
F-9703-VB	18x32	6x29
F-9704-VB	20x34	6x31

"Venetia" Cabinets with Adjustable Side Wing Mirrors

F-5700-V Series "Venetia" Wing Cabinets with Curved Top, Etched Beveled Mirrors

Code No.	Width over all, in.	Wall opening, in.	Door mirror, in.	Wing mirrors, in.	Glass shelves, adj.
			Etched		
F-5700-V	27¼	10⅝x14⅛x3¼	14x20	6x17	2
F-5701-V	29¼	12⅝x18⅛x3¼	16x24	6x21	2
F-5702-V	31¼	14⅝x20⅛x3¼	18x26	6x23	2
F-5703-V	31¼	14⅝x26⅛x3¼	18x32	6x29	3
F-5704-V	33¼	16⅝x28⅛x3¼	20x34	6x31	3

Look for the *Double Triangle*

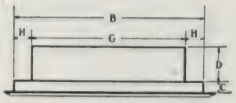
Continued on next page

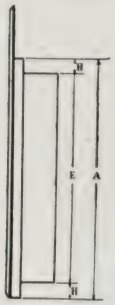
"Parisienne" Recess Medicine Cabinets

Frameless Mirror Doors—No Door Knobs—Waterproofed—Metal Backs

The *"Parisienne"* is a cabinet with French mirrors of a superlative design exquisitely etched. The mirror is made with an enameled border 1 in. wide in either soft or brilliant color tones or in lustrous black. Black borders only are carried in stock. Colored borders will be made on special orders.

Beautiful results are obtained by putting the black or color on the back of the glass. *A frame effect, 1 in. wide, without a frame.*





Cat. No.	Mirror, curved top, in.	Sizes and dimensions as shown in diagrams, in.							Wall opening, in.
		A	B	C	D	E	G	H	
F-5692-V	18x28 curv.	23	17½	1	3¼	20⅛	14⅝	1⁷⁄₁₆	14¾x20¼x3⅜
F-5693-V	18x34 curv.	29	17½	1	3¼	26⅛	14⅝	1⁷⁄₁₆	14¾x26¼x3⅜
F-5694-V	20x36 curv.	31	19½	1	3¼	28⅛	16⅝	1⁷⁄₁₆	16¾x28¼x3⅜

See next page for illustration.

"Parisienne" Cabinets with Adjustable Side Wings

The *"Parisienne"* is a cabinet with French mirrors of a superlative design exquisitely etched. The adjustable side wings are 8 in. in width. Both the mirror and wings are made with an enameled border 1 in. wide in either soft or brilliant color tones or in lustrous black.

Code No.	Box over all, in.	Wall opening, in.	Center mirror, in.	Wings, in.	Glass shelves, adj.
F-5792-V	21x23x4¼	14⅝x20⅛x3¼	Etched, 18x28	8x23	2
F-5793-V	21x29x4¼	14⅝x26⅛x3¼	18x34	8x29	3
F-5794-V	23x31x4¼	16⅝x28⅛x3¼	20x36	8x31	3

See next page for illustration.

"Parisienne" Mirrors

"Parisienne" Mirrors only (without medicine cabinet box) are designated and described in the table below.

"PARISIENNE" MIRRORS

Code No.	Mirror size, in.
F-9692-VB	Etched 18x28
F-9693-VB	18x34
F-9694-VB	20x36

"Parisienne" Mirror only, with side wings (without medicine cabinet box) are designated and described in the table below.

"PARISIENNE" MIRRORS WITH WINGS

Code No.	Center mirror, in.	Wings, in.
F-9792-VB	Etched 18x28	8x23
F-9793-VB	18x34	8x29
F-9794-VB	20x36	8x31

Look for the *Double Triangle*

"VENETIA"

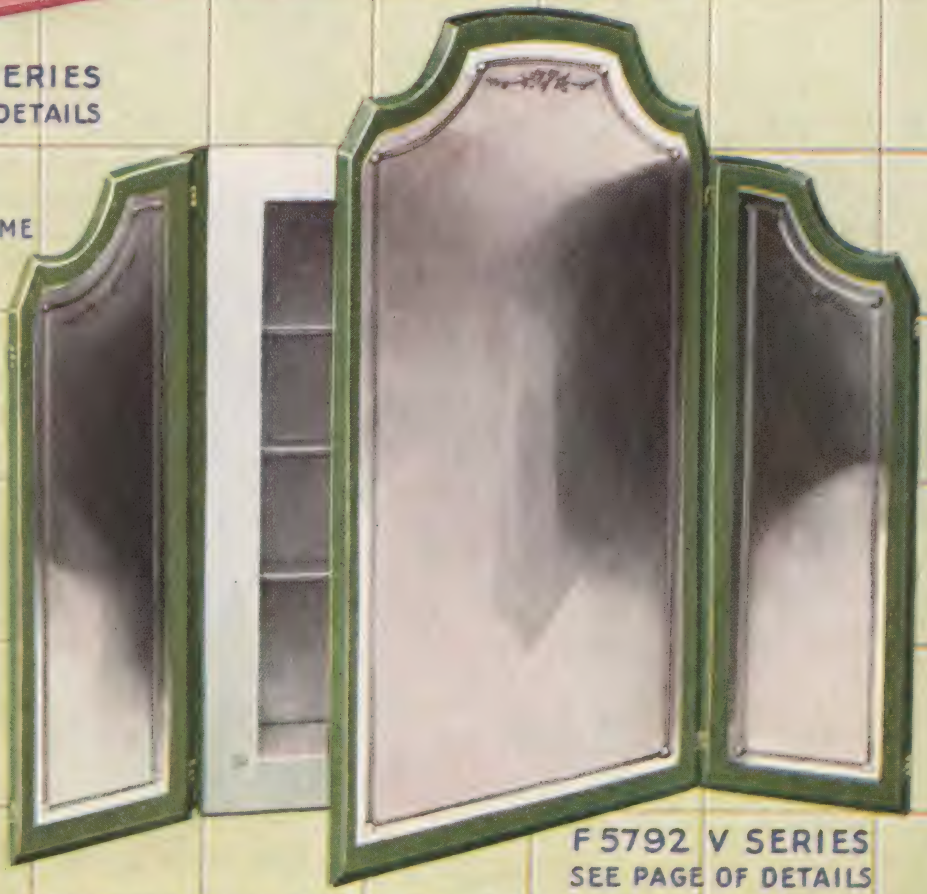
F 5692 V SERIES
SEE PAGE OF DETAILS

COLOR IS APPLIED
BENEATH THE GLASS
THERE IS NO METAL FRAME

"ARCADIAN"

F 5890 V SERIES
CHROMIUM FRAME
SEE PAGE OF DETAILS

"PARISIENNE"



FAIRFACTS ▲ SYMBOL
OF QUALITY

F 5792 V SERIES
SEE PAGE OF DETAILS

COLOR IS APPLIED BENEATH THE GLASS, THERE IS NO METAL FRAME

BATHROOM ACCESSORIES

MEDICINE CABINETS · · · MIRRORS

F 152

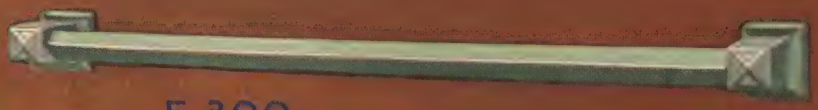
OUR
NEW 1931 DESIGNS
REPLACE THOSE OF
1929 1930

SUPERLATIVE
FINISH

WHITE
BLACK
COLORS

SPECIAL FINISHES

F 400



F 300

FAIRFACTS SYMBOL
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The Fairfacts Company
234-236 WEST FOURTEENTH ST.
NEW YORK, U.S.A.

CABLE ADDRESS
FAIRFACTS
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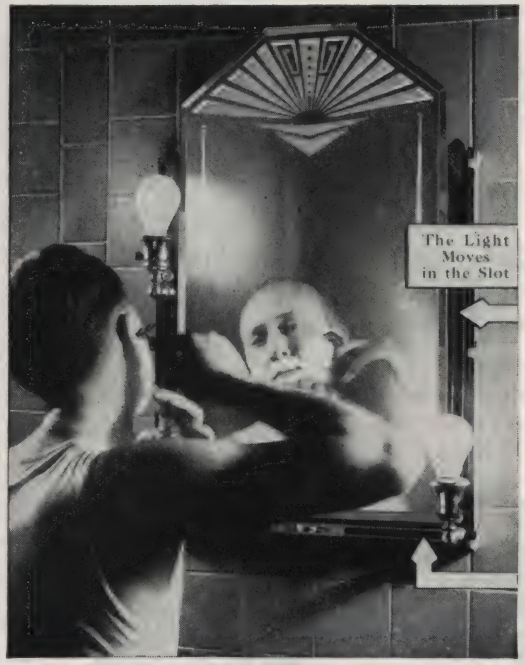
AND BENTLEY'S

CATALOGUE 31

HENKEL "EDGE-LITE" CORPORATION

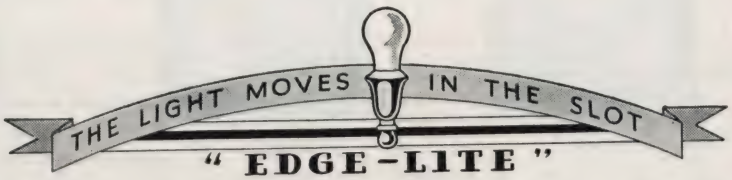
"Edge-Lite" Bathroom Cabinets, Mirrors and Vanities

900 N. Franklin Street, CHICAGO, ILL.



Moderne

Designed in keeping with the growing trend in decoration, the Moderne "Edge-Lite" is in great demand for the better-class homes, apartments, and hotels. All decorations harmonize with the modernistic design cut in the plate glass mirror. Three sizes: Catalog No. 222M, 16½x20½x5 in. overall; Catalog No. 232M, 19¼x22x5 in. overall; Catalog No. 242M, 21x25x5½ in. overall. Three standard color combinations: orchid door, orchid box; green door, green box; black door, ivory box. Shipped ready to install.



All "Edge-Lite" Bathroom Cabinets, Mirrors, and Vanities incorporate the exclusive "Edge-Lite" improvement in lighting. Sliding in slots on the very edge of the mirror, "Edge-Lite" brackets are instantly adjustable to erase any shadow from the face or neck. Too, illumination is more intense, the lights being closer to the mirror than is possible by any other method.

Construction Features

"Edge-Lite" brackets (patented) are held in position by self-adjusting friction clamps which will neither loosen nor stick after years of use. "Edge-Lite" mirrors are of highest grade selected plate glass held in aluminum slots for easy removal. No rosettes which might cause cracking. Cabinet doors, die cast from white brass, are air-cushioned to absorb slams and to protect mirrors. Wiring is done by union labor and is fully enclosed, being led from door frame to cabinet through a metal tube acting also as door stop. Cabinets are rust and corrosion proof—lacquer finish with chromium plated brackets and trim.

"Edge-Lite" Bathroom Cabinets and Mirrors are made in sizes, styles, and color combinations for any requirement—all completely wired at factory ready to install. Approved by Underwriters.

Villa Venice

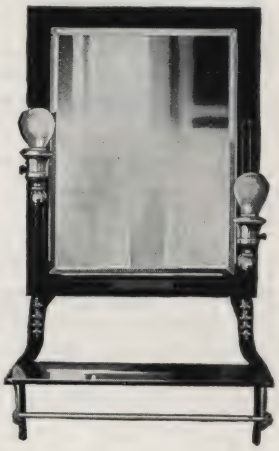
Decorated in the always-admired Venetian style throughout, the Villa Venice enjoys a steady and gaining demand for use in the finer homes, apartments, and hotels. Made in three sizes: Catalog No. 222V, 16½x20½x5 in. overall; Catalog No. 232V, 19¼x22x5 in. overall; Catalog No. 242V, 21x25x5½ in. overall. Three standard color combinations: orchid door, orchid box; green door, green box; black door, ivory box. Wired at the factory.

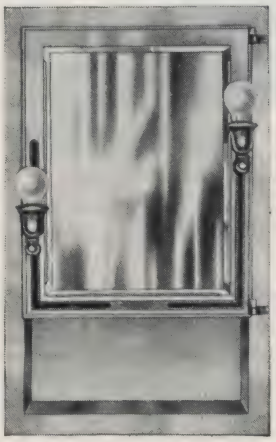
Gramere

A double-light mirror only, without cabinet, the Gramere is especially suitable for dressing rooms in theatres, hotels, and public buildings. Has 5x18-in. suspended shelf made of black vitrolite, and towel rod. Over-all size, 16½x20½ in. Colors: black or ivory. Wired ready for mounting with 4 screws which are hidden behind removable mirror.

Atlantic

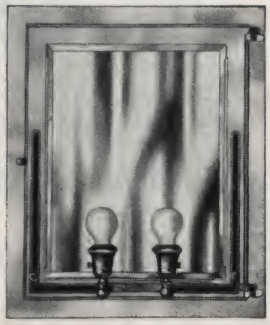
Exactly the same as the Gramere described above, except that the Atlantic has no suspended shelf and only one light. Colors: green or ivory.





University

A conservative model extremely popular for apartment and hotel use. Three shelves within the cabinet with a recessed shelf below. Has two light brackets. Standard finish ivory door and green box-prices for other color combinations on application. Over-all dimensions of the University are 19x30x5 in. Ready wired at the factory.



Metropole

Complete "Edge-Lite" advantages at minimum cost. Especially suitable for apartment hotels, clubs and public buildings. Box size, 19x23x5 in.; wall opening, 16½x20½x4½ in. Mirror size, 16½x20½ in. Two lights. Color combination: ivory door, green box. Wired at the factory.

Dundee

Exactly like the Metropole described above except the Dundee has but one light bracket sliding in continuous slot on three sides of mirror.

HESS WARMING & VENTILATING CO.

Hess Mirrored Bathroom Cabinets and Lavatory Mirrors

1207-1229 South Western Avenue, CHICAGO, ILL.

BRANCH OFFICES

DETROIT, MICH., 3921 Grand River Avenue—Telephone, Glendale 5028 NEW YORK, N. Y., 15 East 40th Street—Telephone, Lexington 8288
MILWAUKEE, WIS., 594-596 National Avenue—Telephone, Orchard 5770

THE CLASSIC—THE CABINET WHICH CONFORMS TO THE HIGHEST QUALITY

Hess Classic Cabinets are built entirely from the standpoint of quality and their simple beauty reflects the height of good taste. Hess Classic Cabinets are for use in the finest homes, apartments, clubs and hotels where the highest quality of design, material and workmanship are desired. The heavy plate mirror, of selected quality, to avoid the defects of commercial plate, conceals the sturdy white cabinet of steel. The hardware is all of non-ferrous metal and chromium plated. The three locking adjustable shelves and the extra one for the bottom of the cabinet, are heavy plate glass and their edges are polished as finely as their surfaces.

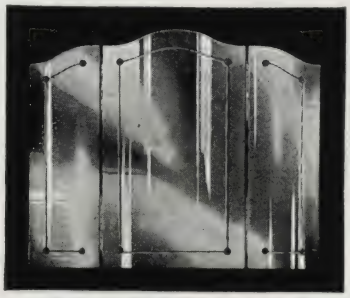
the CLASSIC

HESS CLASSIC (UNFRAMED)

Code word	Mirror, in.	Wall opening, in.	Ship. weight, lb.	Price
Pity	18x30	15x24x4¼	51	$46.50
Pick	16x28	13x22x4¼	40	
Page	20x32	17x26x4¼	61	

HESS CLASSIC (FRAMED)

Code word	Mirror, in.	Wall opening, in.	Ship. weight, lb.	Price
Plank	18x30	15x24x4¼	52	$60.00
Path	16x28	13x22x4¼	41	
Perch	20x32	17x26x4¼	62	



HESS CLASSIC WINGED CABINET

Code cord	Center mirror, in.	Wing mirrors, width, in.	Wall opening, in.	Ship. weight, lb.	Price
Pitch	18x30	9	15x24x4¼	85	$100.00

Mirrors on all unframed Classic Cabinets both carved and square top and on the Winged Classic Cabinet as well, have square polished edges

CLASSIC SQUARE TOP (UNFRAMED)

Code word	Mirror, in.	Wall opening, in	Ship. weight, lb.	Price
Peg	18x28	15x24x4¼	51	$44.00

CLASSIC SQUARE TOP (FRAMED)

Code word	Mirror, in.	Wall opening, in.	Ship. weight, lb.	Price
Pale	18x28	15x24x4¼	52	

The doors of all Hess Classic Cabinets are paneled. This presents a pleasing appearance and insures a substantial and rigid door.

The solid monel metal adjustable shelf brackets are small and do not occupy useful space in the cabinet.

Each Hess Classic Cabinet has chromium plated spring door check. It checks the door gently and without noise.

Hess Classic Cabinets are finished with the finest white lacquer finish and rubbed between coats to produce a satiny texture.

Any Classic mirror can be supplied with steel back for wall hanging over lavatories. A neat chromium plated towel rod can also be supplied on wall hung mirrors. Plain mirrors without mitre lines will be supplied if desired.

Classic Framed

Mirror frames on Hess Framed Classic Cabinets are made of solid monel metal, chromium plated and have a $\frac{7}{16}$-in. face

Cabinets listed in italic can be supplied on special order, and prices quoted when quantity required is known. The cabinets which are priced are carried in stock and can be shipped promptly.

Classic utility or supply cabinets with mirrors 60 in. long can be supplied on special orders.

Trade discounts on application.

A Few Buildings Using Hess Classic Cabinets

Location	Architect	Location	Architect
Chicago, Ill., 1301 Astor Street, Apartment	Philip Mahar	Baton Rouge, La., Governor's Mansion	Weiss, Dreyfous & Seyferth
Highland Park, Ill., Allen Loeb Residence	Russell Walcott and Robert Work	Lincoln, Neb., R. E Campbell Residence	Wilson & Davis
New York, N. Y., 602 East 84th Street, Apartment	George B. Post & Son	Oshkosh, Wis., Rupert Brown Residence	Auler, Jensen & Brown
Fair Haven, N. J., W. D. Potts, Jr. Residence	G. D. Morrow & Sons	Milwaukee, Wis., Edwin B. Bartlett Residence	Thomas S. Zan Alyea

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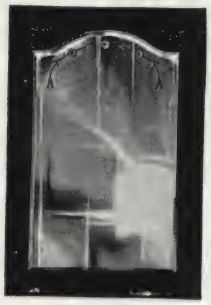
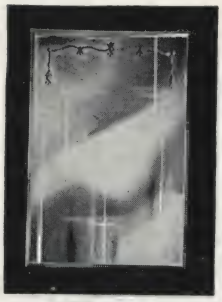
DE LUXE CABINETS

Without Frame



Framed

Without Frame



Framed

De Luxe Venetian—Simplicity, good taste and beauty combine to make the De Luxe Venetian the ideal cabinet for the modern bathroom. The large expanse of plate glass reflects a perfect image framed in a simple design that will harmonize with the finest bathroom. A spacious mirror opens at a touch to disclose gleaming shelves arranged for toilet necessities. Furnished complete with adjustable glass shelves—bulb edge.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Plate glass shelves	Shipping weight, lb.	List price complete
Unframed						
Vamp	*1628	16x28	13x22x4¼	3	40	$30.00
Vent	1824	18x24	15x19x4¼	2	40	28.60
Verb	1830	18x30	15x24x4¼	3	50	32.40
View	2032	20x32	17x26x4¼	3	60	42.75
Framed Has narrow monel metal frame chromium plated						
Monvent	F1824	18x24	15x19x4¼	2	41	$45.25
Monverb	F1830	18x30	15x24x4¼	3	51	49.25

*No. 1628 Venetian will fit between studs without cutting.

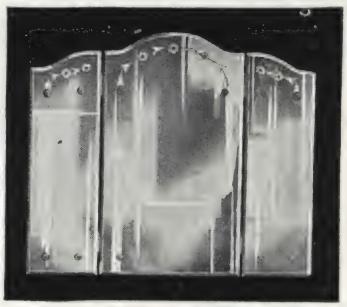
Additional plate glass shelves, $0.50 each.
Any of the above mirrors can be furnished with steel backs for wall hanging, without cabinets; prices on request.
The mirrors in framed cabinets are not beveled.

De Luxe Colonial—Designed in the modern tone of simplicity, the De Luxe Colonial Cabinet offers a distinctive beauty to the home owner who prefers quiet, unostentatious elegance. A large plate glass mirror, beveled, covers the sturdy steel cabinet that is placed behind. Furnished complete with adjustable glass shelves, bulb edge.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Plate glass shelves	Shipping weight, lb.	List price complete
Unframed						
Calf	*620	16x20	13x17x4¼	2	38	$28.50
Cast	828	18x28	15x24x4¼	3	50	33 50
Framed Has narrow monel metal frame chromium plated						
Moncalf	*F620	16x20	13x17x4¼	2	39	$38.00
Moncast	F828	18x28	15x24x4¼	3	51	45.00

*No. 620 Colonial will fit between studs without cutting.

*No. F620 Colonial will fit between studs without cutting.
Additional plate glass shelves, $0.50 each.
Any of the above mirrors can be furnished with steel backs for wall hanging, without cabinets; prices on request.



De Luxe Elite

De Luxe Rosetteless Venetian—This new Venetian cabinet is similar in design to other Hess Venetian Cabinets. The heavy beveled plate glass mirror, however, has no holes nor rosettes, being secured by a lip at the bottom of the door which supports the weight of the mirror and tiny clips on each side of the door at the top hold it in place. It is furnished in a beautiful and wonderfully durable white enamel.

Telegraph code word	Size of mirror, in.	Wall opening, in.	Bulb edge shelves	Shipping weight, lb.	List price
Vast	16x22	13x17x4¼	2	26	$19.00

The above mirror can be furnished with steel back for wall hanging, without cabinet, price on request.

DE LUXE ELITE CABINETS

Telegraph code word	Center mirror size, in.	Wall opening, in.	Plate glass shelves	Shipping weight, lb.	List price complete
Elite	18x30	15x24x4¼	3	85	$80.00

De Luxe Rosetteless Venetian

Style R Cabinet

Sturdy, strong, built for utility in the bathroom demanding the finest in a plain, attractive cabinet. The mirror is of heavy plate glass with beveled edges. Furnished complete with adjustable plate glass shelves.

R and S Cabinet doors have invisible hinges and the cabinets are protected by a hard, white porcelain-like finish.

Style R

Style S

Style S Cabinet

Similar to Style R, this large, spacious cabinet provides a convenient shelf below for the holding of toilet accessories. Its simple, sturdy lines make it practical for every type of bathroom. Furnished complete with adjustable plate glass shelves.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Plate glass shelves	Shipping weight, lb	List price complete
Rare	*10	10x14	13x17x4¼	2	22	$12 10
Reach	12	12x16	15x19x4¼	2	26	13 35
Rent	14	14x18	17x21x4¼	2	30	14 65
Rack	16	16x20	19x23x4½	3	35	22 50

*No. 10 Style R will fit between studs without cutting.
Additional plate glass shelves, $0.50 each.
If mirror without bevel is wanted, deduct $0.90 from above prices.

Telegraph code word	No.	Mirror size, in.	Wall opening, in.	Plate glass shelves	Shipping weight, lb.	List price complete
Oak	*100	10x14	13x22x4¼	3	27	$12.85
Oil	120	12x16	15x24x4¼	3	31	13.95
Ohm	140	14x18	17x26x4¼	3	35	15.45
Ore	160	16x20	19x28x4¼	4	40	23.50

*No. 100 Style S Cabinet will fit between studs without cutting.
Additional plate glass shelves, $0.50 each.
If mirror without bevel is wanted, deduct $0.90 from above prices.

Trade discounts on application.

HOEGGER, INC.

Manufacturers of Solid Brass Bathroom Accessories

TELEPHONE
PALISADE 6-8100

MAIN OFFICE AND FACTORY
532 Gregory Avenue, WEEHAWKEN, N. J.

NEW YORK, N. Y., ARCHITECTS SAMPLES CORPORATION, 101 Park Avenue

For Hoegger Garment Carriers, see Manufacturers' Index

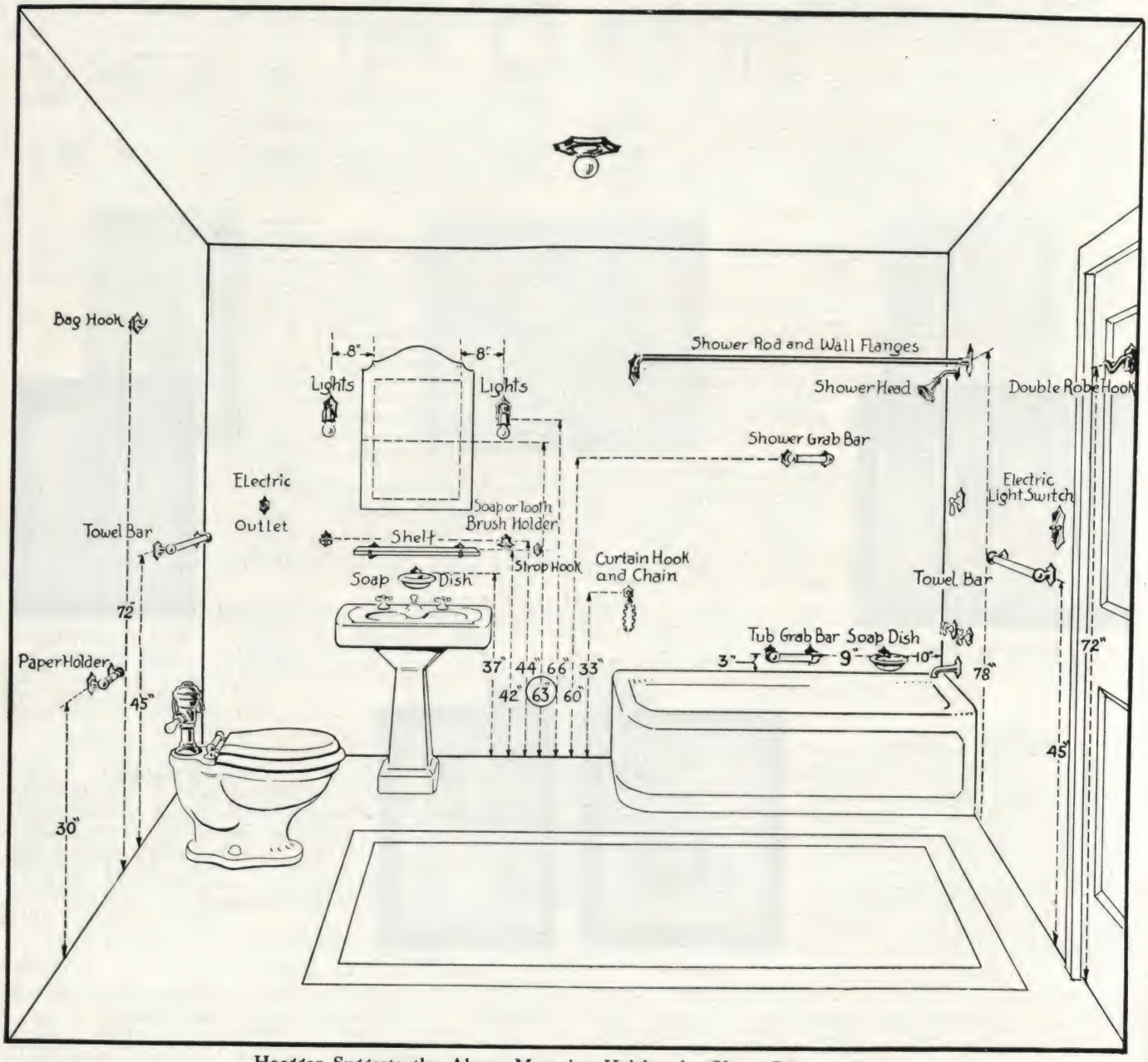
Hoegger Products and Experience

An assurance of quality. Backed by an organization of master craftsmen and a quarter century's experience, Hoegger products have become the standard of excellence among many architects and owners.

In addition to an extensive selection of stock products made in two complete lines of matched design, HOEGGER, INC., manufacture special products to individual designs and specifications.

Mounting Heights for Hoegger Accessories

The mounting heights shown on this page are offered for the convenience of the architect. Due to slight variations of bathroom fixtures and local conditions, these heights are necessarily an average—they have been found to apply to the majority of installations. From experience, it has been found that only a very slight deviation from "63 in." to the center of the medicine cabinet is satisfactory. Mounting heights for electric lighting fixtures will be found under each fixture.



Hoegger Suggests the Above Mounting Heights for Your Convenience

Mounting Heights

Continued on next page

MOUNTING FEATURES OF HOEGGER ACCESSORIES

(Patent No. 1636364)

HOEGGER surface applied accessories consist essentially of two parts, the fixture proper and the solid brass concealed back plate. The back plates are made in several types to facilitate mounting on the various kinds of wall construction. The fixture is rigidly secured to the back plate by a single concealed set screw which is regularly furnished slotted for screw driver, but where fixtures are used in public places, a special theft-proof set screw will be furnished when specified.

Advantages of HOEGGER Concealed Plate type mounting are:

(1) They are easily and quickly installed in any type of wall construction.

(2) The fixtures are not attached to the back plates until the rooms are completely decorated, thus eliminating any possible loss from theft or injury.

(3) Fixtures may be easily removed whenever it is necessary to re-decorate the room.

(4) Due to the construction of the patented back plate post the fixture is forced tightly against the wall surface when set screw is tightened, thus assuring a neat, tight-fitting assembly that will not work loose.

HOEGGER Concealed Back Plates are made in several types to meet the various conditions in wall construction:

"S" Type—Can be mounted on any type of wall. This is our regular plate and is shipped with all fixtures unless otherwise specified.

"SA" Type—"Anker-in" plate set in wall with plaster of paris. Anchors made in two lengths—1¼ in. long for tile or marble walls and 2¼ in. long for cement or plaster walls.

"SH" Type—May be used with any fixture where an additional hook is desired. Hook extends ⅞ in. below flange. *Important*—As the flange of this fixture must be machined at the factory, this type plate must be specified when fixtures are ordered.

"SB" Type—Wall Anchor Bar. The back plate is mounted on a ⅛x1-in. galvanized bar which is placed in the wall during erection.

"SG" Type—Adjustable. Made especially for glass, marble or any sheet wall where the thickness of the material necessitates an adjustable mounting.

All fixtures except 513 and 518 are interchangeable on all HOEGGER back plates

Anker-in (SA) Type Plate

Installing Directions for Hoegger Concealed Plates (Patent No. 1636364)

All HOEGGER Concealed Plates are mounted so that lug is on top (Fig. 1). This lug fits in a recess and keeps the fixture from turning on the concealed plates.

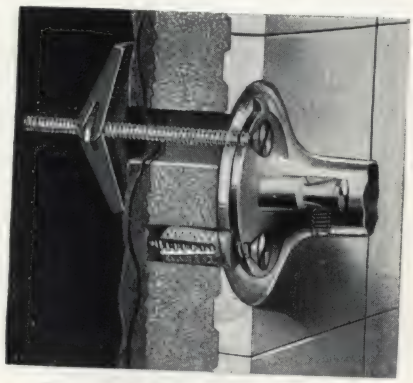
Where fixtures require two concealed plates, as towel and grab bars, carefully measure center to center distance of plates from assembled fixture.

Note: Where conditions warrant, a templet will be furnished for all double plate fixtures.

Fig. 1

Important When Ordering

If Anker-in type wall fastening is wanted add (SA) to catalogue numbers; if concealed screw type is wanted, add (S) only.



Concealed Screw (S) Type Plate

Installing Directions for Anker-in (SA) Type Plates

Cut hole in wall 1⅝ in. wide, ⅝ in. high, 1½ in. deep for short anchor plates used on tile walls, and 2½ in. deep for long anchor plates used on cement or plaster walls. Fill hole with plaster of paris, placing some on anchor, and insert with lug at top (Fig. 1). Hold until set—about one minute.

Important—Fixtures should not be put on plates for at least one hour or preferably after room is decorated and ready for occupancy.

Installing Directions for Concealed Screw (S) Type Plates

On Wood—Use inclosed wood screws.

On Tile—Use inclosed wood screws and lead shields.

On Plaster—Use inclosed wood screws and rawl plugs or toggle bolts.

Note: Plate may be fastened by top screw only, fixture put on and adjusted as required, then fixture carefully removed and hole drilled for bottom screw.

Chromium Plated Tapped Buttons (C-10-24)

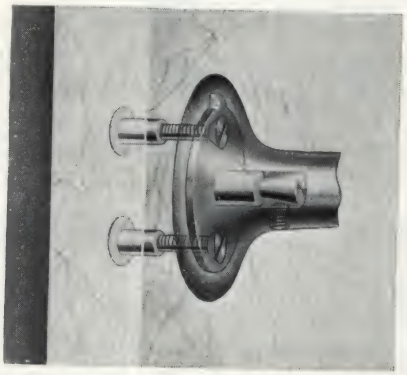
Tapped Brass Sleeves (10-24)

Brass Machine Screws (10-24)

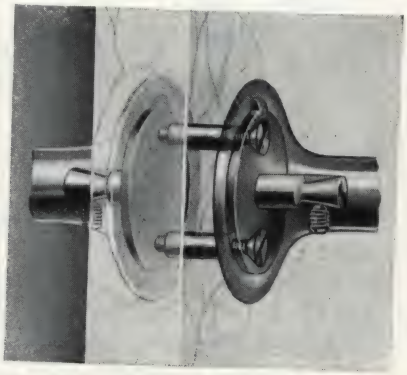
"SH" Back Plate

(Patent applied for) Hook extends ⅞ in. below flange

"SH"-Concealed Screw Back Plate (illustrated) finished to match fixtures with which they are ordered, **$0.50** each.



"S" Type Plate Mounted on Marble with Chromium Plated Buttons and Screw



"S" Type Plates Mounted Back to Back on Marble with Sleeves and Screws

Important: Drill holes vertically 1⅛ in. center to center

Continued on next page

GENERAL INFORMATION

HOEGGER Bathroom Accessories are made in two stock designs. "Parfait" (design patent No. 70560) and "Standard," which permit a wide selection from two complete lines of matched designs.

Finishes of Hoegger Accessories

Medicine Cabinets—The electrically welded 1/8-in. steel cases are finished in baked white enamel or colors on order. The doors are finished as described under each cabinet.

Mirrors—HOEGGER Mirrors are made in many designs and sizes and are equipped with a patented concealed hanger, described on page 12. Mirrors with brass frames furnished in any of the finishes given below under accessories. Prices are listed under each mirror.

Accessories—All Accessories are made of solid brass, and are mounted on the wall with a patented concealed plate, described on preceding page. They are supplied in the following finishes which are designated by placing a letter before the catalogue number.

Price	*Prefix*	*Finish*
As listed	"W"	HOEGGER's "Wyco"—a soft white velvety finish that is guaranteed not to blister, crack or change color.
See table	Name of Color	Colored accessories—Similar to "Wyco"—furnished any color desired on order.
As listed	"C"	"Crodon"* (chromium plate), a permanent non-tarnishable finish; no abrasive necessary to clean.
"Crodon" price plus 10%	"OS"	"Old Sheffield"—Satin finished "Crodon" (chromium plate).
"Wyco" price less 10%	"N"	Nickel plate. Every modern improvement in nickel plating is used in the HOEGGER shops.
"Crodon" price	"NS"	Solid (18%) nickel silver. The finish is the highly polished surface of the nickel silver.
On application	"RG"	Roman gold (20-year coin gold plate)—A beautiful dull rich finish.
On application	"SG"	Satin gold (20-year coin gold plate)—A most distinctive finish similar to "Old Sheffield."
On application	"PG"	Polished gold (20-year coin gold plate)—A highly polished finish.
On application	"S"	Silver plate—A heavy plate of silver, fully guaranteed by HOEGGER.

*Crodon is the trade name of The Chromium Corp. of America and HOEGGER, INC., is licensed to use their process.

PRICES OF COLORED ACCESSORIES AND LIGHTING FIXTURES

Any Color

1 to 25 Articles, Same Color, ADD 25% to Crodon Prices
26 Articles and over, Same Color, same as Crodon Prices

Prices and Deliveries

Trade discounts on application, subject to change without notice.

A handling charge of 25¢ is made for all orders under $10.00 net. An extra charge of 3% is made for all export packing.

The carriers are responsible for all goods lost, damaged or delayed in transit, and in such cases the consignee must immediately notify the carrier agent at destination in writing in order to substantiate the formal claim when it is presented.

No claims allowed unless made within TEN days of receipt of goods.

Orders covering special goods are not subject to cancellation, except upon agreement to make payment for special work which has been performed.

Orders for large quantities and for colored products should be placed as far in advance as possible.

Continued on next page

SPECIFICATIONS FOR BATHROOM ACCESSORIES

This specification shall include the furnishing of all bathroom accessories required for the building.

Bathroom accessories shall be as manufactured by HOEGGER, INC. of Weehawken, N. J., or as approved by architect or owner.

The term "Bathroom Accessories" shall include all medicine cabinets, mirrors, towel bars, glass shelves, paper holders, tumbler holders and other fittings as called for in list of accessories.

Medicine cabinets shall be constructed of 14-gauge steel with interior finish consisting of one coat of priming and three coats of baked-on enamel.

Doors shall be flush to 14-gauge thick cabinet flange and hinges and door stops shall be concealed. Medicine cabinets shall be set flush with wall, the door only being exposed.

The installation of the cabinet shall be such as to provide for the complete finishing of the wall up to the recess and permit the setting of the cabinet after all other trades have finished.

Medicine cabinets shall be equipped with plate glass shelves with polished edges on Crodon adjustable shelf supports and strips.

Mirrors shall be of same construction and material as mirrors of medicine cabinets and shall be secured to wall with concealed hangers.

All mirrors shall be made of Belgian or French glass. All square towel bars shall be of polished cut glass.

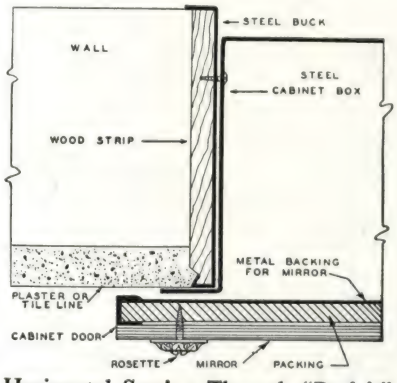
Accessories such as towel bars, soap and tumbler holders and other surface fixtures shall be secured to walls in such a manner that the fixture will draw towards the wall when set screw is tightened.

All accessory parts and fittings shall be made of brass forgings.

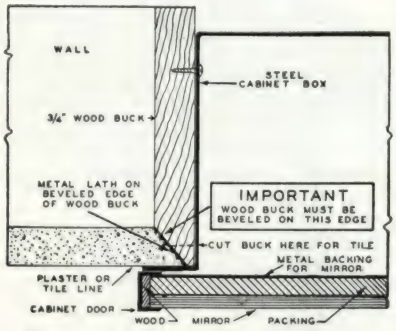
The process of Crodon plating shall be such as will treat the base metal electrically with nickel for thirty minutes and with Crodon for fifteen minutes to produce a plating of adequate thickness and durability.

All lighting fixtures in bathrooms and lavatories shall be Crodon of HOEGGER design in harmony with design of accessory fixtures.

TYPICAL INSTALLATION OF RECESS MEDICINE CABINETS SHOWING HOEGGER STEEL BUCK AND *WOOD BUCK

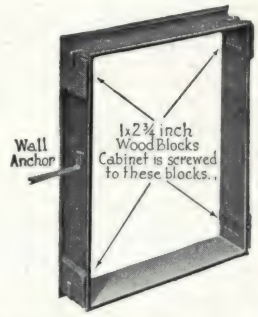


Horizontal Section Through "Parfait" Cabinet Showing Hoegger Steel Buck



Horizontal Section Through "Impériale" Cabinet Showing Wood Buck

Important: Tile or plaster must be kept flush and to an even plane around wall opening so that cabinet flange will fit tightly against the wall.



Hoegger Steel Buck for Recess Medicine Cabinets
(Patent 1715032)
List price, all sizes...**$12.00**

Hoegger Steel Buck for Recess Cabinets

A pressed steel buck, 4½-in. deep, which is built into place in a definite location at the time the terra cotta partition is laid up. Eliminates necessity of cutting the required opening in the partition after the walls have been laid and finished. Saves much time and labor and gives a much better appearance to the finished job. Buck acts as a ground for plaster, giving a straight, flush finished plaster job—cabinet therefore fits absolutely flush against the wall in all cases.

*To be built on job.

Continued on next page

"PARFAIT" RECESS MEDICINE CABINETS

Electrically Welded Steel Cabinets

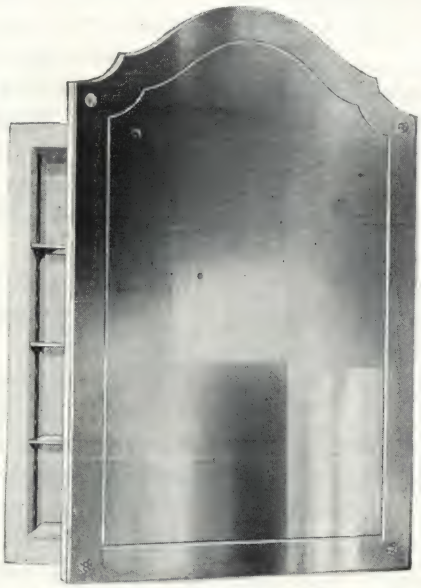
Genuine French Plate Mirror Entirely Conceals the Medicine Cabinet

These cabinets are for use in high class residences, club or hotel rooms where a cabinet of exceptional beauty and design is desired.

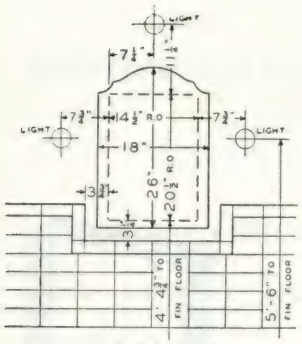
The design of the front of the cabinets (the mirror entirely covers the cabinet) gives them the appearance of a beautiful mirror and conceals the fact that a medicine cabinet is housed behind the mirror.

Construction Features—Door consists of a chromium plated $\frac{7}{16}$ in. brass channel frame with an enameled steel back on which is mounted a polished edge mirror, tightly packed so that there is no tinning sound when door is closed. Hinges are completely concealed in door frame and both are equipped with door stops, an exclusive HOEGGER patented feature; has no knob, door is opened by placing fingers at bottom edge of frame.

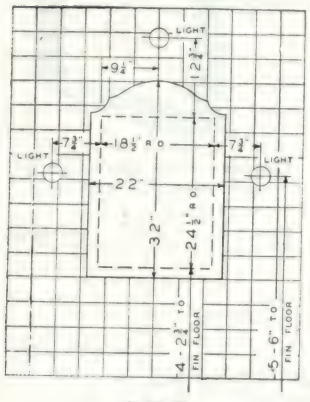
Mirrors supplied without mitre lines if desired.



"Parfait" Recess Medicine Cabinet
(Patents 1646200, 1707013)



C-50-P



C-51-P

Typical Installations of "Parfait" Recess Medicine Cabinets

"PARFAIT" RECESS MEDICINE CABINETS

Catalogue No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List price
C-50-P	18x26	3–13½x4¼x5/16	14½x20½x4½	**$100.00**
C-51-P	22x32	4–17½x4¼x5/16	18½x24½x4½	**120.00**

STRAIGHT TOP "PARFAIT" RECESS CABINETS

ST-50	18x22	3–13½x4¼x5/16	14½x20½x4½	**$ 90.00**
ST-51	22x27⅝	4–17½x4¼x5/16	18½x24½x4½	**110.00**

(For Cabinet details see page 4)

For colored door frame, add $5.00.

For colored cabinet and door frame, add $20.00.

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 3½ and 4½ in. deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep.....add $10.00
8 in. deep.....add 15.00
10 in. deep.....add 20.00
12 in. deep.....add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGER Steel Buck described on page 4 should be used.

"PARFAIT" MIRROR ONLY (No Cabinet)

Catalogue No.	Mirror, in.	List price
C-950-SP	18x26	**$60.00**
C-951-SP	22x32	**80.00**

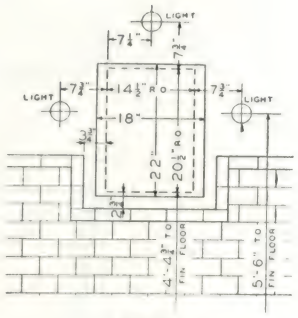
STRAIGHT TOP "PARFAIT" MIRROR ONLY (No Cabinet)

ST-950	18x22	**$50.00**
ST-951	22x27⅝	**70.00**

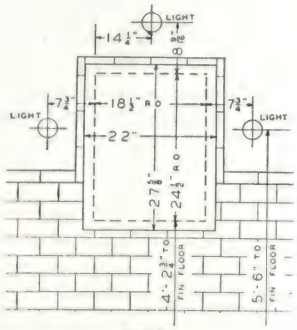
These mirrors are equipped with HOEGGER's Patented Concealed Hanger as described on page 12.

Note: Add $20.00 to list prices for gold back mirror in place of regular silver mirror.

For colored mirror frame, add $5.00.



ST-50



ST-51

Typical Installations of Straight Top "Parfait" Recess Medicine Cabinets

HOEGGER Cabinets and Mirrors can be furnished to your design and specifications on order

HOEGGER *"Parfait" Cabinets and Mirrors* HOEGGER

Continued on next page

"PARFAIT" RECESS CABINETS WITH SIDE MIRRORS

This cabinet is identically the same as the "Parfait" (described on preceding page) with the exception that side mirrors have been added.

Mirrors supplied without mitre lines if desired.

"PARFAIT" RECESS CABINET WITH SIDE MIRRORS

Catalogue No.	Mirrors, in.		Glass shelves, in.	Rough opening, in.	List price
	Center	Side			
C-75-P	18x26	8x22	3–13½x4¼x5/16	14½x20½x4½	**$150.00**
C-76-P	22x32	10x27½	4–17½x4¼x5/16	18½x24½x4½	**175.00**

***STRAIGHT TOP "PARFAIT" RECESS CABINETS WITH SIDE MIRRORS**

ST-75	18x22	8x22	3–13½x4¼x5/16	14½x20½x4½	**$140.00**
ST-76	22x27 5/8	10x27 5/8	4–17½x4¼x5/16	18½x24½x4½	**165.00**

*Cabinets same as illustrated at the right except that mirrors have straight tops.

For colored door frames, add $10.00.

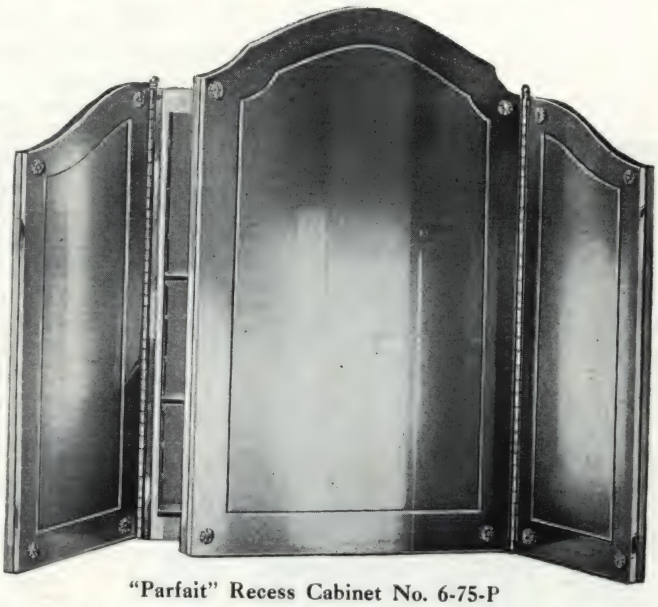
For colored cabinet and door frames, add $25.00.

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 3½ and 4½ inches deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep.....add $10.00
8 in. deep.....add 15.00
10 in. deep.....add 20.00
12 in. deep.....add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.



"Parfait" Recess Cabinet No. 6-75-P

Mirrors Only (No Cabinet)

Mirrors listed at the right are equipped with HOEGGER'S Patented Concealed Hanger as described on page 12.

"PARFAIT" TRIPLICATE

Catalogue No.	Mirrors, in.		List price
	Center	Side	
C-975-SP	18x26	8x22	**$100.00**
C-976-SP	22x32	10x27½	**125.00**

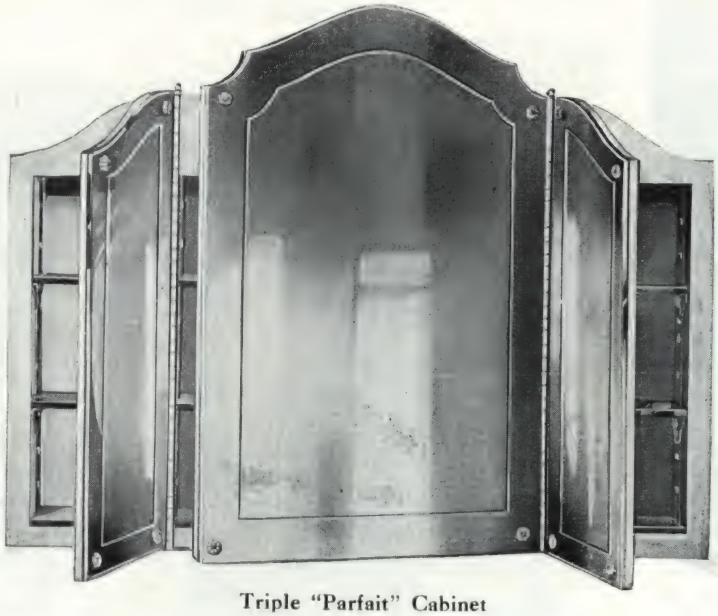
STRAIGHT TOP "PARFAIT" TRIPLICATE

Catalogue No.	Mirrors, in.		List price
	Center	Side	
ST-975	18x22	8x22	**$ 90.00**
ST-976	22x27 5/8	10x27 5/8	**115.00**

Note: Add $40.00 to list prices shown at the left for gold back mirror in place of regular silver mirror.

For colored mirror frames, add $10.00.

This is the same construction as C-75-SP and C-76-SP cabinets shown and listed above, with the exception that it has three separate medicine cabinets —one under each door.



Triple "Parfait" Cabinet

Mirrors supplied without mitre lines if desired.

Note: For prices of mirrors only, see "Parfait" Triplicate mirrors in table above.

"TRIPLE-PARFAIT" RECESS MEDICINE CABINETS

Cat. No.	Mirrors, in.		Cabinets, in.		Glass shelves, in.		Rough opening, in.	List price
	Ctr.	Side	Ctr.	Side	Center	Side		
C-77-TP	18x26	8x22	18x17	7x17	3-17¾x4¼x5/16	6-6 7/8x4¼x5/16	33x17¾x4½	**$200.00**
C-78-TP	22x32	10x27½	22x22	9x22	4-21¾x4¼x5/16	8-8 7/8x4¼x5/16	41x23¼x4½	**250.00**

"Parfait" Cabinets and Mirrors

Continued on next page

"IMPÉRIALE" RECESS SUPPLY CABINET AND DRESSING MIRROR

(Patents 1646200, 1707013)

This new product by HOEGGER provides ample room for storage of the necessary bathroom supplies in the bathroom, and at the same time provides a beautiful dressing mirror.

The mirror on the cabinet illustrated is 20 in. wide and 60 in. high.

The depth of the cabinet must necessarily be determined by the room available on the job. Regularly furnished 4½ in. deep, but can be supplied any depth up to 12 in. on order. Prices on other depths on application.

The mirror frame is $\frac{7}{16}$ in. solid brass, regularly finished in Wyco (white) or Crodon (chromium plate), but can be furnished in colors if desired. Colored mirror frames furnished at prices shown.

Price of colored cabinet and mirror frame on application.

Cabinet is equipped with 4 plate glass shelves, adjustable every 2 in., and 1 stationary shelf at bottom.

Bottom of cabinet should be 12 in. above finished floor line.

C-65 "Impériale" Recess Supply Cabinet and Dressing Mirror

The plate glass mirror entirely conceals the cabinet

RECESS SUPPLY CABINET AND DRESSING MIRROR

Cat. No.	Mirror size, in.	Cabinet depth, in.	Rough opening, in.	List price
C-65	20x60	4½	18½x58½x4½	**$225.00**

CORNER TYPE SUPPLY CABINET AND DRESSING MIRROR (Not Recessed)

Cat. No.	Mirror size, in.	Shelves, in.	List price
C-465	20x60	13¾x13¾x19⅝x⅝	**$255.00**

Note: Cabinet extended 14 in. each way from corner.

RECESS SUPPLY CABINET WITH TRIPLE DRESSING MIRRORS

Cat. No.	Mirror size, in.		Cabinet depth, in.	List price
	Center	Side		
C-66	20x60	10x60	4½	**$375.00**

Leave rough opening 18½x58½x4½ in.

MIRRORS ONLY

Single Type			Triple Type			
Cat. No.	Size, in.	List price	Cat. No.	Mirror, size, in. Center	Side	List price
C-965-S	20x60	**$100.00**	**C-966-S**	20x60	10x60	**$225.00**

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 4½-in. deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep....add $15.00
8 in. deep....add 30.00
10 in. deep....add 45.00
12 in. deep....add 60.00

CORNER MEDICINE CABINETS

Corner medicine cabinets are ideal for use where space is at a premium and as an added convenience in bathrooms equipped with regular wall cabinets. They are easily and quickly installed as they are not recessed.

C-462

C-462 IMPÉRIALE CORNER CABINET

Cat. No.	Mirror size, in.	Glass shelves, in.	List price
C-462	20x26	(4)13¾x13¾x19⅝x⅝	**$85.00**

Cabinet extends 14 in. each way from corner.

Equipped with same door as C-62 cabinet (see page 8).

414

414 CORNER CABINET

Cat. No.	Mirror size,in.	Door size, in.	Glass shelves, in.	List price
414	18x24	20x26	(3)13¾x13¾x19⅝x⅝	**$60.00**

Cabinet extends 14 in. each way from corner.

Equipped with same door as 214 cabinet (see page 11).

Continued on next page

"IMPÉRIALE" RECESS MEDICINE CABINETS

Genuine French Plate Mirror Entirely Conceals the Medicine Cabinet

(Patents 1646200, 1707013)

One of HOEGGER's most popular medicine cabinets. Narrow Crodon finished frame makes this cabinet distinctly individual and attractive Mirrors supplied without mitre lines if desired.

"IMPERIALE" RECESS CABINETS

Cat. No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List price
C-61	16x22	3–13½x4¼x5/16	14½x20½x4½	$ 50.00
C-62	20x26	4–17½x4¼x5/16	18½x24½x4½	75.00
C-63	24x30	4–21½x4¼x5/16	22½x28½x4½	100.00

Colored door frames at prices shown
For colored cabinet and door frame add $15.00.

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 3½ and 4½ in. deep at the prices shown, but can also be supplied in the following depths on order:

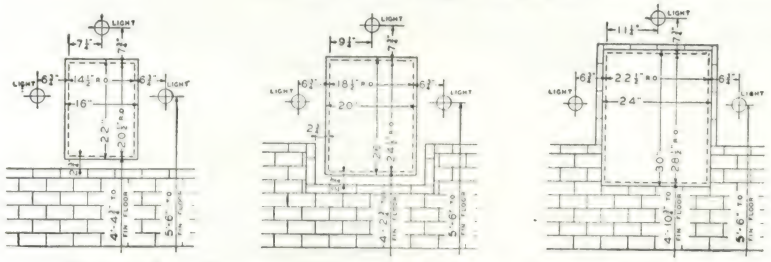
6 in. deep.....add $10.00
8 in. deep.....add 15.00
10 in. deep.....add 20.00
12 in. deep.....add 25.00

Note: Add $20.00 to list prices shown at the right for gold back mirror in place of regular silver mirror.
Colored mirror frames at prices shown.

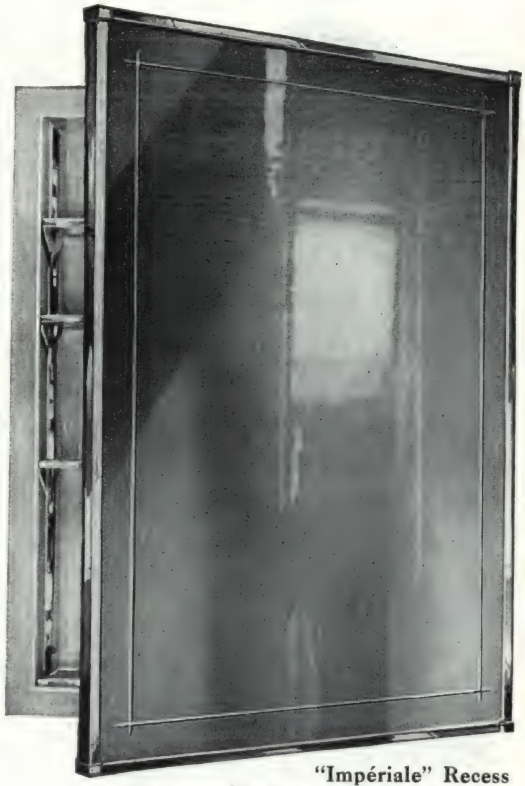
MIRRORS ONLY

Catalogue No.	Mirror, in.	List price
C-961-S	16x22	$35.00
C-962-S	20x26	50.00
C-963-S	24x30	65.00

These mirrors are equipped with HOEGGER's Patented, Concealed Hanger, described on page 12.



Typical Installations of "Impériale" Recess Medicine Cabinets



"Impériale" Recess Medicine Cabinet No. C-61

"Oval-Impériale" Cabinets

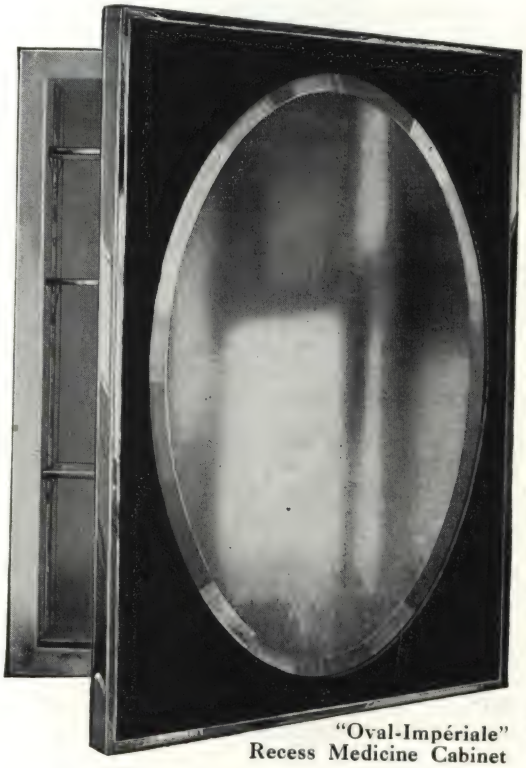
A new cabinet by HOEGGER, correct in every point of design and construction. Standard finish of door is black with Crodon frame.

"OVAL-IMPÉRIALE" CABINETS

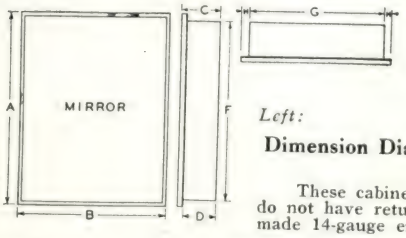
Cat. No.	Mirror, in.	Frame, in.	Glass shelves, in.	Rough opening, in.	List price
C-49	16½x21¾	20x26	4–17½x4¼x5/16	18½x24½x4½	$100.00

MIRRORS ONLY

Catalogue No.	Mirror, in.	Frame, in.	List price
C-949-S	16½x21¾	20x26	$75.00



"Oval-Impériale" Recess Medicine Cabinet



Left:

Dimension Diagram of Recess Medicine Cabinets

These cabinets fit flush with the wall and do not have return flanges. Cabinet cases are made 14-gauge enameled steel

Catalogue Nos.												Dimensions in in.						
Parfait	Straight top Parfait	Parfait with side mirrors	Straight top Parfait with side mirrors	Impériale	Oval Impériale	Impériale Parfait	Impériale Parfait with side mirrors	Colonial	Gothic	Standard	Standard 2/3 doors	A	B	C	D	F	G	H
C-50-P	ST-50	C-75-P	ST-75	C-61	....	C-43-P	C-42-P	C-44	C-46	213	233	22	16	5¼	4½	20	14	i
C-51-P	ST-51	C-76-P	ST-76	C-62	C-49	C-40-P	C-41-P	C-45	C-47	214	234	26	20	5¼	4½	24	18	1
.....	.....	.....	.....	C-63	....	.....	.....	....	....	215	235	30	24	5¼	4½	28	22	1

"Impériale" Cabinets and Mirrors

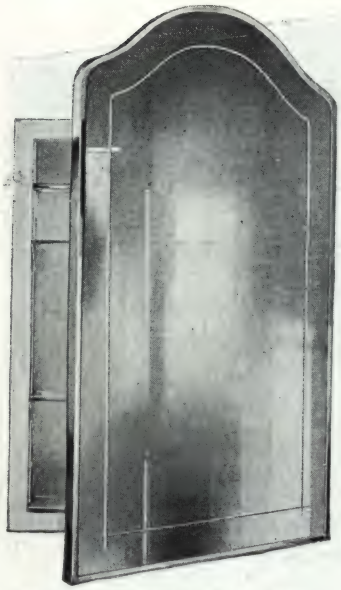
Continued on next page

"IMPERIALE-PARFAIT" RECESS CABINETS

(Patents 1646200, 1707013)

Electrically Welded Steel Construction

Genuine French Plate Mirror Entirely Conceals the Medicine Cabinet



"Impériale-Parfait" Medicine Cabinet

"Studied simplicity" is the keynote of true art, and in this popular design HOEGGER craftsmen have produced a medicine cabinet which has appealed to all who have seen it.

The narrow 7/16 in. frame, finished in Crodon, Wyco (white) or color (on order) is correctly proportioned and makes a neat clean frame for the genuine French plate mirror.

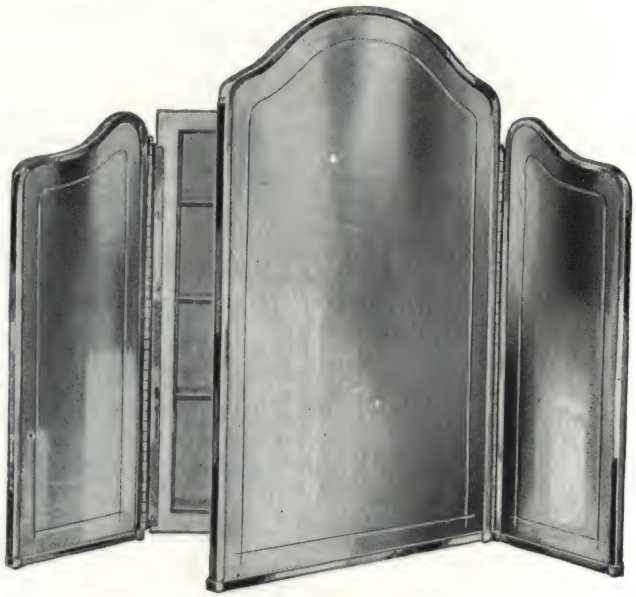
Doors open to left on order.

Mirrors supplied without mitre lines if desired.

With Side Mirrors—In combining side mirrors of matched design with the "Impériale-Parfait" cabinet, HOEGGER offers a striking example of art and simplicity.

The 7/16 in. frame is regularly furnished in the non-tarnishable Crodon or Wyco (white) but can be furnished in any color on order.

Mirrors supplied without mitre lines if desired.



"Impériale-Parfait" Cabinet with Side Mirrors

"IMPÉRIALE-PARFAIT" RECESS CABINETS

Catalogue No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List price
C-43-P	16x27	3–13½x4¼x5/16	14½x20½x4½	**$ 85.00**
C-40-P	20x32	4–17½x4¼x5/16	18½x24½x4½	**110.00**

"IMPÉRIALE-PARFAIT" CABINETS WITH SIDE MIRRORS

Catalogue No.	Mirror, in. Center	Mirror, in. Side	Glass shelves, in.	Rough opening, in.	List price
C-42-P	16x27	8x22	3–13½x4¼x5/16	14½x20½x4½	**$150.00**
C-41-P	20x32	10x26	4–17½x4¼x5/16	18½x24½x4½	**185.00**

(For Cabinet details see page 8)

Colored door frames at prices shown

For colored cabinet and door frame, add $15.00

SPECIAL DEPTH CABINETS

These cabinets are regularly furnished 3½ and 4½ in. deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep.....add $10.00
8 in. deep.....add 15.00
10 in. deep.....add 20.00
12 in. deep.....add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 5 should be used.

MIRRORS ONLY (No Cabinets)

"Impériale-Parfait"

Catalogue No.	Mirror, in.	List price
C-943-SP	16x27	**$60.00**
C-940-SP	20x32	**80.00**

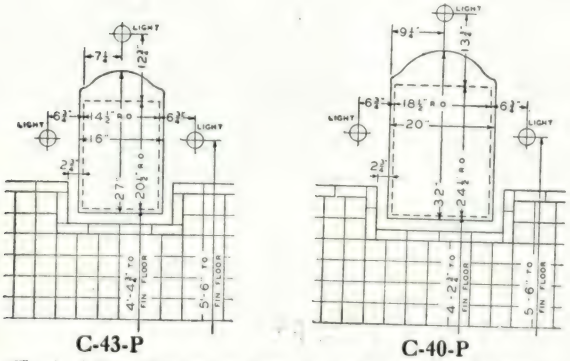
"Impériale-Parfait" Triplicate

Catalogue No.	Center mirror, in.	Side mirrors, in.	List price
C-942-SP	16x27	8x22	**$110.00**
C-941-SP	20x32	10x26	**135.00**

These mirrors are equipped with HOEGGER'S Patented Concealed Hanger, described on page 12.

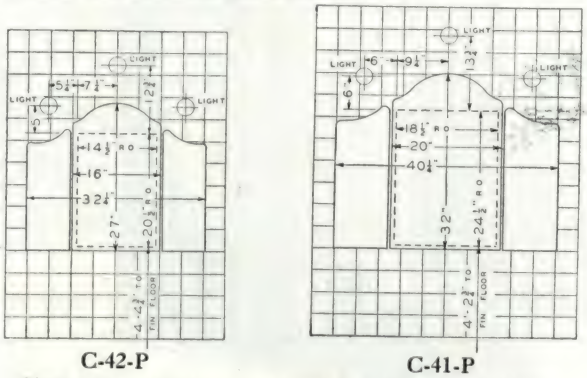
Note: Add $20.00 to list price for gold back mirror in place of regular silver mirror for G-943SP and C-940SP. Add $40.00 for C-942SP and C-941SP.

Colored door frames at prices shown.



C-43-P C-40-P

Typical Installation of "Impériale-Parfait" Medicine Cabinets



C-42-P C-41-P

Typical Installations of "Impériale-Parfait" Cabinets with Side Mirrors

HOEGGER Cabinets and Mirrors can be furnished to your design and specifications on order

Continued on next page

"COLONIAL" AND "GOTHIC" RECESS MEDICINE CABINETS

Electrically Welded Steel Cabinets

Genuine French Plate Mirror Entirely Conceals the Medicine Cabinet

"Colonial" Medicine Cabinet

$\frac{7}{16}$-in. brass frame Crodon finished; genuine French plate glass mirror.

Identically the same construction as the "Impériale" cabinet, the only difference being the shape of the mirror.

"Gothic" Medicine Cabinet

$\frac{7}{16}$-in. brass frame Crodon finished; genuine French plate glass mirror.

Also identically the same construction as the "Impériale" cabinet with the exception of shape of mirror. Gothic design gives an ultra-modern touch to cabinet.

"Colonial" Medicine Cabinet
(Patents 1646200, 1707013)

General Notes on Both Types

The mirror frame, while regularly furnished in Crodon (chromium plate) or Wyco (white) may be ordered in any color.

Doors open to left on order.

Mirrors supplied without mitre lines if desired.

Colored door frame at prices shown.

For colored cabinet and door frame, add $15.00.

Note: On new work where these cabinets are to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.

Mirrors are equipped with HOEGGER'S Patented Hanger as described on page 12.

Add $20.00 to list prices for gold back mirror in place of regular silver mirror.

Colored mirror frames at prices shown.

SPECIAL DEPTH CABINETS

Cabinets are regularly furnished 3½ and 4½ inches deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep	add $10.00
8 in. deep	add 15.00
10 in. deep	add 20.00
12 in. deep	add 25.00

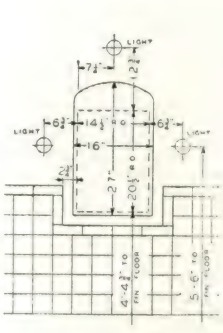
"Gothic" Medicine Cabinet
(Patents 1646200, 1707013)

"COLONIAL" MEDICINE CABINETS

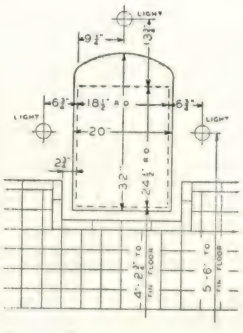
Catalogue No.	Mirror, in.	Glass shelves, in.	Rough opening, in.	List price
C-44	16x27	3–13½x4¼x5/16	14½x20½x4½	**$ 75.00**
C-45	20x32	4–17½x4¼x5/16	18½x24½x4½	**100.00**
"GOTHIC" MEDICINE CABINETS				
C-46	16x27	3–13½x4¼x5/16	14½x20½x4½	**$ 75.00**
C-47	20x32	4–17½x4¼x5/16	18½x24½x4½	**100.00**

"COLONIAL" MIRRORS ONLY

Catalogue No.	Mirror, in.	List price
C-944-S	16x27	**$50.00**
C-945-S	20x32	**70.00**
"GOTHIC" MIRRORS ONLY		
C-946-S	16x27	**$50.00**
C-947-S	20x32	**70.00**

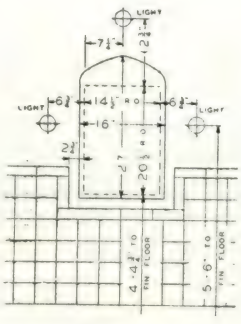


C-44

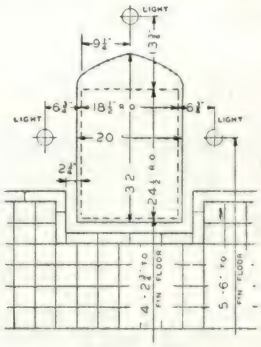


C-45

Typical Installations of "Colonial" Medicine Cabinets



C-46



C-47

Typical Installations of "Gothic" Medicine Cabinets

HOEGGER *"Colonial" and "Gothic"* CABINETS AND MIRRORS HOEGGER

Continued on next page

"STANDARD" RECESS AND SURFACE MEDICINE CABINETS

Electrically Welded Steel Cabinets

(Patents 1646200, 1707013)

Recess Medicine Cabinets, Nos. 213, 214 and 215

The highest type of "Standard" medicine cabinet. Doors have concealed hinges and stops. No knob, door is opened by placing fingers in recess at bottom edge of frame.

Two-thirds Door Recess Medicine Cabinets, Nos. 233, 234 and 235

This cabinet is exactly the same construction as the 213, 214 and 215 with the exception of the two-thirds door in place of the full door, which leaves an exposed shelf, so desirable in hotels and apartments.

Standard Recess Medicine Cabinet

General Notes on Both Types

Baked white enamel finish. Colors on order only.

Equipped with lock and key when specified. Add $10.00 to list price.

Door opening to the left may be had on Nos. 213, 214 and 215 at the same price; for door opening to the left on Nos. 233, 234 and 235, add $5.00 to prices shown.

For colored cabinets and door frames, add 20% to prices shown.

(For Cabinet details see page 8.)

SPECIAL DEPTH CABINETS

Cabinets are regularly furnished 3½ and 4½ inches deep at the prices shown, but can also be supplied in the following depths on order:

6 in. deep	add $10.00
8 in. deep	add 15.00
10 in. deep	add 20.00
12 in. deep	add 25.00

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.

Standard Two-third Door Medicine Cabinet

"STANDARD" RECESS MEDICINE CABINETS

Catalogue No.		Mirror size, in.	Glass shelves, in.	Rough opening, in.	List price	
Plain mirror	Beveled mirror				Plain mirror	Beveled mirror
213	**2213**	14x20	3–13½x4¼x5/16	14½x20½x4½	**$30.00**	**$32.00**
214	**2214**	18x24	4–17½x4¼x5/16	18½x24½x4½	**50.00**	**52.00**
215	**2215**	22x28	4–21½x4¼x5/16	22½x28½x4½	**62.00**	**66.00**

"STANDARD" SURFACE TYPE WALL CABINETS

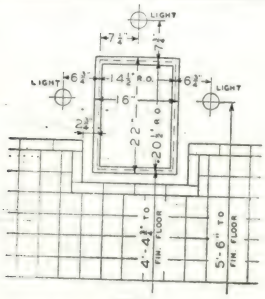
Catalogue No.		Mirror size, in.	Outside size, in.	List price	
Plain mirror	Beveled mirror			Plain mirror	Beveled mirror
323	**2323**	14x20	16x22x5	**$36.00**	**$38.00**
324	**2324**	18x24	20x26x5	**57.00**	**59.00**
325	**2325**	22x28	24x30x5	**70.00**	**74.00**

"STANDARD" TWO-THIRDS DOOR RECESS MEDICINE CABINETS

Cat. No.		Mirror size, in.	Glass shelves, in.	Rough opening, in.	Height of exposed shelf, in.	List price	
Plain mirror	Beveled mirror					Plain mirror	Beveled mirror
233	**2233**	14x13	3-13½x4¼x5/16	14½x20½x4½	6	**$28.00**	**$29.00**
234	**2234**	18x16	4-17½x4¼x5/16	18½x24½x4½	7	**44.00**	**46.00**
235	**2235**	22x19	4-21½x4¼x5/16	22½x28½x4½	8	**50.00**	**54.00**

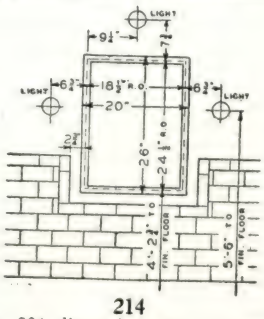
"STANDARD" TWO-THIRDS SURFACE TYPE—EXPOSED SHELF

Catalogue No.		Mirror size, in.	Outside size, in.	Height exposed shelf, in.	List price	
Plain mirror	Beveled mirror				Plain mirror	Beveled mirror
333	**2333**	14x13	16x22x5	6	**$34.00**	**$35.00**
334	**2334**	18x16	20x26x5	7	**51.00**	**53.00**
335	**2335**	22x19	24x30x5	8	**58.00**	**62.00**



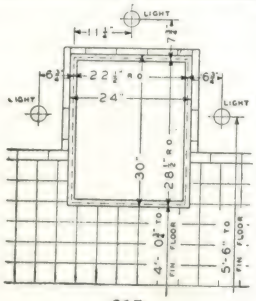
213

No. 233 dimensions are the same, except 4 ft. 1⅜ in. from bottom of rough opening to finished floor



214

No. 234 dimensions are the same, except 3 ft. 10⅞ in. from bottom of rough opening to finished floor



215

No. 235 dimensions are the same, except 3 ft. 8⅜ in. from bottom of rough opening to finished floor

Note: On new work where this cabinet is to be installed in brick or gypsum wall, the HOEGGER Steel Buck described on page 4 should be used.

HOEGGER *Cabinets and Mirrors can be furnished to your design and specifications on order*

HOEGGER *"Standard" Recess and Surface* MEDICINE CABINETS HOEGGER

Continued on next page

BATHROOM MIRRORS—CONCEALED HANGERS

These mirrors are of the same construction as those used on the "Impériale" Medicine Cabinets, and are available in any size or shape. Stock sizes only are listed on this page. They are hung flat against the wall with our Patented Concealed Hanger, no screws or fastening of any kind exposed.

Left:

906 Mirror

The frames of these mirrors are made of white enameled steel, filled with well-seasoned wood as shown in the cross section, and make a very serviceable low priced mirror

Right:

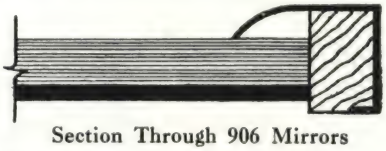
C-909-S Mirror

$\frac{7}{16}$-in. Brass Frame
Wyco or Crodon Finish
Frames made of solid brass, finished in Crodon (chromium plate), Wyco (white), or colors on order

For colored mirror frames use "Crodon" prices. Frames furnished in 18% solid polished nickel silver same price as Crodon.

NO. 906 MIRRORS
¾-in. White Enameled Steel Frame

Size, In.	No. 906 Plain Mirror	No. 2906 Beveled Mirror
12x18	$11.00	$12.00
14x20	12.00	14.00
18x24	16.00	19.00
24x30	31.00	35.00
24x36	35.00	40.00
24x48	45.00	53.00
24x60	55.00	65.00



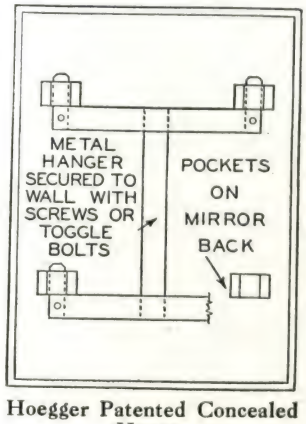
Section Through 906 Mirrors

NO. 909 MIRRORS

Wyco Frame			Crodon Frame		
Mirror, in.	W-909-S Plain	W-2909-S Beveled	Mirror, in.	C-909-S Plain	C-2909-S Beveled
12x18	$17.90	$18.90	12x18	$18.20	$19.20
14x20	20.80	22.80	14x20	21.30	23.30
18x24	27.00	29.00	18x24	28.00	30.00
24x30	37.50	40.50	24x30	39.50	42.50
24x36	42.50	47.50	24x36	44.00	49.00
24x48	51.00	59.00	24x48	53.00	61.00
24x60	58.00	68.00	24x60	61.00	71.00

NO. C-900-S OVAL MIRROR
$\frac{7}{16}$-in. Frame
Wyco or Crodon Finish

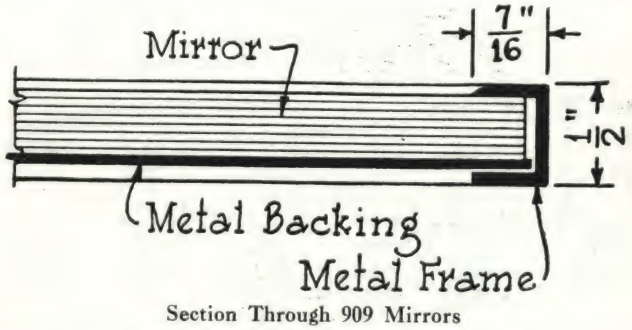
Wyco Frame			Crodon Frame		
Mirror, in.	W-900-S Plain	W-2900-S Beveled	Mirror, in.	C-900-S Plain	C-2900-S Beveled
12x18	$16.40	$17.40	12x18	$17.10	$18.10
14x20	19.00	21.00	14x20	19.90	21.90
18x24	25.00	27.00	18x24	27.00	29.00



Hoegger Patented Concealed Hanger

Information Required When Ordering

When ordering mirrors give first the width and then the height, or state definitely which way the mirror will be hung so that the hangers may be properly placed.



Section Through 909 Mirrors

HOEGGER *Cabinets and Mirrors can be furnished to your design and specifications on order*

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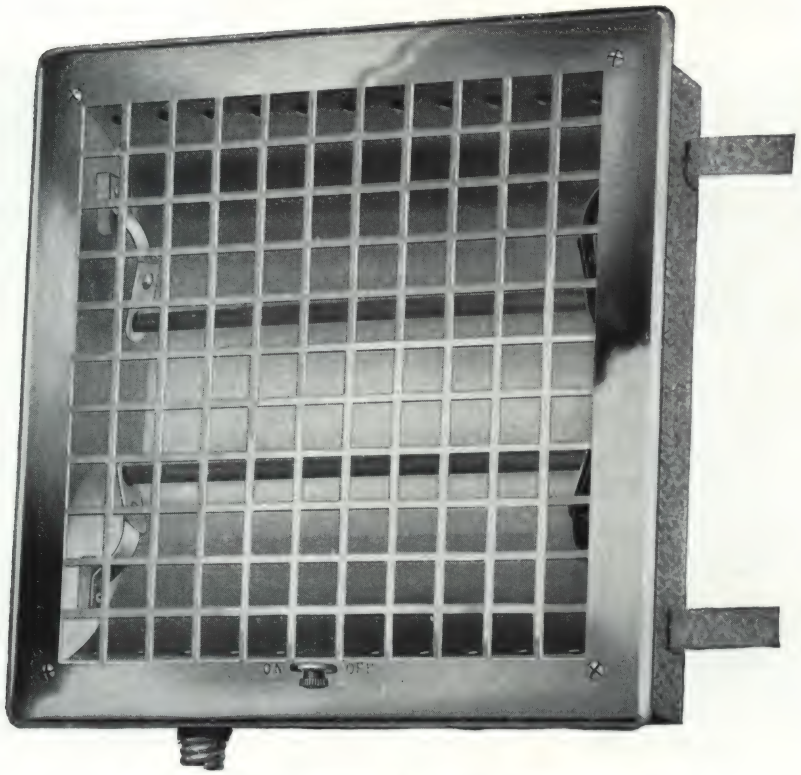
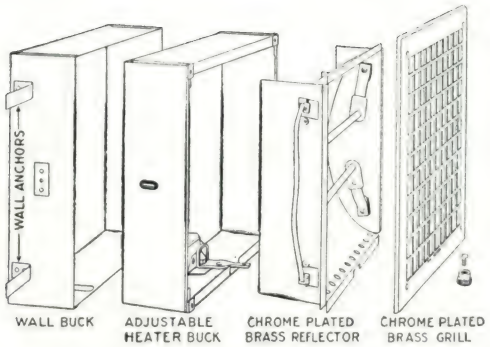
RECESS ELECTRIC HEATERS
Chromium Plated



Recess Chromium Plated Adjustable Electric Heater



Method of Assembly

The galvanized wall back is installed when wall is erected. Heater back is adjustable in wall back to allow grill to fit tightly against wall surface.

Heating units are quickly and easily snapped in place in the spring terminals.

Holes at extreme top and bottom of heat reflector allow a circulation of air to keep backs cool.

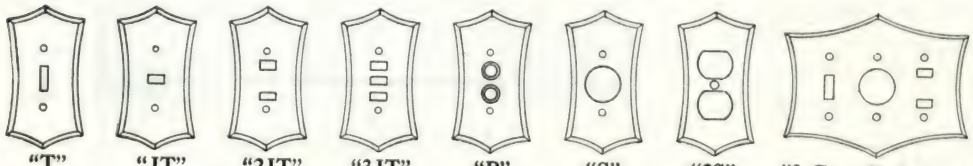
Packed in individual cartons complete with built-in switch and Bx clamp.

RECESS CHROMIUM PLATED ADJUSTABLE ELECTRIC HEATERS

Catalogue No.	Watts	Size of grill, in.	Size of wall back, in.	List price
C-190	500	9¼x 9¼	8¾x 8¾x3¾	**$50.00**
C-191	1000	13¼x13¼	12¾x12¾x3¾	**60.00**

CRODON PARFAIT SWITCH PLATES

Hoegger Switch Plates are made of solid brass ⅛-in. thick. Will not bend or dent. Are regularly finished in Crodon (Chromium plate). Can also be furnished in any other plated finish or any color desired.



"T" Toggle — **"JT" Junior Toggle** — **"2JT" Double Junior Toggle** — **"3JT" Triple Junior Toggle** — **"P" Push** — **"S" Service** — **"2S" Duplex Service** — **"3 Gang T-S-2JT" Method of ordering Multiple Gang Plates**

Switch Plates other than shown above made to order when sufficient details for manufacture are supplied

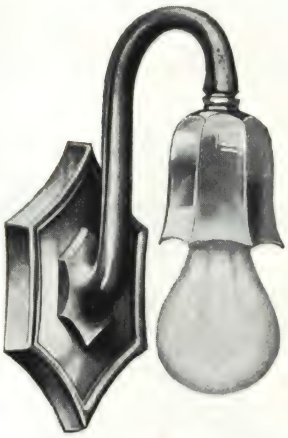
LIST PRICES

Type	Width, in.	Height, in.	List price
Single	3¼	5½	**$2.50**
*2-gang	5⅜	5½	**4.00**
*3-gang	7⅛	6	**6.00**
*4-gang	9	6	**8.00**

*Gang combination plates on order only.

HOEGGER *Electric Heaters and Switch Plates* HOEGGER

Continued on next page

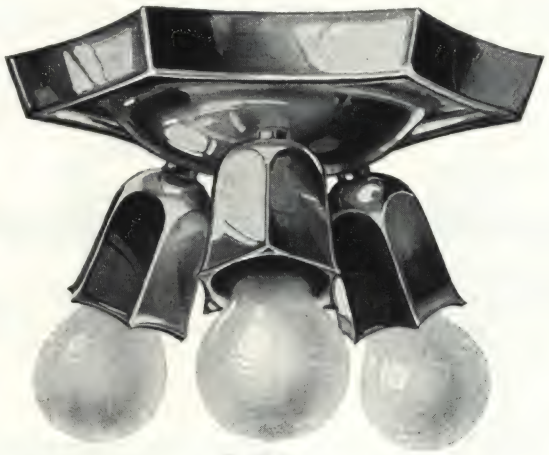


C-28-P

Price $15.00

Projection from wall (including bulb), 5⅛ in. Height, 8 in.

Set outlet box 65 in. from floor line. Switch on wall flange add $1.00

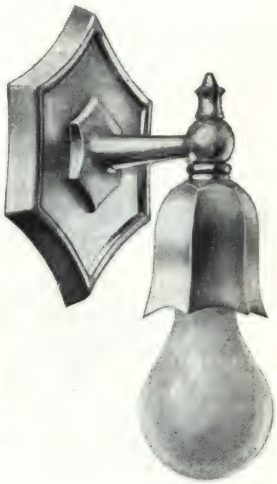


C-38-P

Price $30.00

Dimensions shown on diagram below.

Chain pull switch, add $2.00



C-33-P

Price $14.00

Projection from wall (including bulb), 4½ in. Height (including bulb), 5½ in.

Set outlet box 69 in. from floor line. If mounted with bulb up, set outlet box 63 in. from floor line.

Switch on wall flange, add $1.00

Left:

C-29-SP

Price . . $30.00

Projection from wall (including bulb), 5 in. Height, 10⅞ in.

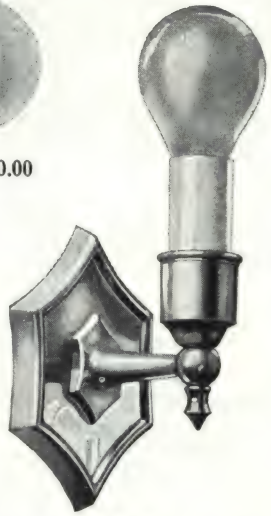
Set outlet box 66 in. from floor line

C-27-P

Price $12.00

Dimensions shown on diagram below.

Chain pull switch, add $2.00



C-26-P

Price $12.00

Projection from wall (including bulb), 4½ in. Height (including bulb), 9½ in.

Set outlet box 63 in. from floor line.

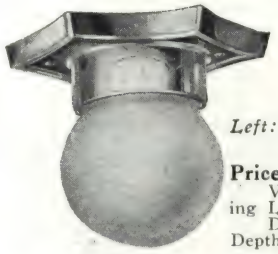
Regularly furnished with chain pull switch

C-34-SP

Price $25.00

Projection from wall (including bulb), 5 in. Height, 6 in.

Set outlet box 66 in. from floor line



Left:

C-35-P

Price . . $12.00

Vapor Proof Ceiling Light.

Diameter 6¾ in. Depth 6 in.

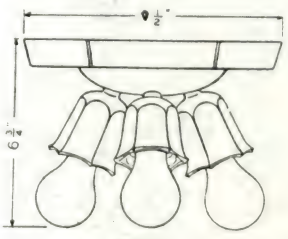
C-32-P

List Price $30.00

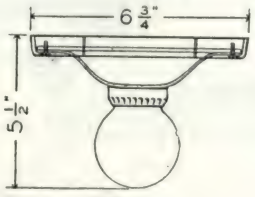
Projection from wall (including bulb), 5¾ in. Spread (including bulb), 13½ in. Height (including bulb), 8½ in.

Set outlet box 7 in. above top of cabinet mirror.

Switch on wall flange, add $1.00



C-38-P



C-27-P

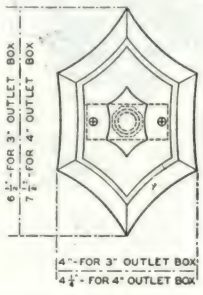
Dimension Diagrams of Ceiling Lights

Right:

Wall Fixture Flange

Fixtures cover 3 in. outlet boxes.

4¼ x 7½ in. flange for 4 in. boxes (except C-29-SP and C-34-SP) $3.00 each



Colored Accessories Any Color

Prices

1 to 25 articles (same color) add 25% to above prices

25 articles and over (same color) same as above prices

HOEGGER

Electric Lighting Fixtures

HOEGGER

Continued on next page

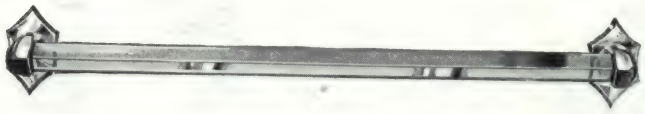
A beautiful and distinctive design by HOEGGER which may be matched with cabinets and lighting fixtures, and which will add charm to the most luxurious bathroom.

Glass can be furnished in clear crystal, white opal (vitrolite), or black at the prices shown.

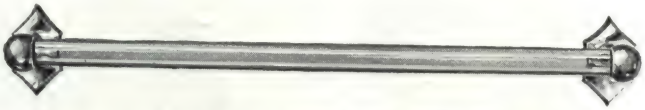
Brackets of fixtures are furnished in either Crodon (chromium plate), as illustrated, or Wyco (white), at the prices shown. For Old Sheffield finish, add 10%. Prices of 20-year Coin Gold Plate and silver plate furnished on request.

Colored Accessories (Any Color) *Pages 15 and 16—1 to 25 Articles (Same Color)*—Add 25% to prices shown. *25 Articles and Over (Same Color)*—Same prices as shown.

All Metal Towel Bars at prices shown

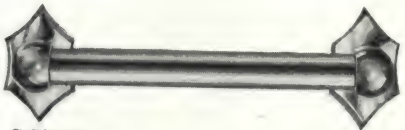


C-506-SP—⅞" Square Polished Cut Glass Towel Bar
Wall flange, 2x3½"; Projection, 3¾"
Prices—18" $11.30, 24" $12.50, 30" $13.70, 36" $14.90
Clear Crystal, White Opal or Black Glass at above prices



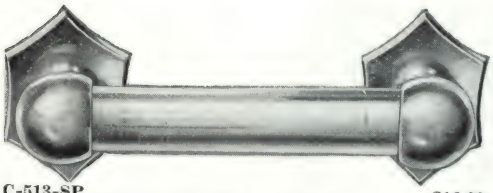
C-509-SP—1" Round Glass Towel Bar
Wall flange, 2x3½"; Projection, 3¾"
Prices—18" $8.60, 24" $9.20, 30" $9.80, 36" $10.40
Clear Crystal, White Opal or Black Glass at above prices

C-600-SP—⅜x5" Glass Shelf Spring Brackets
Patent applied for
Wall flange, 2x3½"; Projection, 5½"
Prices—18" $11.60, 24" $12.80, 30" $14.00, 36" $15.20
Clear Crystal, White Opal or Black Glass at above prices



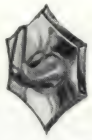
C-516-SP..... $9.00
1" All-Metal Grab Bar
Center to center of brackets, 9"; Wall flange, 2x3½"; Projection, 2½"
Width, 11"

C-8-SP, $3.00
Double Robe Hook
Wall flange, 2x3½"
Width, 3¼"
Projection, 3"



C-513-SP..... $16.00
1½" Glass Grab Bar
Center to center of brackets, 9"; Wall flange, 2⅞x4"; Projection, 3½"
Width, 12"

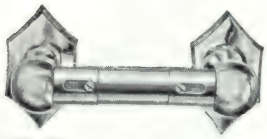
C-514-SP, $4.00
Towel Pin and Robe Hook
Wall flange, 2x3½"
Height, 4¼"
Projection, 3¾"



C-4-SP, $2.00
Strop or Bag Hook
Wall flange, 2x3½"
Projection, 2"

C-813-SP, $4.00
Toothbrush Holder
Wall flange, 2x3½"
Width, 2⅜"
Projection, 3⅞"

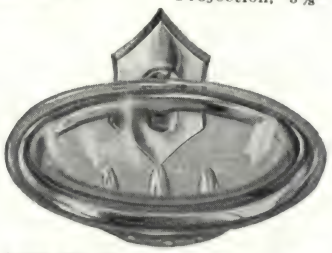
C-801-SP, $5.00
Tumbler Holder
Wall flange, 2x3½"
Width, 3"
Height, 4¼"
Projection, 4"



C-856-SP..... $8.00
Toilet Paper Holder
Takes standard 5" roll toilet paper
Center to center of brackets, 6"
Wall flange, 2x3½"
Width, 7½"

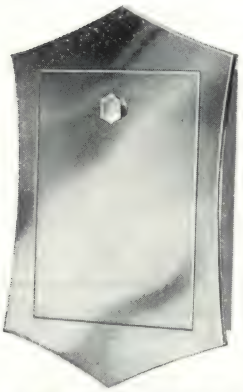
C-10-SP, $2.30
Strop or Bag Hook
Wall flange, 2x3½"
Projection, 2⅞"

C-717-SP..... $6.00
All-Metal Soap Holder
Wall flange, 2x3½"
Width, 4½"
Projection, 3¾"
With drain holes—same price

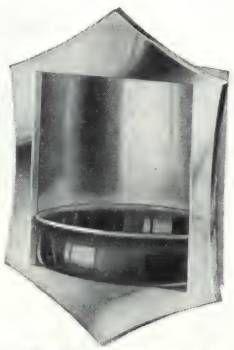


C-704-SP—Small Soap Dish, $6.00
Wall flange, 2x3½"; Projection, 6"
Dish size, 6¼x5x2"
With drain hole, add $1.00
C-715-SP—Large Soap Dish, $8.00
Wall flange, 2x3½"; Projection, 6¾"
Dish size, 7¼x6x2"
With drain hole, add $1.00
Clear Crystal, White Opal or Black Glass Dishes at above prices

C-841-SP, $4.00
Toothbrush Holder
Wall flange, 2x3½"
Width, 2½"
Projection, 3⅜"

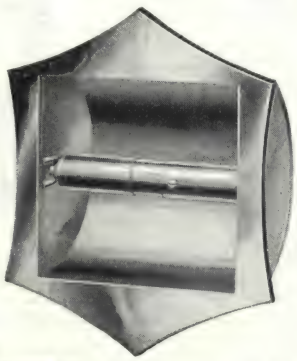


C-173-SP..... $28.00
"Parfait" Recess Toilet Paper Box
Use 5x7 sheet paper
Width, 7¼"; Height, 11⅝"; Depth, 2⅝"
Exact Opening:
5⅞" Wide, 8¼" High, 2½" Deep

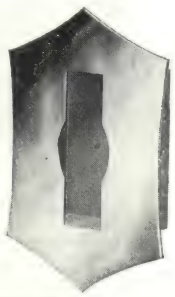


C-174-SP..... $18.00
"Parfait" Recess Soap or Tumbler Holder
Width, 7⅞"; Height, 10⅛"; Depth, 3½"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep
Black or Crystal Dish

C-175-SP..... $20.00
"Parfait" Recess Soap Holder and Grab Bar
Width, 7⅞"; Height, 10⅛"; Depth, 3½"
Projection, 2¼"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep
Black or Crystal Dish



C-172-SP..... $18.00
"Parfait" Toilet Paper Holder
Takes Standard 5" Roll Toilet Paper
Width, 7⅞"; Height, 10⅛"; Depth, 3½"
Exact Opening:
5⅞" Wide, 6⅛" High, 3⅜" Deep



C-171-SP..... $16.00
"Parfait" Recess Toilet Paper Box
Takes Folded Paper
Width, 5¼"; Height, 8"; Depth, 1¾"
Exact Opening:
4¼" Wide, 5¼" High, 1⅞" Deep

"Parfait" Bathroom Accessories

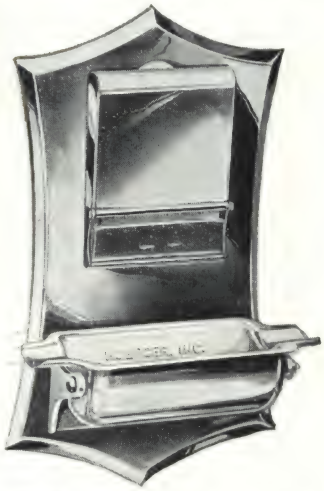
Continued on next page

Ash trays and match holders may be mounted on the wall in bathrooms, toilets or on tables of residences, hotels, clubs, ships, etc.

They are installed with theftproof screws and cannot be removed except with a special tool.

The ash trays are not removable but are hinged at the front and are emptied by turning them completely over.

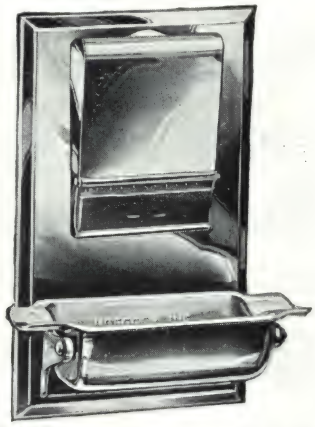
HOEGGER Bottle Openers illustrated may be installed in bathrooms, kitchens and pantries as an added convenience.



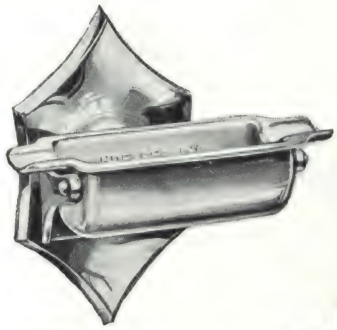
C-483-P **$4.30**
"Parfait" Wall Ash Tray and Paper Match Holder
Width, 3¼"
Height, 5½"
Projection, 1⅝"

C-499 ..... **$1.50**
Wall Bottle Opener and Safety Cork Screw
Width, 1¾"
Height, 5¼"
Projection, 1½"

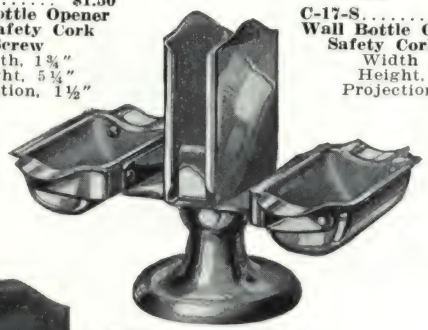
C-17-S **$4.00**
Wall Bottle Opener and Safety Cork Screw
Width 2¼"
Height, 4¾"
Projection, 2⅛"



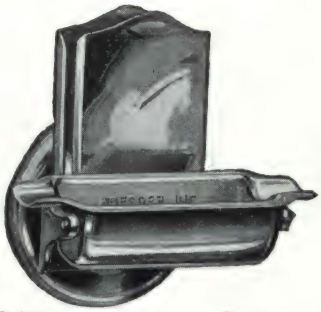
C-487 ..... **$3.60**
Wall Ash Tray and Paper Match Holder
Width, 3¼"
Height, 4½"
Projection, 1⅝"



C-480-SP **$4.80**
"Parfait" Wall Ash Tray
Width, 3¼"
Height, 3½"
Projection, 1⅝"

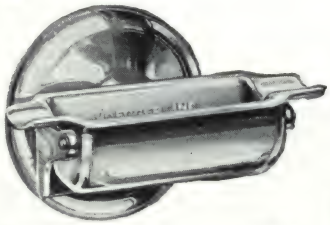


C-490-S **$6.50**
Theftproof Table Ash Tray and Match Box Holder
Width, 3¼"
Length, 4¾"
Height, 3¾"



C-485-S **$4.20**
Wall Ash Tray and Match Box Holder
Width, 3¼"
Height, 3½"
Projection, 3"

C-481-SP **$5.20**
"Parfait" Wall Ash Tray and Match Box Holder
Width, 3¼"
Height, 4"
Projection, 3"



C-484-S **$3.80**
Wall Ash Tray
Width, 3¼"
Height, 2¼"
Projection, 3"

C-491 ..... **$0.80**
Paper Match Holder
Width, 1⅝"
Height, 2¼"

C-482-P **$3.90**
"Parfait" Wall Ash Tray and Match Box Holder
Width, 3¼"
Height, 6"
Projection, 1⅝"

C-489 ..... **$1.50**
Ash Tray Only
Width, 1½"
Length, 3¼"
Depth, 1"

C-488 ..... **$2.00**
Wall Ash Tray
Width, 3¼"
Height, 1"
Projection, 1½"

C-486 ..... **$3.20**
Wall Ash Tray and Match Box Holder
Width, 3¼"
Height, 5"
Projection, 1⅝"

HOEGGER *Ash Trays, Match Safes and Bottle Openers* HOEGGER

Continued on next page

These accessories are made of solid forged brass, finished in Crodon (chromium plate), Wyco (white) or colors (on order).
For Old Sheffield finish, add 10% to Crodon prices. Crystal or Opal Glass at prices shown. For Black Glass, add 10% of Crodon prices. Twenty year coin gold plate or silver plate furnished on order only.

Mounting—Flanges fit tightly against wall; all supporting screws are concealed. They are easily removed while walls are being redecorated.
Specify whether type "S" (concealed screw) or "SA" (anker-in) back plates are wanted. Example—C-507-S (concealed screw) or C-507-SA (anker-in).

Colored Accessories on Pages 17 and 18 (Any Color)—*1 to 25 Articles (Same Color)*—Add 25% to prices shown. *25 Articles and Over (Same Color)*—Same prices as shown.

⅞" Square Polished Cut Glass Towel Bar
Wall flange, 2¼"; Projection, 3½"
W-506-S or SA (Wyco) 18" **$8.40**, 24" **$9.60**, 30" **$10.80**, 36" **$12.00**
C-506-S or SA (Crodon) 18" **$9.40**, 24" **$10.60**, 30" **$11.80**, 36" **$13.00**
For Wood Sheet Wyco Bars, deduct 25 per cent. from above prices

1" Round Towel Bar
Wall flange, 2¼"; Projection, 3¼"
W-507-S or SA (Wyco) 18" **$6.30**, 24" **$6.90**, 30" **$7.50**, 36" **$8.10**
C-507-S or SA (Crodon) 18" **$7.30**, 24" **$7.90**, 30" **$8.50**, 36" **$9.10**

1" Round Towel Bar
Wall flange, 2¼"; Projection, 3¼"
W-509-S or SA (Wyco) 18" **$5.80**, 24" **$6.40**, 30" **$7.00**, 36" **$7.60**
C-509-S or SA (Crodon) 18" **$6.80**, 24" **$7.40**, 30" **$8.00**, 36" **$8.60**

⅜x¾" Rectangular All Metal Towel Bar
Wall flange, 2¼"; Projection, 3"
W-510-S or SA (Wyco) 20" **$3.70**, 24" **$3.95**, 30" **$4.30**
C-510-S or SA (Crodon) 20" **$4.45**, 24" **$4.75**, 30" **$5.20**

Left:
Tumbler and Tooth-brush Holder
Wall flange, 2¼"
Width, 3¼"
Height, 5"
Projection, 4"
W-811-S or SA $4.80
C-811-S or SA $5.80

Strop or Bag Hook
Projection, 1¼"
Height, 1"
W-2-S (Wyco) **$.60**
C-2-S (Crodon) **.70**

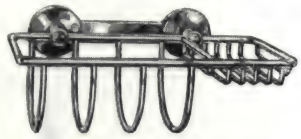
1" Grab Bar
Wall flange, 2¼"; Projection, 2¾"
W-516-S or SA (Wyco) 6" **$5.60**, 9" **$5.90**
C-516-S or SA (Crodon) 6" **$6.60**, 9" **$6.90**

Strop or Bag Hook
Wall flange, 2¼"
Projection, 2¼"
W-4-S or SA $1.60
C-4-S or SA $1.90

1½" Grab Bar
Wall flange, 3"; Projection, 3½"
W-518-S or SA (Wyco) 9" **$9.90**; 12" **$11.20**, 18" **$13.80**, 24" **$16.30**
C-518-S or SA (Crodon) 9" **$11.10**, 12" **$12.40**, 18" **$15.00**, 24" **$17.50**

Soap Holder
Wall flange, 2¼"; Projection, 5¾"
Dish size—6¼x5x2"
W-704-S or SA (Wyco) **$3.80**
C-704-S or SA (Crodon) **$4.40**
For china dish—add **$1.50**
For drain hole—add **$1.00**

Tub Soap Holder
(as above)
Wall flange, 2¼"; Projection, 6½"
Dish size—7¼x5¾x2"
W-715-S or SA (Wyco) **$5.80**
C-715-S or SA (Crodon) **$6.50**
For china dish—add **$1.50**
For drain hole—add **$1.00**



Soap and Sponge Holder
Wall Flange, 2¼"
Height, 4¼"
Projection, 6"
W-725-S or SA (Wyco) **$8.40**
C-725-S or SA (Crodon) **$10.00**
Same as above, only to fit over rim of tub:
W-712 (Wyco) **$6.50**
C-712 (Crodon) **$7.80**

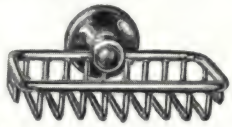
Toothbrush Holder
Wall flange, 2¼"
Height, 2¾"
Projection, 4"
W-813-S or SA $2.80
C-813-S or SA $3.40

Toothbrush Holder
Wall flange, 2¼"
Width, 3"
Projection, 2¼"
W-841-S or SA $2.70
C-841-S or SA $3.20

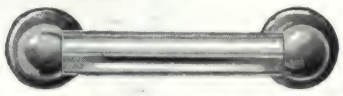
Coat and Hat Hook
Wall flange, 2¼"
Projection, 4"
Height, 3½"
W-13-S or SA $2.30
C-13-S or SA $2.80

Metal Soap Holder
Wall flange, 2¼"
Width, 4½"
Projection, 4"
Dish size, 4½x2¾x1¼"
W-717-S or SA $3.70
C-717-S or SA $4.50

Tumbler Holder
Wall flange, 2¼"
Width, 3¼"
Height, 3¾"
Projection, 4"
W-801-S or SA $3.60
C-801-S or SA $4.30

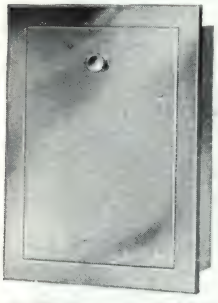


Soap Holder
Wall flange, 2¼"
Projection, 4¾"
Dish size, 6x3½x1"
W-711-S or SA (Wyco) **$4.00**
C-711-S or SA (Crodon) **$4.80**
Same as above, only to fit over rim of tub:
W-708 (Wyco) **$3.30**
C-708 (Crodon) **$4.00**



1½" Grab Bar
Wall flange, 3½"; Projection, 4"
W-513-S or SA (Wyco) 9" **$10.40**, 12" **$11.70**, 18" **$14.30**, 24" **$16.80**
C-513-S or SA (Crodon) 9" **$11.70**, 12" **$13.00**, 18" **$15.60**, 24" **$18.10**

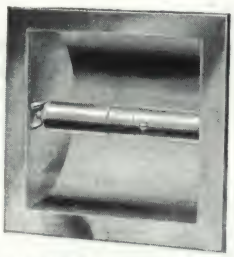
Double Robe Hook
Wall flange, 2¼"
Width, 3"
Projection, 2¾"
W-8-S or SA $2.00
C-8-S or SA $2.40



C-183-S.....$20.00
Recess Toilet Paper Box
Use 5x7" sheet paper
Width, 6½"
Height, 9"
Depth, 2½"
Exact Opening:
5⅞" Wide, 8⅜" High, 2½" Deep

C-184-S.....$10.00
Recess Soap or Tumbler Holder
Width, 7"
Height, 7"
Depth, 3½"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep

C-185-S.....$12.00
Recess Soap Holder and Grab Bar
Width, 7"
Height, 7"
Depth, 3½"
Projection, 2¼"
Exact Opening:
6⅛" Wide, 5⅞" High, 3⅜" Deep
Black or crystal dish



C-182-S.....$10.00
Recess Toilet Paper Holder
Takes standard 5" roll toilet paper
Width, 7"
Height, 7"
Depth, 3½"
Exact Opening:
5⅞" Wide, 6⅛" High, 3⅜" Deep

S-181-S....$8.50
Recess Toilet Paper Box
Takes folded paper
Width, 5"
Height, 6"
Depth, 2⅛"
Exact Opening:
4¼" Wide
5¼" High
1⅞" Deep

C-186-S..$10.00
Surface Toilet Paper Box
Takes folded paper
Width, 4¼"
Height, 6"
Depth, 2"

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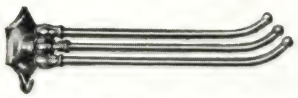


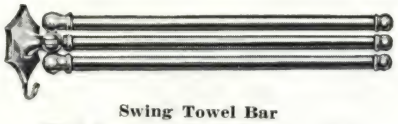
Swing Towel Bar
Wall flange, 2x3½"
Length, 12"; Dia. of bars, ⅜"
Flange hook, ⅞"
W-500-S or SA (Wyco) **$4.60**
C-500-S or SA (Crodon) **$5.50**

Exposed Screw Roll Paper Holder
Width, 5¼"
Exposed Screw only
W-853 (Wyco) **$2.50**
C-853 (Crodon) **$3.00**

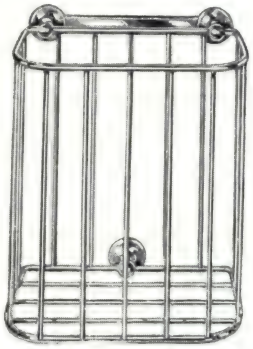
Roll Paper Holder
Wall flange, 2¼" Width, 8¼"
C-C of Posts, 6"
W-856-S or SA (Wyco) **$5.80**
C-856-S or SA (Crodon) **$7.00**

Roll Paper Holder
Wall flange, 2¼"; Width, 8½"
C-C of Posts, 6⅜"
W-850-S or SA (Wyco) **$5.60**
C-850-S or SA (Crodon) **$6.70**

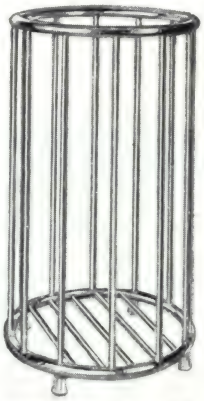
Solid Brass Paper Box
Exposed Screw only
Size, 7x5x1¾"
Use 5x7" paper
W-851 (Wyco on Brass) **$4.20**
C-851 (Crodon on Brass) **$5.00**



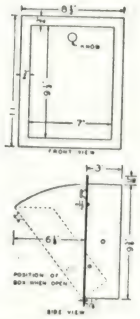
Swing Towel Bar
Wall flange, 2x3½"; Length, 16";
Bars, $\frac{3}{16}$" diameter
Flange hook, ⅞"
W-504-S or SA (Wyco finish) **$8.00**
C-504-S or SA (Crodon finish) **$9.60**



Soiled Towel Basket
Width, 12¾"; Height, 16";
Projection, 6¼"
W-553-S or SA (Wyco) **$20.00**
C-553-S or SA (Crodon) **$24.00**



Soiled Towel Basket
Diameter, 10½";
Height, 19"
W-554 (Wyco) **$20.00**
C-554 (Crodon) **$24.00**



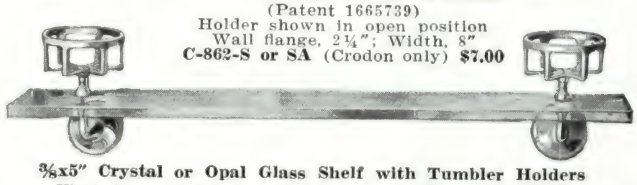
Recess Paper Box
W-854 (Wyco on Steel) **$12.00**

Solid Brass Paper Box
(Exposed Screw only)
Size 5½x7x1¾"
W-855 (Wyco) **$4.20**
C-855 (Crodon) **$5.00**
Use 5x7" paper

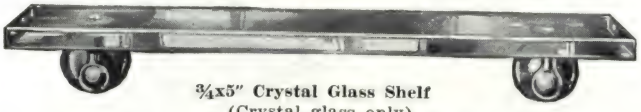
Towel Pin
Wall flange, 2¼"
Flange hook, ⅞"
Height, 4¼"
Projection, 3¾"
W-514-S or SA (Wyco) **$2.50**
C-514-S or SA (Crodon) **$3.00**

Tension Spring Roll Paper Holder
(Patent 1665739)
Holder shown in open position
Wall flange, 2¼"; Width, 8"
C-862-S or SA (Crodon only) **$7.00**

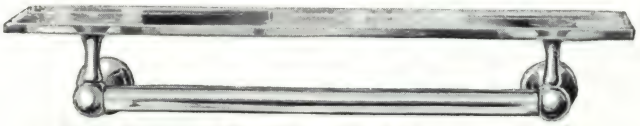
⅜x5" Crystal or Opal Glass Shelf
Spring Brackets
Patent Applied For
Wall flange, 2¼"; Projection, 5¾"
W-600-S or SA (Wyco) 18" **$8.60,** 24" **$9.80,** 30" **$11.00,** 36" **$12.20**
C-600-S or SA (Crodon) 18" **$9.60,** 24" **$10.80,** 30" **$12.00,** 36" **$13.20**



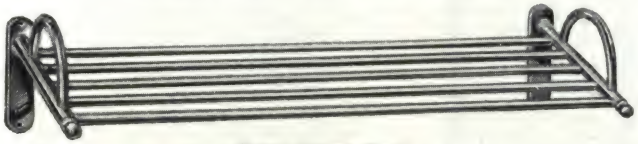
⅜x5" Crystal or Opal Glass Shelf with Tumbler Holders
Wall flange, 2¼"; Height overall, 5"; Projection, 5½"
W-601-S or SA (Wyco) 24" **$12.50,** 30" **$13.70,** 36" **$14.90**
C-601-S or SA (Crodon) 24" **$14.00,** 30" **$15.20,** 36" **$16.40**



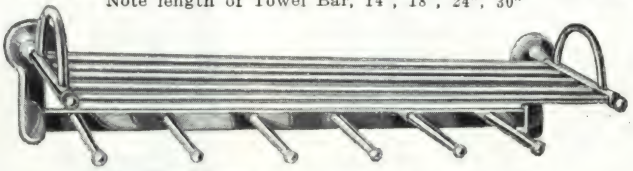
¾x5" Crystal Glass Shelf
(Crystal glass only)
Wall flange, 2¾"; Height overall, 3¾"; Projection, 5¼"
W-608-S (Wyco) 24" **$20.10,** 30" **$22.50**
C-608-S (Crodon) 24" **$22.10,** 30" **$24.50**



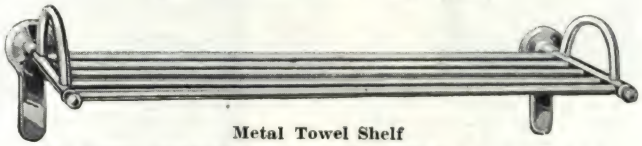
⅜x5" Crystal or Opal Glass Shelf and 1" Towel Bar
Wall flange, 2¼"; Projection, 5¼"; Height, 4¼"
W-614-S or SA (Wyco) 18" **$12.30,** 24" **$14.10,** 30" **$15.90,** 36" **$17.70**
C-614-S or SA (Crodon) 18" **$13.60,** 24" **$15.40,** 30" **$17.20,** 36" **$19.00**
Note length of Towel Bar, 14", 18", 24", 30"



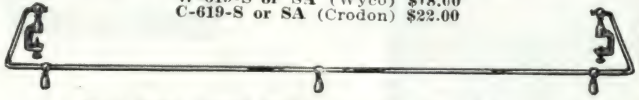
Metal Towel Shelf
Wall flange, 1¼x5⅛"; Length overall, 25¼"; Projection, 8½"
W-621 (Exposed Screw only) **$9.00**
C-621 (Exposed Screw only) **$11.00**



Metal Towel Shelf with Towel Pins
Wall flange, 2¼x5¼"; Length overall, 26¼"; Projection, 8½"
W-619-S or SA (Wyco) **$18.00**
C-619-S or SA (Crodon) **$22.00**



Metal Towel Shelf
Wall flange, 2¼x5¼"; Length overall, 26¼"; Projection, 8½"
W-618-S or SA (Wyco finish) **$10.00**
C-618-S or SA (Crodon finish) **$12.00**



Solid Brass Guard Rail for 5" Glass Towel Shelves
W-612 (Wyco) 18" **$3.50,** 24" **$3.60,** 30" **$3.70,** 36" **$4.50**
C-612 (Crodon) 18" **$4.20,** 24" **$4.30,** 30" **$4.40,** 36" **$5.40**

THE F. H. LAWSON CO.

Famous Since 1816 as Manufacturers of High Grade Metal Products

MAIN FACTORY AND OFFICES

Evans, Whately, Boston and B. & O. R. R.

CINCINNATI, OHIO

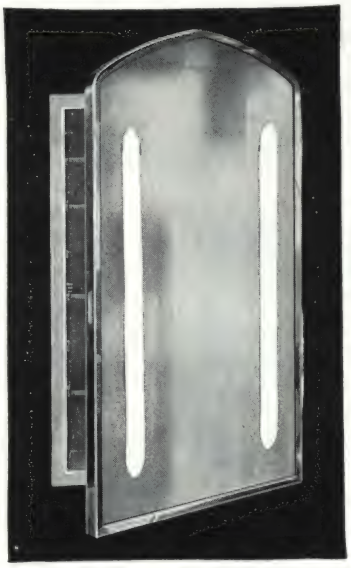
BRANCH OFFICES: NEW YORK, N. Y., and CHICAGO, ILL.

For Lawco Steel Access Units, see Manufacturers' Index

LAWCO BATHROOM CABINETS

Nos. 915 and 925 DeLuxe—Exquisite mirror in beautiful lacquer or chromium plated frame. No. 915 door size 15½x25½ in., wall opening 12¾x20¼x3½ in. No. 925 door size 18x32 in., wall opening 15⅜x26⅞x3½ in., outside dimensions 17⅞x29⅜ in.

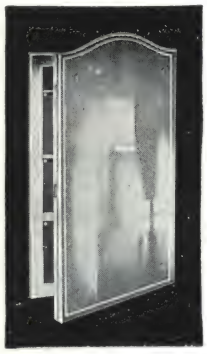
No. 915 (lacquered frame) $24.00
No. 915 (chromium plated) 36.00
No. 925 (lacquered frame) 40.00
No. 925 (chromium frame) 60.00



Lawco Mirror-Lite Models D and E

A distinguished and effective fixture. Hammered frosted glass, through which light comes, reduces glare to a minimum, throwing an even light over every part of the person before the mirror. Chromium-plated frame or lacquered to conform with any color scheme at slight additional cost. Model D outside dimensions 17⅞x28⅝ in. Wall opening 16¼x27x4⅞ in. Mirror 17¼x32¼ in. Model E outside dimensions 15⅜x22¾ in. Wall opening 12¾x20⅛x4⅞ in. Mirror 14¾x25¼ in.

Model D, list price.....$125.00
Model E, list price..... 100.00



Nos. 800 and 900—Unusual decorative value. Beautiful design. DeLuxe construction with many exclusive features. No. 800 outside dimensions 17¾x23½ in. Mirror 18x26 in., wall opening 15⅛x20⅞x3½ in. No. 900 outside dimensions 19¾x31 in., mirror 20x34 in., wall opening 17⅛x23⅜x3½ in.

No. 800, list price..$33.50
No. 900, list price.. 41.50

Nos. 780, 785 and 795—No. 780 standard. Large Venetian type at medium price. Outside dimensions 15½x21½ in., mirror size 16x24 in., wall opening 13½x19½x3 in. No. 785 mirror size 18x26 in., outside dimensions 17½x23½ in., wall opening 15⅜x21⅜x3¼ in. No. 795 mirror 18x32 in., outside dimensions 17½x29 in., wall opening 15⅜x26⅞x3¼ in.

No. 780, list price.$17.00
No. 785, list price. 23.00
No. 795, list price. 26.00

Nos. 750 and 775—Junior. Quality and beauty of appearance at low cost. No. 750 mirror size 16x22 in., wall opening 13½x19½x3 in., outside dimensions 15½x21½ in. No. 755 mirror size 18x24 in., wall opening 15½x21½x3 in., outside dimensions 17½x23½ in.

No. 750, list price $15.00
No. 775, list price 18.00

LAWCO CHALLENGERS

Nos. 5600 and 5650—While selling at extremely low prices, Lawco Challengers represent a combination of highest grade materials and workmanship. No. 5600 mirror size 12x16 in. plain, wall opening 13⅜x23⅜x3⅜ in. Outside dimensions 16x27x1¼ in. No. 5650 mirror size 14x18 in., wall opening 15⅜x25⅜x3⅜ in., outside dimensions 18x28x1¼ in.

No. 5600, list price.....$10.00
No. 5650, list price..... 12.00

No. 56 Challenger—In keeping with modern simplicity. Beautiful lines. Chromium plated steel frames, cabinets finished in Lawco Vitro-like White Enamel resembling porcelain. No. 56 door size 16x30 in., wall opening 13⅜x23⅜x3⅜ in., weight 45 lbs. Three heavy, bulb-edge shelves.

No. 56, list price.....$29.00

Mitred Line Mirror can be furnished at an extra list price of $5.00 per cabinet.

Nos. 3100 and 4100—Challengers on price, quality and utility. Mirrors set in stainless steel polished frames. Bulb-edge shelves. No. 3100 mirror size 12x16 in., wall opening 13⅜x17⅜x3⅜ in. Outside dimensions 16x20x1¼ in. No. 4100 mirror size 14x18 in., wall opening 15⅜x19⅜x3⅜ in. Outside dimensions 18x22x1¼ in.

No. 3100, list price.....$ 8.50
No. 4100, list price..... 10.50

Nos. 31 and 41—Lawco Challengers are made of heavy materials, with chromium plated steel frames. The workmanship is the usual Lawco quality. They have aristocratic appeal, yet are made for the modest budget. No. 31 door size 16x21 in., wall opening 13⅜x17⅜x3⅜ in. No. 41 door size 18x23 in., wall opening 15⅜x19⅜x3⅜ in.

No. 31, list price.....$23.00
No. 41, list price..... 25.00

Mitred Line Mirror can be furnished at an extra cost of $5.00 per cabinet, list.

THE MIAMI CABINET COMPANY

Bathroom Cabinets and Accessories

MIDDLETOWN, OHIO

Products

MIAMI PURE WHITE BATHROOM CABINETS.
MIAMI STEEL IRONING BOARD CABINET.
MIAMI BATHROOM ACCESSORIES.

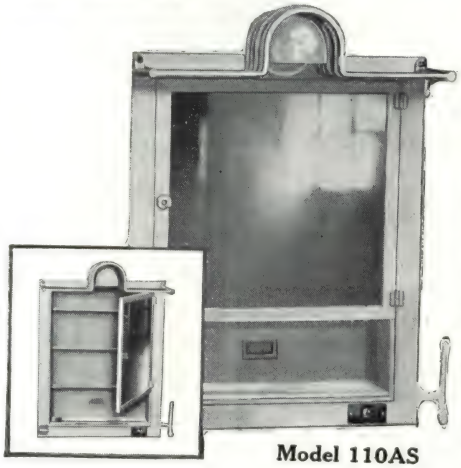
Miami Pure White Cabinets

Construction—Miami Cabinets are made from heavy gauge Armco steel. Thick, air-cushioned doors, used on all models, are swung on specially designed hinges drop-forged from solid brass.

Finish—The *crystal snow* finish used on all Miami products is not a baked-on enamel.

It is of a pyroxylin nature, applied by a special process, and is guaranteed not to discolor with age, nor to crack, craze or peel.

The American Standard



Model 110AS

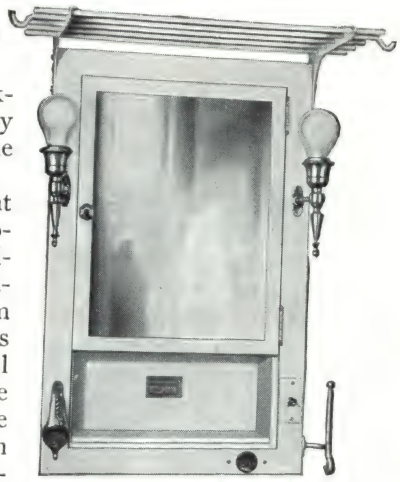
Mirror, 16x16 in.
Inside, 17x23 in.
Overall, 21x27 in.
Opening, 17½x24½ in.

Advantages—It saves the separate installation of a number of essential items. As regularly furnished it eliminates completely one electric outlet in every bathroom. Total savings average $5 to $6 per room. It is exceptionally convenient for guests.

Equipment—Towel tray, combination light fixture, opal shade and holder; water bag hook; used towel and razor strop hook; luminous tipped switch; switch box; junction box; razor blade drop; bottle opener; vitrolite shelf. Complete details on this and other hotel models is given in Catalog No. 8.

Special Hotel Cabinet

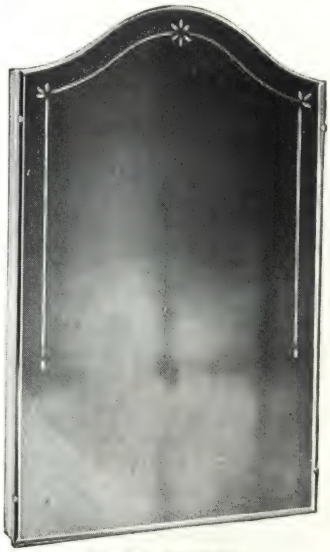
The special hotel cabinet at the right can be made up by attaching the fixtures shown to any flush door model in the Miami line.



Special Hotel Model

Regular equipment includes, either chromium plated or enameled towel tray with water bag hooks, chromium plated light brackets (either keyless or pull chain), switch (where keyless brackets are used), combination hook, hot plug, combination corkscrew and bottle opener, vitrolite shelf, junction box for connecting house and cabinet wires, and razor blade drop.

The regular equipment is very flexible and can be altered to meet individual requirements.



Model 750VH
Model 710VH
Model 700VH

Venetian Model

The all-glass Venetian Model at the left, fitted with the "H" mirror design, is furnished in three sizes. Other mirrors include the handsome "AB" design or, for those who prefer the ultimate in simplicity, the "P" or plain mirror without etching.

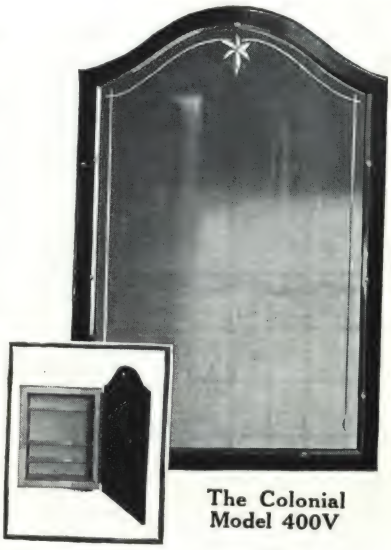
The mirrors on Miami Venetian Models are suspended on heavy built-up panels by clips of special design which eliminates breakage. The doors are of such solid construction that they may be slammed without injury to the mirror.

Colonial Model

The Colonial Model which is shown at the right is one of several "panel door" models, noted for their attractive design and rugged construction.

Other cabinets of this type are illustrated in our complete new Catalog No. 8.

An attractive feature of these cabinets is that the door panel can be finished in special color to match the walls or other fixtures.



The Colonial
Model 400V

DIMENSIONS, INCHES

Model	750V	710V	700V	400V
Mirror	18x28	16x26	14x22	14x22
Over all	18x28	16x26	14x22	15¾x23¾
Inside	15x21	13x19	11x15	12¾x16¾
Wall opening	15¾x21¾	11¾x15¾	11¾x15¾	13⅛x17½

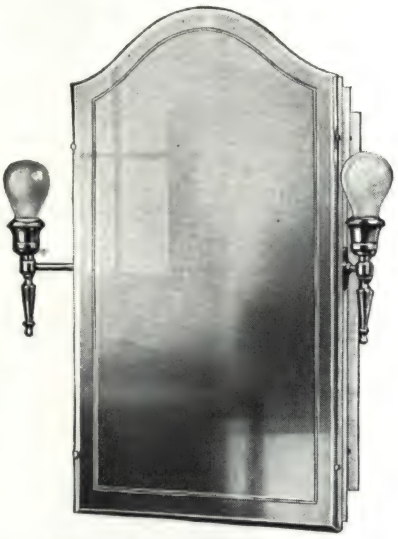
Continued on next page

The Countess—Model 780VABS
The Duchess—Model 770VABS
The Princess—Model 760VABS

The Miami Line

The Miami line of bathroom cabinets is complete and contains a model for every purpose. Only a few of the more popular styles are shown here but we shall be pleased to forward a complete catalog upon receipt of your request. We are prepared also to quote prices on special cabinets in quantities.

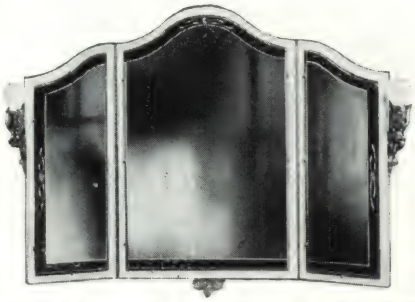
Special Note: Any model in the Miami line can be finished at a small additional charge to match special colors.



Cabinet Equipped with Light Brackets

Venetian Cabinets with Adjustable Mirror Designs

The Miami Venetian Models are furnished in a variety of styles and mirror designs. The cabinet shown above is fitted with adjustable side mirrors and the "ABS" mirror consisting of a black border enameled in the glass with polished gold cut work showing through. Miami Venetians resemble unusually handsome mirrors hung flush on the wall as there is no knob, hardware or portion of the body visible to indicate that a spacious cabinet is hidden behind the door. Regular equipment for the cabinet shown above includes adjustable bulb edge glass shelves and razor blade drop.



"M" Mirror Design, Shop No. DLVM

Cabinets with Light Brackets

Chromium plated light brackets of distinctive design can be attached to any model in the Miami line except the wing types.

These brackets of either the keyless or pull chain type add a very distinctive and practical touch to the cabinet. They concentrate the light at the point it is needed most and there is enough light reflected by the mirror to illuminate the entire bathroom.

The wiring system is a model of simplicity and has been approved by the Underwriters' Laboratories, Inc.

Models 310 and 410

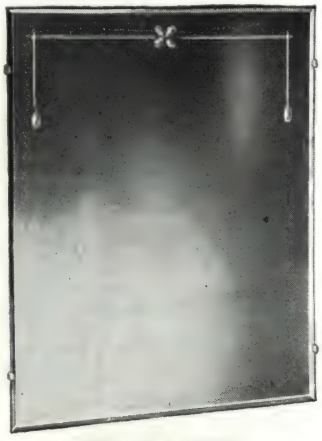
De Luxe Cabinet

The de Luxe model shown above is recommended for the finer homes and apartments. It is complete in every respect and a model of convenience. The adjustable wing mirrors carry attractive light brackets controlled by a switch below the door. Regular equipment includes locked compartment for poisonous medicines, Vitrolite shelves and razor blade drop.

Standard Models

Models 310 and 410 are especially recommended for the modest bathroom where price is to be considered. These cabinets are very rugged in construction and of a uniformly high quality. Models 300 and 400 are similar to Models 310 and 410 respectively, but do not have the open shelf below the door.

The Model 690VH shown at the right is made in one size only. It is a distinctive fixture for the inexpensive bathroom.



Model 690VH

DIMENSIONS, INCHES

	De Luxe	780VABS	770VABS	760VABS	690VH	310	410	300	400
Mirror	18 x28 8 x24	18 x28 6 x24	16 x26 6 x22	14 x22 6 x19	14x18	14 x18	12 x16	14 x18	12 x16
Over all	44½x29¾	30½x28	28½x22	26½x22	14x18	19 x29	17 x27	19 x23	17 x27
Inside	17 x22½	15 x21	13 x19	11 x15	11x15	15 x25	13 x23	15 x19	13 x23
Wall opening	17½x24	16 x22	14 x20	12 x16	12x16	15½x25½	13½x23½	15½x19½	13½x23½

Continued on next page

A Complete Line of Bathroom Accessories

With a great deal of pride we present this beautiful line of bathroom accessories to the architects and builders of America. It is now possible to obtain a complete service on your bathroom accessories from one source and with the protection of a name that has long been synonymous with Quality.

Miami Bathroom Accessories are made of bronze and offered in four finishes—chrome, nickel, enamel and solid nickel silver. The designs, executed by master craftsmen, are perfect in every detail and the workmanship throughout is of the highest character.

The fixtures shown below form but a part of an extensive line and, upon request, we will gladly furnish descriptive matter on other units. We are also prepared to quote prices on fixtures of a special nature.

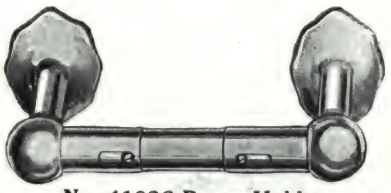
Advisory Service to Architects

A long experience in furnishing bathroom fixtures for many of the largest and finest buildings in the country is available to architects without charge to assist them in planning and selecting the fixtures best suited to the jobs in hand.

Every type of fixture and accessory used in the bathroom is included in the Miami line. In addition, Miami is particularly well equipped to design and manufacture special articles the architect may desire for unusual conditions or locations.

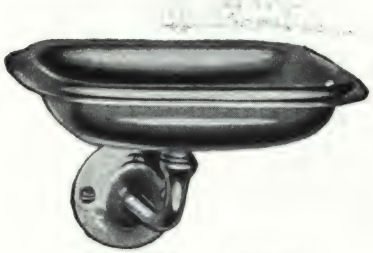
The architect may, therefore, specify Miami fixtures with absolute confidence, (1) that all fixtures required will be available, (2) that they will be of the highest grade, (3) that the finish of each article will be perfect and (4) that the date of delivery will be met regardless of how large the order is.

No. 42071 Glass Shelf
Lengths overall: 18, 24, 30 in. Width 5 and 6 in. Thickness ⅜ and ½ in.

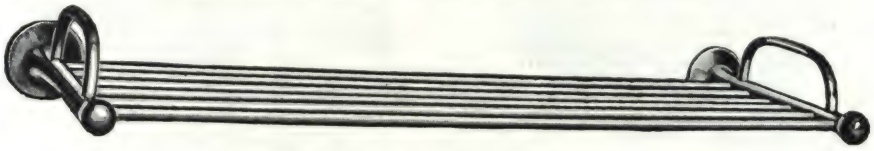


No. 41026 Paper Holder

No. 93 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar ⅞ in. square

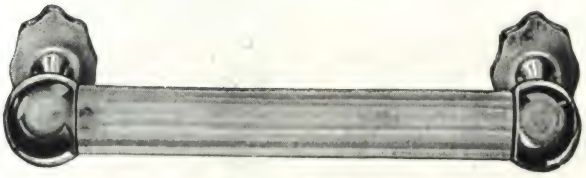


No. 271 Soap Holder
Size: 4¾x3¾ in.
Removable drainer



No. 505 Towel Shelf
Length 25 in. Width 8⅝ in.

No. 502½ Towel Basket
Height 15 in. Width 12 in.
Depth 5 in.



No. 4099 Grab Bar
Length, 9, 12, 15, 18, 24 in. Diam. 1¼ in.

No. 578 Liquid Soap Holder

No. 476 Tumbler Holder

Finishes

Metal parts are finished in chromium plate, nickel plate, nickel silver or white enamel. Towel and grab bars are furnished in crystal, opal or black glass, or enameled wood.

Shelves are furnished in crystal, opal, or black glass.

No. 65 Hook
Height 2⅞ in.

MORTON MANUFACTURING COMPANY

White Enameled Steel Medicine Cabinets

CABLE ADDRESS
"MORMANCO CHICAGO"

5192 West Lake Street
CHICAGO, ILL.

Codes A.B.C.
5th Edition, Bentley's
Lieber's

Products

STEEL, WHITE ENAMELED MEDICINE CABINETS for all types of residential buildings.

For Safety Treads, see Manufacturers' Index.

Features of Cabinet Construction

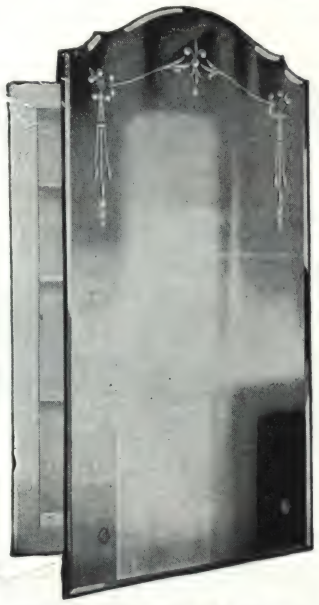
Made of rust-resisting steel. Corners electrically butt-welded. All parts of body electrically spot-welded. Hinges and brackets rustproof—brackets die-cast and permanently fastened in sides of cabinet. Special friction catch—easily workable, holds door securely.

Heavy plate glass mirrors, plain or 1-in. bevel. Crystal glass knob. Plate glass shelves with rolled front edge. Sanitary rounded corners on each cabinet (an exclusive Morton feature) prevent accumulation of dust and dirt. High gloss enamel finish sprayed and permanently baked on steel.

Cabinet 5 in. deep over all; frame has 1-in. return flange.

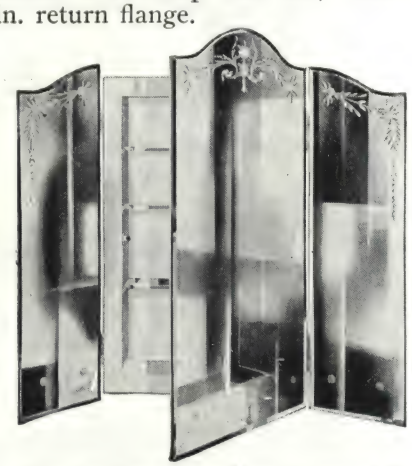
The "Georgian"—Model H

An attractive all-mirror door model, made in one size only, with or without etching



The "Venetian"—Models F and AF

The most popular style all-mirror door cabinet. Model F, illustrated above, has a built-up hollow door. Made in 4 sizes. Model AF is similar in appearance, made in one size only, especially designed and priced for the large building operation



The "Vanitie Venetian"—Model K

A "Venetian" style with movable side wings. Cabinet behind center mirror only. Made in but one size.

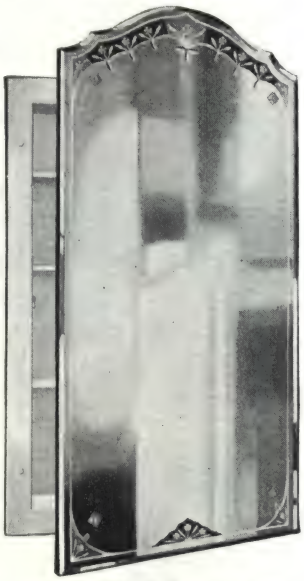
Chromium Plated or Baked Enamel

Chromium plated or enameled frame—can be furnished for Models AF, F, H and K at extra cost. Illustration shows Model F with beautiful chromium plated frame

WALL OPENING SPECIFICATIONS

Model	Mirror size, in.	Wall opening specifications, in.
A	10x14 12x16 14x18 16x20	13x16 ¾ 15x18 ¾ 17x20 ¾ 19x22 ¾
B	10x14 12x16 14x18 16x20	13x23 ½ 15x25 ½ 17x27 ½ 19x29 ½
E	12x16 14x18 16x20	17 ⅛ x21 ⅛ Outside dimensions 19 ⅛ x23 ⅛ —no wall opening 21 ½ x25 ½ required
AF	16x24	13 ½ x20 ¼
F (including "Modernistic")	18x26 18x32 20x28 20x34	15x18 ¾ 15x25 ½ 17x20 ¾ 17x27 ½
H	16x20	13x16 ¾
K	18x32 8x29 ½ (wings)	15x25 ½
Hotel Type	16x16	19x25 ½

Special models to meet unusual conditions also illustrated in new Catalog M-6.
Free on request.
Please order by model and mirror size.



"Modernistic" Model F

A Model F cabinet equipped with mirror No. 11, one of six new Modernistic designs. Green and black predominate, with etched silver flowers. Available on all sizes of Model F at small additional cost

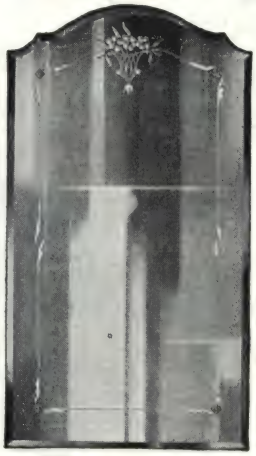
Continued on next page

NEW STYLES IN MIRROR DESIGNS BY MORTON

Styles in Venetian Mirrors Applicable to Model F at Small Extra Charge

Same Specifications as Model F

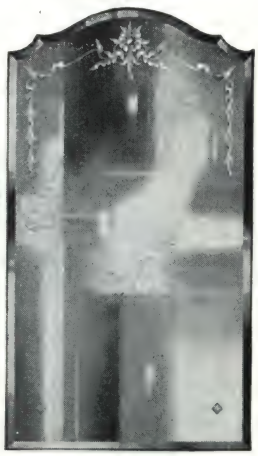
No. 6
The absence of mitre lines and the silver flowered etching at the top allows this mirror to be used in any style bathroom



No. 7
This etching, with the attractive basket design and broken mitre lines, has a tendency to add height to the mirror and brings about a tall, graceful effect throughout

No. 8
The stark simplicity of this beautiful mirror with V-cut mitre line is in keeping with the modern trend to eliminate superfluous details in every sense of the word

No. 9
Quite similar to No. 7 but with V-cut mitre lines and a well balanced, artistic etching at the top. As beautiful as it is practical



No. 10
Designed for those whose tastes run to a more elaborate etching, yet not overdone because the lower part of the mirror is plain, allowing full vision

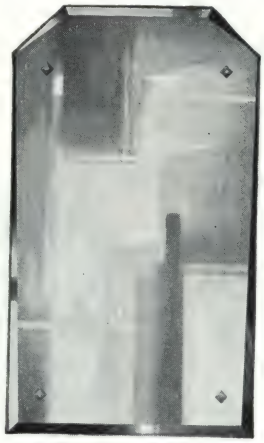
Styles in Modernistic Designs Applicable to Model F at Small Extra Charge

Same Specifications as Model F

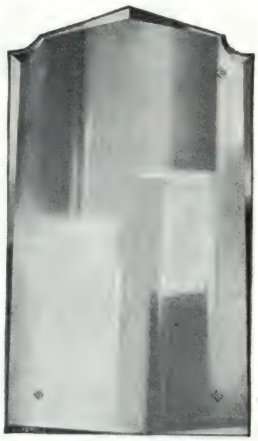
No.12
The general outline of this mirror represents modern art. The design is unusually neat and attractive. Black and silver is the color combination

No. 13
This mirror is entirely different and striking. The black and silver bars at the top together with the black border around the sides and bottom are rich in appearance

No. 14
The black and silver coloring, the tapered effects of the black border lines, and the dainty center design make this mirror unusually beautiful

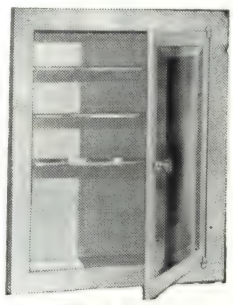


No. 15
For simplicity, this mirror without etching or coloring is offset by wide tapering bevels, which add brilliancy and attractiveness



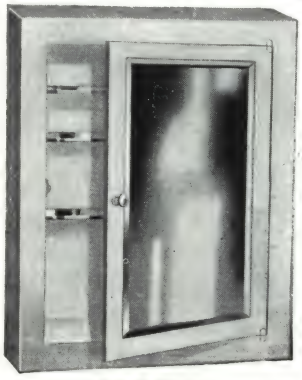
No. 16
This mirror likewise has no color, but the wide tapering bevels and the general shape appeal to those who like simplicity

Standard Type Cabinets for Hotels, Apartments, Etc.

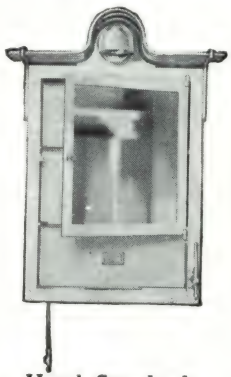


Model A
A recessed model, almost square in shape, with four roomy shelves, reasonably priced and made in four standard sizes

Model B—Recessed Type with Open Shelf Below
Exceedingly popular because of the convenient open shelf below. Same mirror sizes as Model A and also made in four standard sizes



Model E
A typical Morton Medicine Cabinet for wall mounting—no opening required—ideal for remodeling. Made in three standard sizes

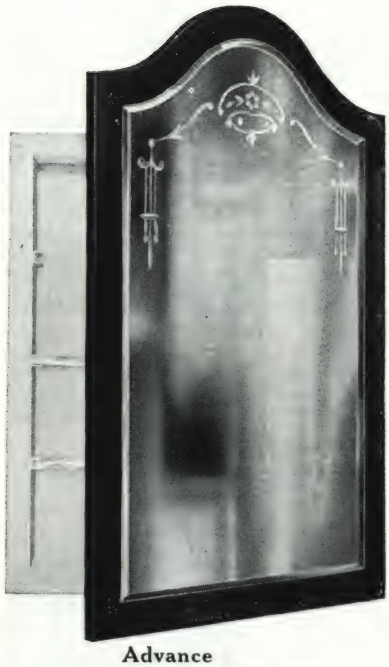


Hotel Standard
Complete with overhead light fixture, combination wet towel and razor strop hook, combination corkscrew and bottle opener, etc. One size only—other sizes to order

QUAKER METAL PRODUCTS CO.

Manufacturers of Steel Medicine Cabinets and Kitchen Cabinets and Radiator Enclosures

2228-2238 North 28th Street
PHILADELPHIA, PA.



Advance

Quaker Maid Medicine Cabinets

Quaker Maid steel medicine cabinets are made in six popular models. Beautiful in appearance and substantially constructed.

Standardization and quantity production on a quality basis have made it possible to offer the architect steel medicine cabinets at attractive prices.

Structural Features of Quaker Maid Steel Cabinets

Quaker Maid Cabinets are made from heavy gauge special process rustproof steel.

Bodies and Frames—Are die cut and formed from a single sheet of steel, electrically and torch welded, thus producing a cabinet without seams or joints.

Shelf Brackets—Sanitary U-shaped shelf supports prevent tipping of shelf contents, anchored through slits in side of cabinet body.

Shelves—Highest quality bulb edge clear glass.

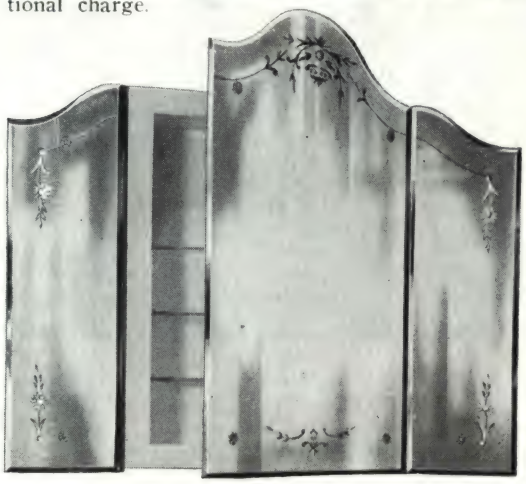
Door—The door is made of 16 gauge furniture steel and is fastened by means of a concealed bullet catch.

Mirrors—High grade ¼-in. plate glass with beveled edges and beautiful designs.

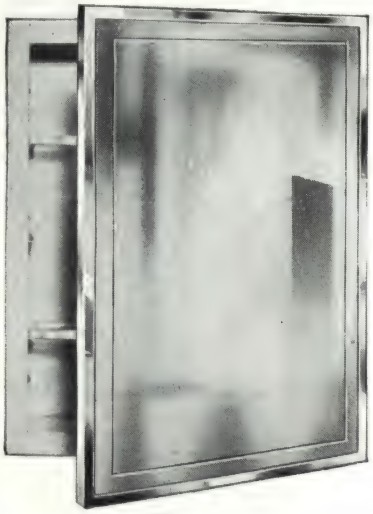
Finish—Regularly finished in white lacquer. May be had in any specified color at a slight additional charge.

Challenger

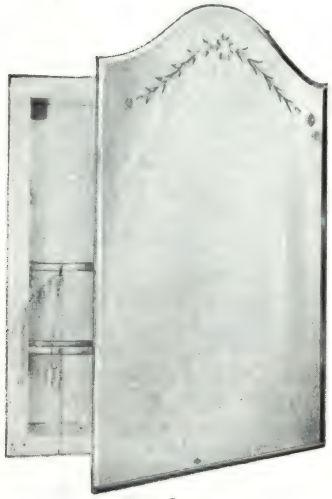
Model-B



De Luxe



Classic

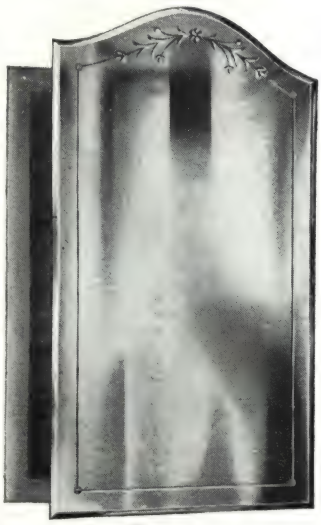


Leader

DIMENSIONS

Model	Catalogue No.	Wall opening, in.	Mirror, in.	Over all in.
De Luxe	300	17½x25½	20 x32	36 x32
De Luxe	301	15½x21½	18 x28	32 x28
Envoy	315	15½x21½	18 x28	18 x28
Envoy	316	17½x25½	20 x32	20 x32
Leader	307	14½x18½	16 x24	16 x24
Challenger	401	12½x16½	14 x18	14 x18
Challenger	402	14 x18	16 x20	16 x20
Classic	501	12½x16½	14 x18	14 x18
Classic	502	14 x18	15½x19½	16 x20
Classic	502CF*	14 x18	15½x19½	16 x20
Advance	724	14 x18	14 x22	16 x24
Advance	728	14 x21	14 x26	16 x28
Model B	40	13 x18	12 x12	17½x22½
Model B	50	15 x20	14 x14	19½x24½
Model B	60	17 x23	14 x14	21½x27½

Note: All mirrors shown above can be furnished without etching or with miter cut line.
*Chromium frame.



Envoy

THE CHARLES PARKER COMPANY

ESTABLISHED 1832

Manufacturers of Bathroom Furnishings

MERIDEN, CONN.

NEW YORK OFFICE, CHARLES PARKER CO., INC., 25 Murray Street

100 YEARS

PARKER PRODUCTS AND THE COMPANY BEHIND THEM

One of the greatest recommendations a product can have is the reputation and responsibility of the company back of it. THE CHARLES PARKER COMPANY, also manufacturers of the famous Parker Gun, completes a century of business in the year 1932.

The Parker bathroom line is complete and includes mirrors, medicine cabinets, etc., to fulfill any requirement of the architect. He can be assured in specifying Parker products that (1) all fixtures required will be available, (2) that they will be of the highest grade, (3) that the finish of every article will be perfect and lasting, and (4) that the date of delivery will be met regardless of the size of the order.

Designs and Finishes—Both design and finish, as well as perfect construction, play an important part in the appearance and lasting qualities of both fixtures and accessories. Only the most modern methods are employed in producing the lasting Parker finishes. These are supplied regularly in four finishes: chromium plate, nickel plate, solid nickel silver and white enamel.

Advisory Service to Architects—A long experience in furnishing bathroom fixtures for many of the largest and finest buildings in the country is available to architects without charge, to assist them in planning and selecting the fixtures best suited to the job in hand.

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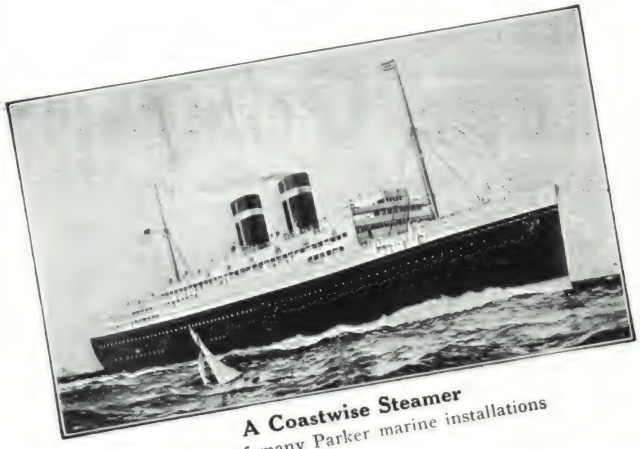
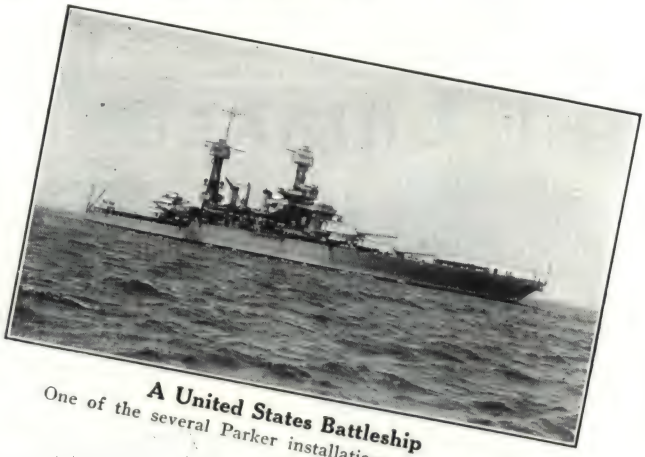
A FEW TYPICAL PARKER INSTALLATIONS



A Coastwise Steamer
Typical of many Parker marine installations



A United States Battleship
One of the several Parker installations for the Navy

Apartment House at 740 Park Avenue, New York, N. Y.

Parker Equipment Used in This Modern Building

The Medical Center, New York, N. Y.
Parker equipment used in this, the largest group of medical buildings in the world

Complete Equipment for Large Contracts Is a Specialty of the Parker Organization

Every type of fixture and accessory used in the bathroom is included in the Parker line. Parker is also particularly well equipped to design and manufacture special articles the architect may desire for unusual conditions or locations.

The company specializes on large contracts where complete bathroom fixture equipment is required. Parker accessories have been installed in leading hotels, hospitals, clubs, apartment houses, office buildings, etc., throughout the country, as well as on several of the largest battleships, steamships and yachts built in American and foreign shipyards.

Continued on next page

PARKER BATHROOM ACCESSORIES

Each article has been carefully designed to have perfect proportion and grace of line yet with the proper strength where needed. Only the best of materials and workmanship are utilized in their production and the greatest care is given to the proper finishing of each article.

All castings are produced in our own foundry according to special formulas. In this way, we are able to control the finished product in a manner which would otherwise be impossible.

This control extends not only to the article itself but to the final completion date as well. It enables us to meet delivery dates with a certainty which is frequently of great importance on large contracts, where the completion of a large building may be involved.

Parker Chromium—Chromium Plate has today superseded all other finishes by its everlasting qualities. It never requires polishing.

Parker Nickel—Consists of a heavy coating of nickel evenly deposited by electricity and then polished to a high lustrous finish. This has been used for years with uniformly satisfactory results.

Parker Nickel Silver—The fixtures are manufactured of solid nickel silver and highly polished without plating. This makes an attractive finish which is very durable.

Parker White Enamel—A most satisfactory finish where white is desired. The articles are given a sufficient number of coats of special enamel to insure a durable finish that is easily kept clean.

THE PARKER CONCEALED SCREW DEVICE

This device developed by The Charles Parker Company for mounting their bathroom accessories, adds the final touch to the appearance of fine fixtures.

It consists of a brass disc in the center of which is riveted a post ⅜ in. in diameter and ⅞ in. long with a hole drilled and tapped ½ in. from the disc. The mounting fixtures are of two sizes; one with 1⅜-in. disc for the usual fixtures and one with a larger disc for extra large or heavy fixtures. Beside the post is a small stud which fits into a recess in the fixture and insures that the screw hole in the fixture lines up accurately with tapped hole in the mounting device.

Advantage of the Concealed Screw Device

(1) It eliminates unsightly screw heads which frequently spoil the appearance of otherwise beautiful fixtures.

(2) When used in public buildings it prevents removal or theft of the fixture which cannot be removed without the special key.

(3) The mounting device may be installed before the final finish is put on the walls and the fixtures installed later. In this way there is no danger of marring the wall finish during installation or of injuring finish of fixture while final decorating is being done.

(4) The mounting devices may be shipped to the job in advance of the fixtures which, therefore, do not have to be stored, eliminating danger of theft.

(5) White enamel fixtures can be installed without danger of chipping the enamel.

(6) There are no screw heads in which dust and dirt can collect or on which towels, etc., can catch.

(7) The detaining screw goes entirely through the mounting post. This feature insures the stability of the fixtures, for whether the screw is absolutely tight or a trifle loose, the fixture will not turn or loosen from the wall until the screw is entirely removed.

Method of Installation

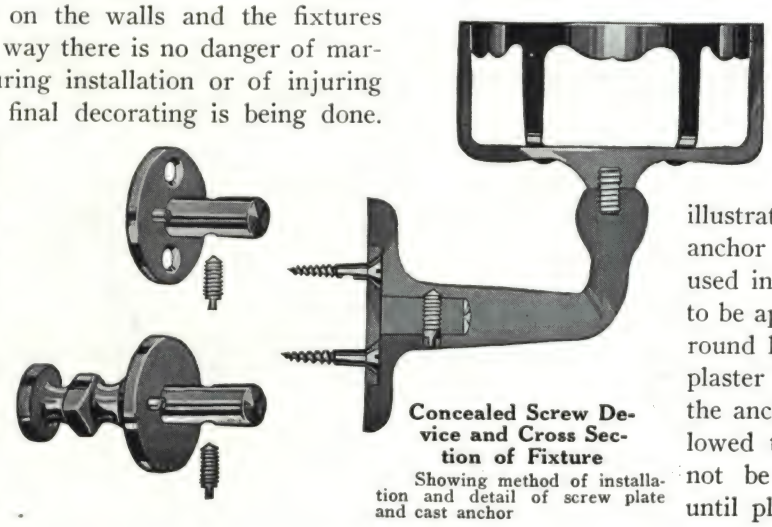
The mounting device is first fastened to the wall with ordinary flat head screws. If the device and fixture are shipped together they must first be separated.

The fixture is then placed against the flange and turned into the recess in the fixture.

The special screw is next placed in the hole in the fixture and tightened until it is fast.

A special key for tightening the screw is furnished with each order.

When there are a number of similar articles to be installed, especially items with two brackets which must be spaced accurately as in the case of towel bars, a template is furnished which insures the correct spacing and facilitates installation.



Concealed Screw Device and Cross Section of Fixture

Showing method of installation and detail of screw plate and cast anchor

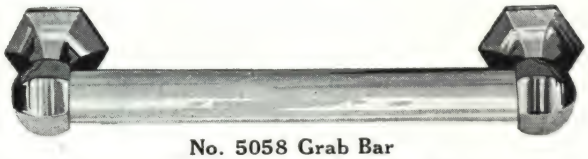
Cast Anchor—An illustration of Parker's cast anchor plate is shown. This is used in connection with fixtures to be applied to tile surfaces. A round hole is drilled in the tile, plaster of paris slushed in and the anchor then inserted and allowed to set. Fixtures should not be applied to the anchor until plaster has thoroughly set.

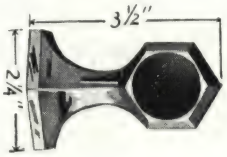
Continued on next page

HEXAGON 1882 Chas Parker PATTERN

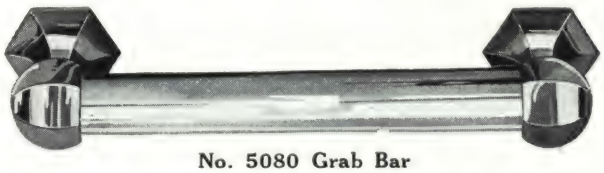
GRAB BARS, TOWEL BARS AND SHELVES

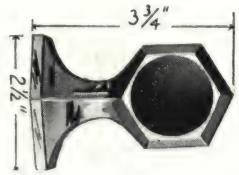
Metal parts are finished in chromium plate, nickel plate, nickel silver or white enamel
Bars are furnished in crystal, opal or black glass or enameled wood
Shelves are furnished in crystal, opal or black glass





No. 5058 Grab Bar
Lengths center to center: 12, 15, 18, 24, 30 in. Bar 1¼-in. diam.





No. 5080 Grab Bar
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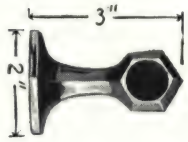
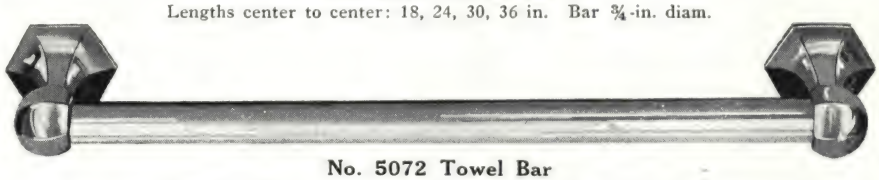
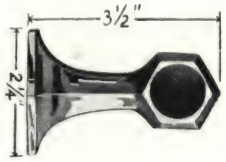
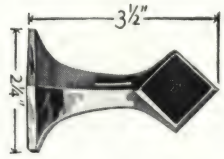


No. 5074 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar ¾-in. diam.

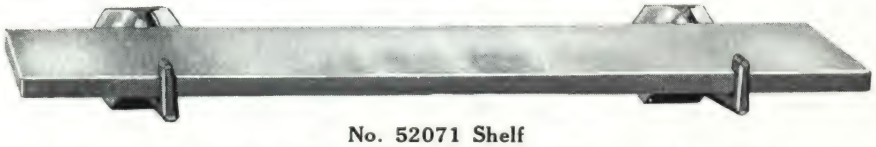


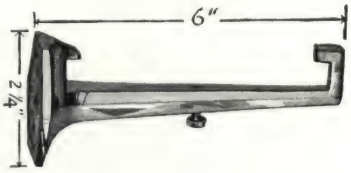


No. 5072 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar 1-in. diam.

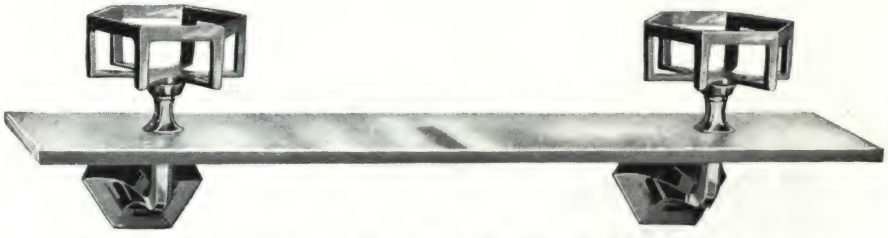


No. 5093 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar ⅞-in. square





No. 52071 Shelf
Lengths overall: 18, 24, 30 in. Widths 5 and 6 in. Thickness ⅛ and ½ in.



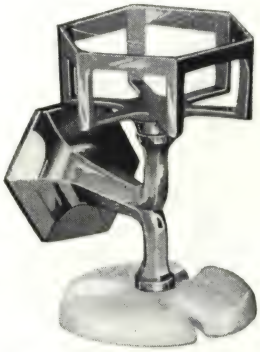
No. 52066 Shelf and Tumbler Holders
Lengths overall: 18, 24, 30 in. Width 5 in. Thickness ⅛ and ½ in.

Continued on next page

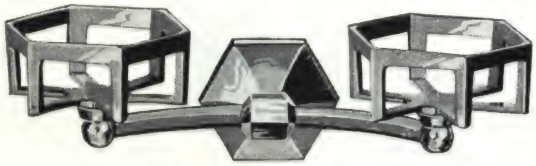
HEXAGON PATTERN

TUMBLER AND TOOTH BRUSH HOLDERS

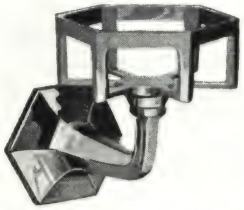
Finished in chrominum plate, nickel plate, nickel silver or white enamel



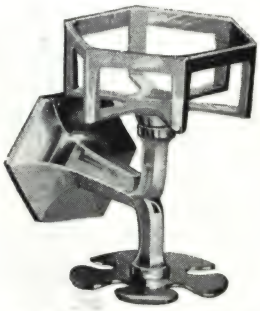
No. 5966 Tumbler and Toothbrush Holder



No. 5988 Double Tumbler Holder
Spread 9¼ in.



No. 5476 Single Tumbler Holder



No. 5972 Tumbler and Toothbrush Holder

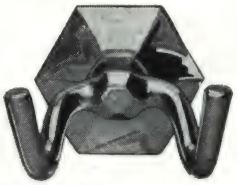
MISCELLANEOUS PIECES

Finished in chromium plate, nickel plate, nickel silver or white enamel

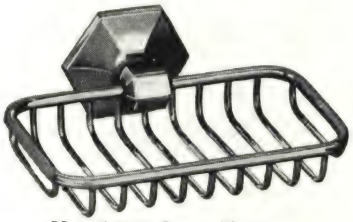
No. 5055 Single Hook
Height 2 in.

No. 5950 Toothbrush Holder

No. 5976 Toothbrush Holder

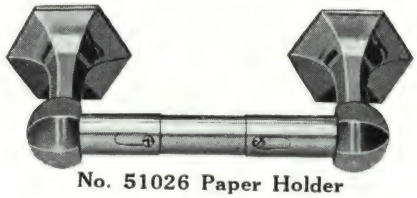


No. 5056 Double Hook
Height 1½ in.



No. 5282 Soap Holder
Size 6x3½x1 in.

No. 5064 Towel Pin
Projection 6½ in.
Cast in one piece



No. 51026 Paper Holder

No. 5576 Soap Holder
Takes No. 209 liner
Projection 5½ in.

No. 5986 Combination Double Tumbler and Soap Holder
Takes No. 201 liner. Spread 9¼ in.

No. 5475 Combination Tumbler and Soap Holder
Takes No. 201 liner

Continued on next page

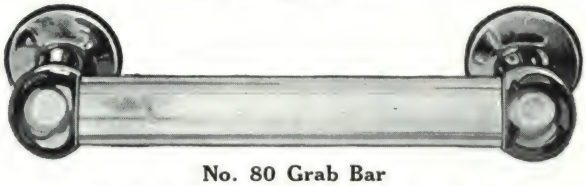
1823 Chas. Parker

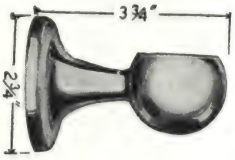
■ PARKER ■ BATHROOM ■ ACCESSORIES ■■■

GRAB BARS AND TOWEL BARS

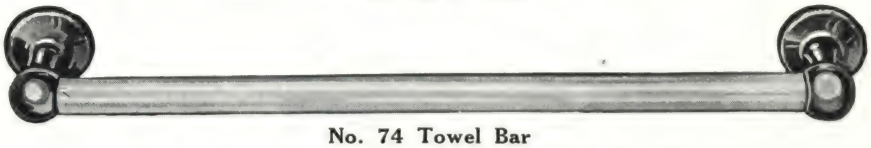
Metal parts finished in chromium plate, nickel plate, nickel silver or white enamel
Bars are furnished in crystal, opal or black glass or enameled wood

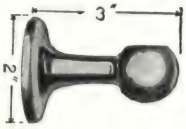
No. 58 Grab Bar
Lengths center to center: 12, 15, 18, 24, 30 in.
Bar 1¼ in. diam.



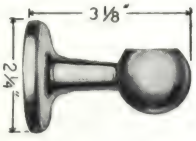


No. 80 Grab Bar
Lengths center to center: 12, 15, 18, 24, 30 in.
Bar 1½ in. diam.

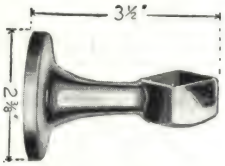




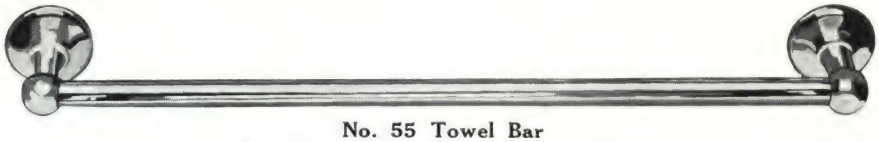
No. 74 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar ¾ in. diam.
No. 75 Towel Bar same as No. 74 except bar is all metal

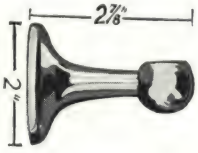


No. 72 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar 1 in. diam.

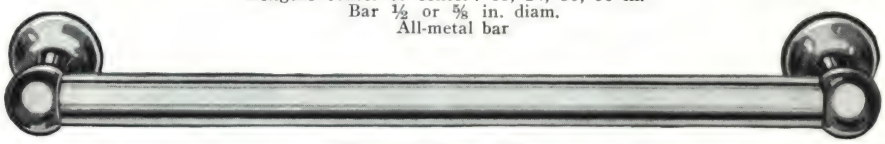


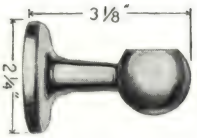
No. 93 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar ⅞ in. square





No. 55 Towel Bar
Lengths center to center: 18, 24, 30, 36 in.
Bar ½ or ⅝ in. diam.
All-metal bar





No. 77 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar 1 in. diam.
All-metal bar

No. 94 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Bar ⅜ x ¾ in,
All-metal bar

Continued on next page

PARKER BATHROOM ACCESSORIES

METAL TOWEL BARS

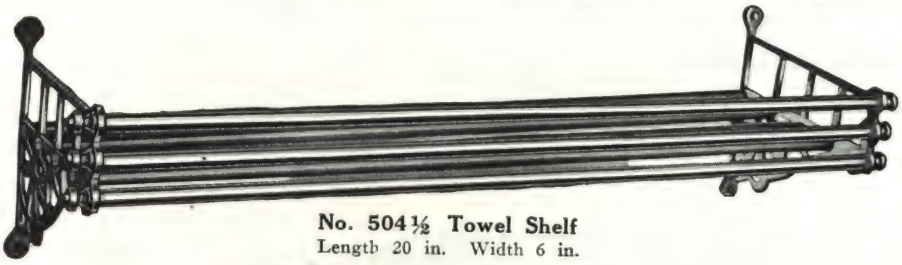
Finished in chromium plate, nickel plate, nickel silver or white enamel

No. 010 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Diam. ⅜ or ½ in.
Heavy stamped flanges

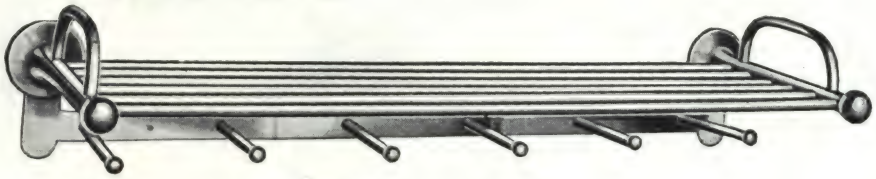
No. 10 Towel Bar
Lengths center to center: 18, 24, 30, 36 in. Diam. ½ or ⅝ in.
Heavy cast flanges

TOWEL SHELVES

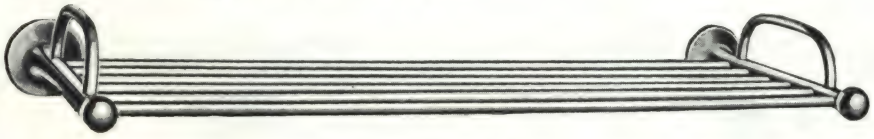
Finished in chromium plate, nickel plate, nickel silver or white enamel



No. 504½ Towel Shelf
Length 20 in. Width 6 in.



No. 606 Towel Shelf
Length 25 in. Width 8⅜ in.

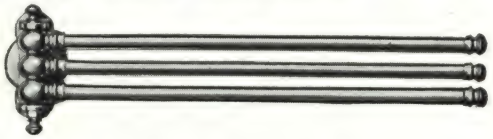


No. 505 Towel Shelf
Length 25 in. Width 8⅜ in.

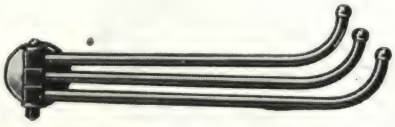
SWINGING TOWEL RACKS

Finished in chromium plate, nickel plate, nickel silver or white enamel

No. 38 Towel Rack
Length 15 in. Diam. each bar ⅜ in.



No. 36 Towel Rack
Length 16 in. Diam. each bar ½ in.



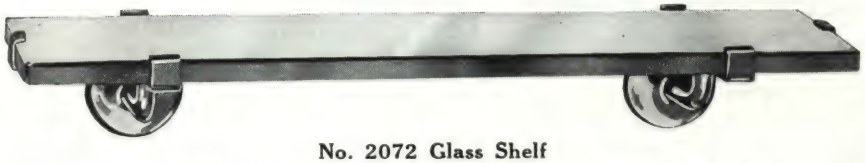
No. 50 Towel Rack
Length 11 in. Diam. each bar ⅜ in.

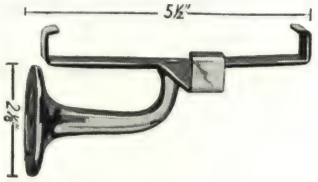
Continued on next page

1823 Parker ■ PARKER ■ BATHROOM ■ ACCESSORIES ■ ■ ■

GLASS SHELVES

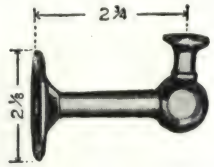
Metal parts finished in chromium plate, nickel plate, nickel silver or white enamel
Shelves are furnished in crystal, opal or black glass



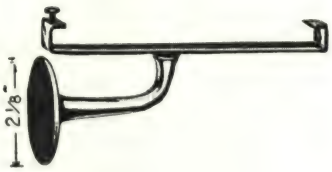


No. 2072 Glass Shelf
Lengths overall: 18, 24, 30 in. Width 5 and 6 in. Thickness 5/16 and ½ in.

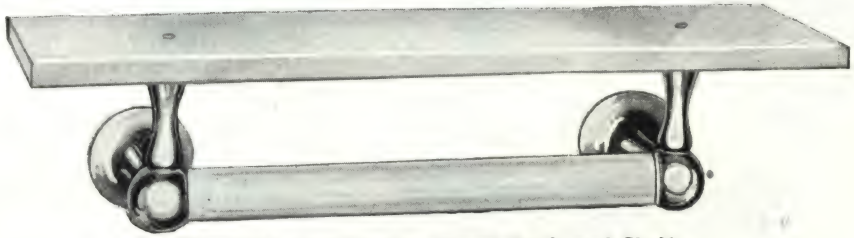
No. 2071 Glass Shelf
Lengths overall: 18, 24, 30 in. Width 5 and 6 in. Thickness 5/16 and ½ in.

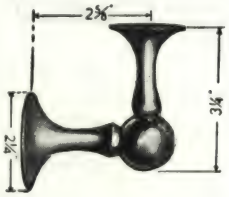


No. 2037 Glass Shelf
Lengths overall: 18, 24, 30 in. Width 5 and 6 in. Thickness 5/16 and ½ in.



No. 2051 Glass Shelf
Lengths overall: 18, 24, 30 in. Width 5 and 6 in. Thickness 5/16 and ½ in.





No. 2041 Combination Towel Rack and Shelf
Lengths overall: 24 and 30 in. Width 5 in. Thickness 5/16 and ½ in.
Crystal or opal bar, 1 in. diam.

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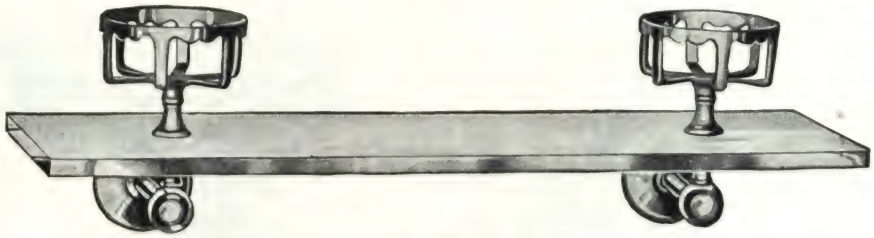
PARKER BATHROOM ACCESSORIES

GLASS SHELVES WITH TUMBLER HOLDERS

Metal parts finished in chromium plate, nickel plate, nickel silver or white enamel
Shelves furnished in crystal, opal or black glass

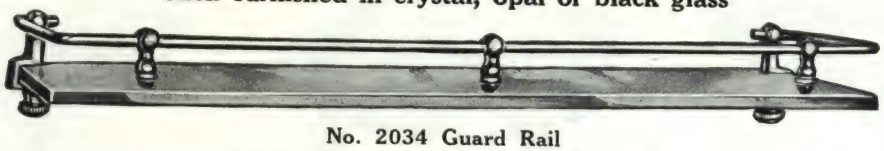


No. 2066 Combination Shelf and Tumbler Holder
Lengths overall: 18, 24 and 30 in. Width 5 and 6 in. Thickness 5/16 and 1/2 in.

No. 2067 Combination Shelf and Tumbler Holder
Lengths overall: 18, 24 and 30 in. Width 5 and 6 in. Thickness 5/16 and 1/2 in.

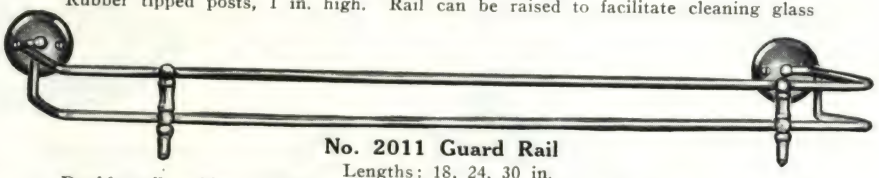
GUARD RAILS FOR GLASS SHELVES

Metal parts finished in chromium plate, nickel plate, nickel silver or white enamel
Shelf furnished in crystal, opal or black glass

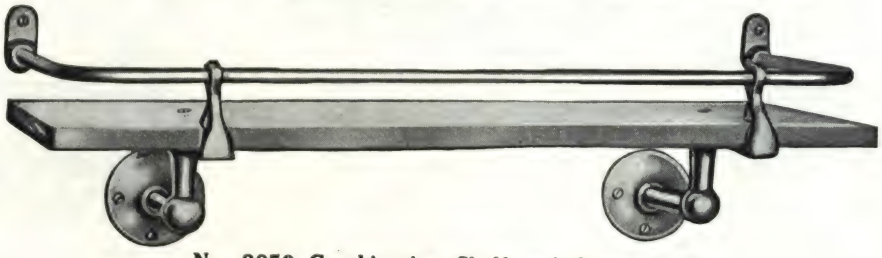


No. 2034 Guard Rail
Lengths: 18, 24, 30 in. For 5/16 and 1/2-in. glass
Rubber tipped posts, 1 in. high. Cast clamps with adjustable screws to fasten to shelf. Can be raised to facilitate cleaning glass

No. 2010 Guard Rail
Lengths: 18, 24, 30 in.
Rubber tipped posts, 1 in. high. Rail can be raised to facilitate cleaning glass



No. 2011 Guard Rail
Lengths: 18, 24, 30 in.
Double rail, rubber tipped posts. Rail can be raised to facilitate cleaning glass



No. 2059 Combination Shelf and Guard Rail
Lengths: 18, 24, 30 in. Width 5 and 6 in. Thickness 5/16 and 1/2 in.

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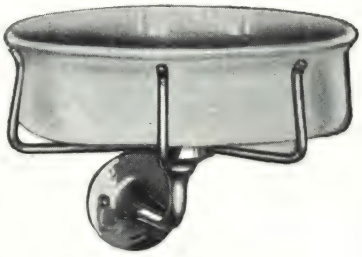
1923 Chas. Parker

PARKER BATHROOM ACCESSORIES

SOAP HOLDERS

Finished in chromium plate, nickel silver, nickel plate and white enamel
Liners furnished in either opal or crystal



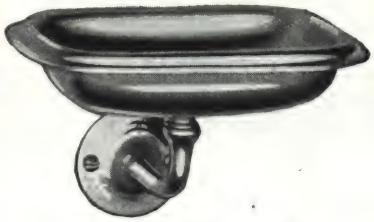
No. 540 Soap Holder
Size: 5¼ x 3½ x 1¼ in.
No. 203 Liner

No. 578 Liquid Soap Holder
Height 7 in. Projects from wall 6¼ in.

No. 259 Soap Holder
Size: 5x4½ in.
No. 201 Liner

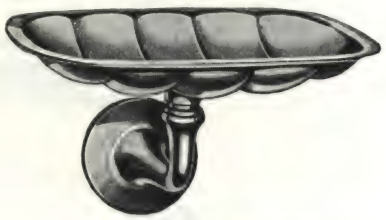
No. 576 Soap Holder
Projection 5½ in.
No. 209 Liner

No. 562 Soap Holder
Size: 5x4½ in.
No. 201 Liner

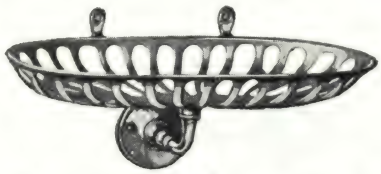


No. 271 Soap Holder
Size: 4¾ x 3¾ in.
Removable drainer

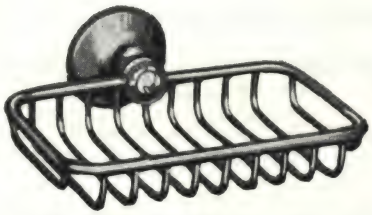
No. 291 Soap Holder
Size: 4¾ x 3¾ in.
Removable drainer



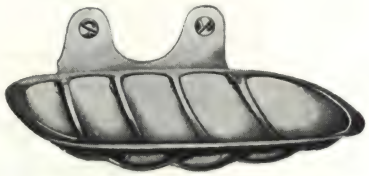
No. 541 Soap Holder
Size: 4½ x 3½ in.



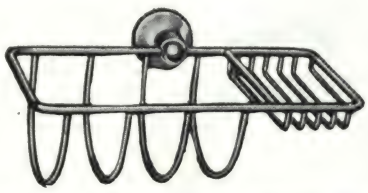
No. 1240 Soap Holder or Comb and Brush Tray
Size: 10½ x 4¾ x 1¼ in.



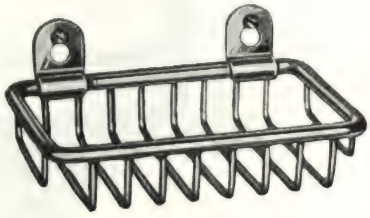
No. 282 Soap Holder
Size: 6x3½x1 in.



No. 537 Soap Holder
Size: 4½ x 3½ in.



No. 921 Combination Sponge and Soap Holder
Extreme length 10¼ in.



No. 287 Soap Holder
Size: 5½ x 3¾ x 1 in.

Continued on next page

PARKER BATHROOM ACCESSORIES

1853 Chas. Parker 1930

HOOKS AND CORKSCREWS

Finished in chromium plate, nickel silver, nickel plate or white enamel

No. 65 Hook
Height 2⅞ in.

No. 67 Hook
Height 5¾ in.

No. 66 Hook
Height 3½ in.

No. 46 Hook
Height 1½ in.

No. 4 Hook
Height 1¼ in.

No. 30 Hook
Height ⅝ in.

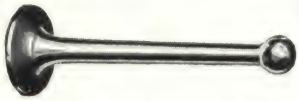
No. 59 Hook
Height 2 in.

No. 52 Hook for Razor Strops

No. 70 Hook
Height 3¾ in.

No. 47 Hook
Height 3⅛ in.

No. 57 Combination Towel Pin and Hook
Projects from wall 6½ in.
Cast in one piece



No. 64 Towel Pin
Projects from wall 6½ in.
Cast in one piece

No. 24 Towel Pin
Projects from wall 6½ in.

No. 101 Corkscrew and Decapper

No. 102 Corkscrew and Decapper

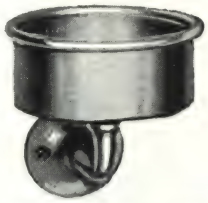
Continued on next page

PARKER BATHROOM ACCESSORIES

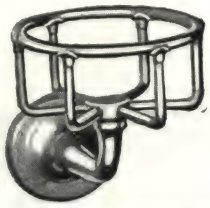
TUMBLER HOLDERS

Finished in chromium plate, nickel silver, nickel plate or white enamel

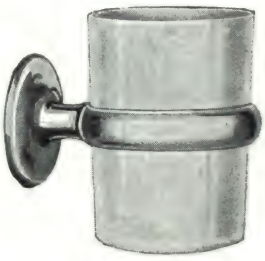
No. 476 Tumbler Holder



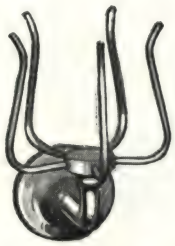
No. 922 Tumbler Holder



No. 799 Tumbler Holder



No. 855 Tumbler Holder



No. 803 Tumbler Holder

No. 988 Double Tumbler Holder
Spread 9¼ in.

No. 490 Double Tumbler Holder
Spread 9¼ in.

TOOTH BRUSH HOLDERS

Finished in chromium plate, nickel silver, nickel plate or white enamel

No. 950 Tooth Brush Holder

No. 946 Tooth Brush Holder

No. 976 Tooth Brush Holder

Continued on next page

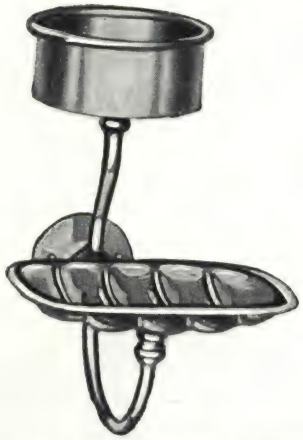
PARKER BATHROOM ACCESSORIES

1923 Catalog

TUMBLER HOLDERS AND COMBINATIONS

Finished in chromium plate, nickel silver, nickel plate or white enamel

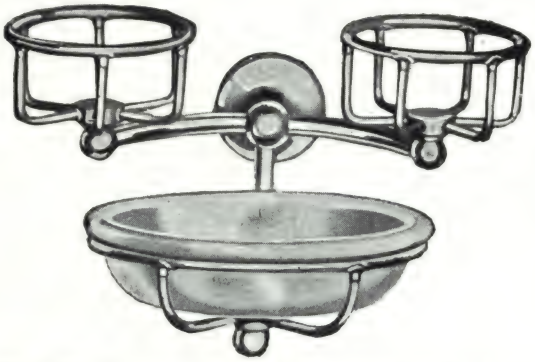
No. 979 Combination Tumbler and Soap Holder



No. 825 Combination Tumbler and Soap Holder

No. 475 Combination Tumbler and Soap Holder

No. 986 Combination Double Tumbler and Soap Holder
Spread 9¼ in.

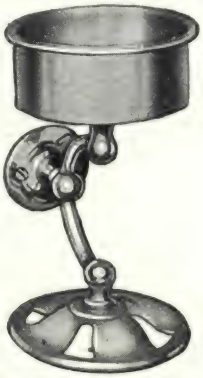


No. 980 Combination Double Tumbler and Soap Holder
Spread 9¼ in.

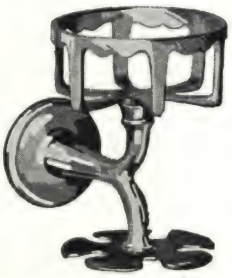
COMBINATION TUMBLER AND TOOTH BRUSH HOLDERS

Finished in chromium plate, nickel silver, nickel plate or white enamel

No. 949 Combination Tumbler and Tooth Brush Holder



No. 948 Combination Tumbler and Tooth Brush Holder



No. 972 Combination Tumbler and Tooth Brush Holder

No. 966 Combination Tumbler and Tooth Brush Holder

Continued on next page

PARKER BATHROOM ACCESSORIES

MEDICINE CABINETS

The Parker line of bathroom cabinets is complete and contains a model for every purpose. Only a few of the more popular styles are shown here but we shall be pleased to forward a complete catalogue upon receipt of your request. We are prepared also to quote prices on special cabinets in quantities.

Special Note: Any model in the Parker line can be finished at a small additional charge, to match special colors.

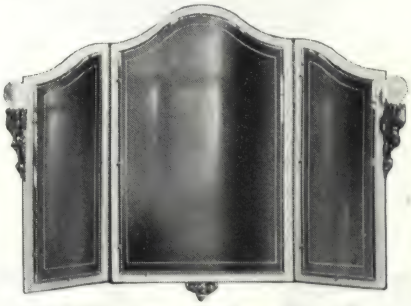
The Countess—Model 780-VABS
The Dutchess—Model 770-VABS
The Princess—Model 760-VABS

Venetian Type Cabinets

The Parker Venetian Models are furnished in a variety of styles and mirror designs. The cabinet shown above is fitted with adjustable side mirrors and the "ABS" mirror consisting of a black border enameled in the glass with polished gold cut work showing through.

Parker Venetians resemble unusually handsome mirrors hung flush on the wall as there is no knob, hardware or portion of the body visible to indicate that a spacious cabinet is hidden behind the door.

Regular equipment for the cabinet shown above includes adjustable bulb edge glass shelves and razor blade drop.



"ABS" Mirror Design, Shop No. DLV ABS

Cabinet with Light Brackets

Light Brackets for Cabinets

Chromium plated light brackets of distinctive design can be attached to any model in the Parker line, except the wing types. These brackets of either the keyless or pull chain type add a very distinctive and practical touch to the cabinet. They concentrate the light at the point it is needed most and there is enough light reflected by the mirror to illuminate the entire bathroom.

The wiring system is a model of simplicity and has been approved by the Underwriters' Laboratories, Inc.

Models 750-VM and 710-VM

De Luxe Model Cabinet

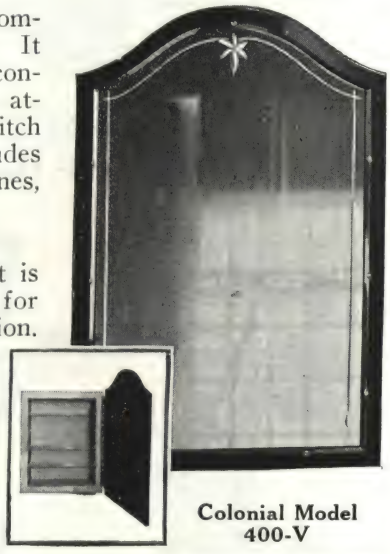
The De Luxe model shown above is recommended for the finer homes and apartments. It is complete in every respect and a model of convenience. The adjustable wing mirrors carry attractive light brackets controlled by a switch below the door. Regular equipment includes locked compartment for poisonous medicines, Vitrolite shelves and razor blade drop.

Colonial Model Cabinet

The Colonial cabinet shown at the right is one of several "panel door" models, noted for their attractive design and rugged construction. Other cabinets of this type are illustrated in our complete new catalogue.

Mitered Line Design Cabinet

At the left is shown the "M" or mitered line design on all glass Venetian models. This particular design is offered in two sizes.



Colonial Model 400-V

DIMENSIONS, INCHES

Model	De Luxe	780VABS	770VABS	760VABS	750VM	710VM	400V
Mirror	18 x28 8 x24	18 x28 6 x24	16 x26 6 x22	14 x22 6 x19	18 x28	16 x26	14 x22
Over all	44½x29¾	30½x28	28½x26	26½x22	18 x28	16 x26	15¾x23¾
Inside	17 x22½	15 x21	13 x19	11 x15	15 x21	13 x19	12¾x16¾
Wall opening	17½x24	15¾x21¾	13¾x19¾	11¾x15¾	15¾x21¾	13¾x19¾	13½x17½

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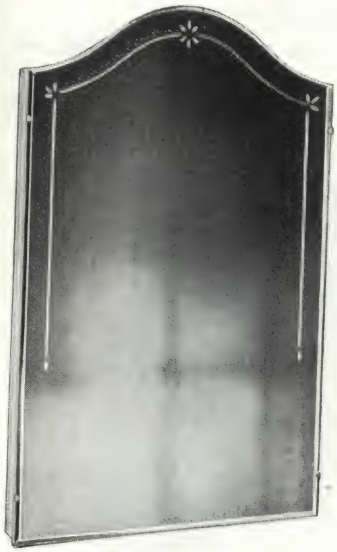
PARKER BATHROOM ACCESSORIES

MEDICINE CABINETS



Model 750-VH
Model 710-VH
Model 700-VH

The all-glass Venetian model shown at the left fitted with the "H" mirror design is furnished in three sizes. Other mirrors which may be had if desired include the handsome "AB" design or for those who prefer the ultimate in simplicity the "P" or plain mirror without etching.

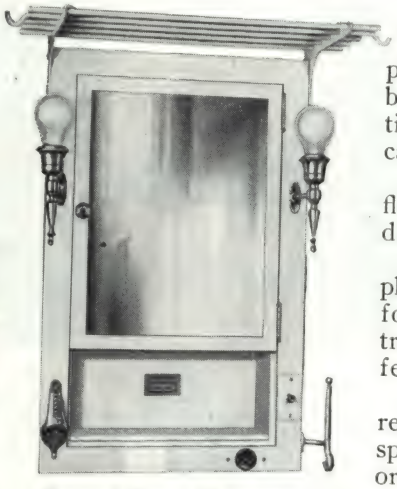
The mirrors on Parker Venetian Models are suspended on heavy built-up door panels by clips of special design which eliminate breakage. The doors are of such solid construction that they may be slammed without injury to the mirror.

The cabinet at the right is furnished in one size only and is recommended as a distinctive fixture for the inexpensive bathroom.

Model 690-VH

Special Hotel Cabinet

The special hotel cabinet at the right can be made up by attaching the fixtures shown to any flush door model in the Parker line. Regular equipment includes: either chromium plated or enameled towel tray with water bag hooks, chromium plated light brackets (either keyless or pull chain), switch (where keyless brackets are used), combination hook, hot plug, combination corkscrew and bottle opener, vitrolite shelf, junction box for connecting house and cabinet wires, and razor blade drop.

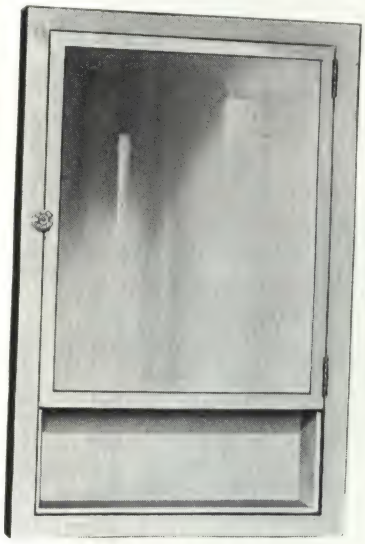


Special Hotel Cabinet

The regular equipment is very flexible and can be altered to meet individual requirements.

The cabinets are shipped completely wired, assembled and ready for installation, except for the towel tray which can be attached in a very few minutes time on the job.

These cabinets are not carried in regular stock but are made up on special order and therefore small orders cannot always be handled promptly.



Models 300 and 400

Standard Type Cabinets

Models 300, 400, 310 and 410 are especially recommended for the modest bathroom where price is to be considered. These cabinets are very practical in design, rugged in construction and of a uniformly high quality.

Regular specifications include glass knobs, plain plate mirrors and three adjustable bulb edge glass shelves. Beveled mirrors may be substituted at a slightly higher price.

Models 310 and 410

DIMENSIONS, INCHES

Model	750VH	710VH	700VH	690VH	300	400	310	410
Mirror	18x28	16x26	14x22	14x18	14 x18	12 x16	14 x18	12 x16
Over all	18x28	16x26	14x22	14x18	19 x23	17 x21	19 x29	17 x27
Inside	15x21	13x19	11x15	11x15	15 x19	13 x17	15 x25	13 x23
Wall opening	16x22	14x20	12x16	12x16	15½x19½	13½x17½	15½x25½	13½x23½

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1923 Chas. Parker

PARKER BATHROOM ACCESSORIES

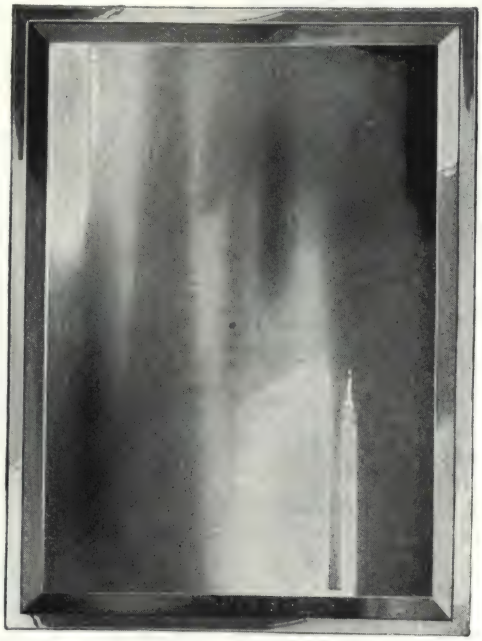
BEVELED PLATE GLASS MIRRORS

Frames finished in chromium plate, nickel plate or white enamel except as noted

Hangers are supplied on the sides for horizontal mounting or on the ends for vertical mounting, as specified

Mirrors are heavy plate glass, beveled and well silvered

No. 3016 Mirror with Rounded Frame
Frame is brass with corners mitered and brazed
Sizes: 16x20, 18x24 and 18x30 in.
Special sizes if desired.



No. 3020 Mirror with Flat Frame
Frame is brass with corners mitered and brazed
Sizes: 12x18, 16x20, 18x24 and 18x30 in.
Special sizes if desired.

No. 3018 Oval Mirror
Frame is brass made in one piece
Sizes: 16x20, 18x24, and 18x30 in.
Special sizes if desired.

No. 4006 Mirror with Beveled Frame
Frame is steel with corners welded, furnished in white enamel only
Sizes: 12x18, 16x20, 18x24, and 18x30 in.

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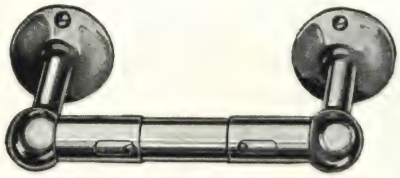
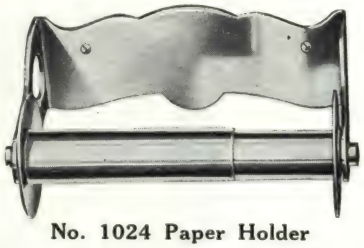
PARKER BATHROOM ACCESSORIES

PAPER HOLDERS, RIM GUARDS AND TOWEL BASKETS

Metal parts finished in chromium plate, nickel plate, nickel silver or white enamel



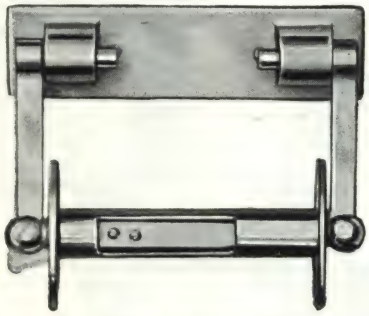
No. 1026 Paper Holder



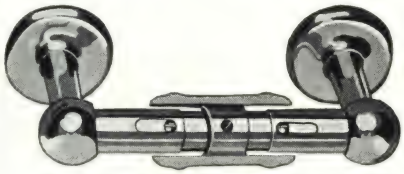
No. 1024 Paper Holder

No. 1022 Paper Holder

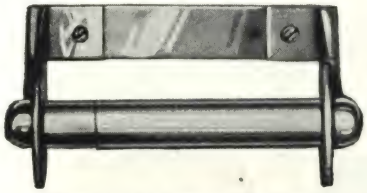
No. 1028 Paper Holder



No. 1029 Paper Holder

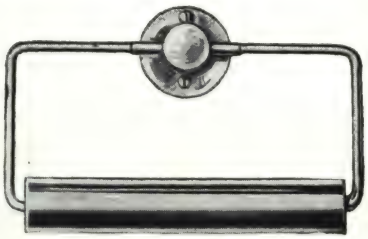


No. 1038 Paper Holder

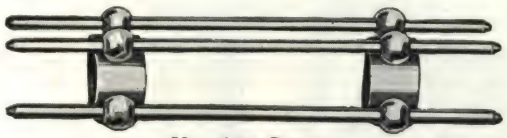


No. 1032 Paper Holder

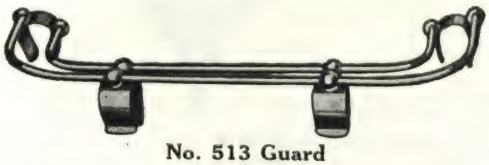
No. 1020 Paper Holder



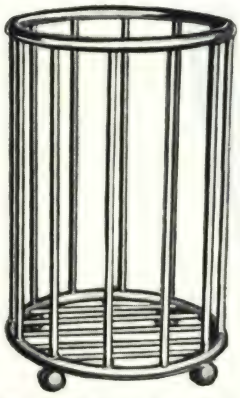
No. 1019 Paper Holder



No. 524 Guard
Regular length 15 in.
Special lengths if desired
Not finished in white enamel



No. 513 Guard
Regular length 21 in. from center to center
Special lengths if desired
Not finished in white enamel



No. 503 Towel Basket
Height 15 in. Diam. 10 in.

No. 502½ Towel Basket
Height 15 in. Width 12 in. Depth 5 in.

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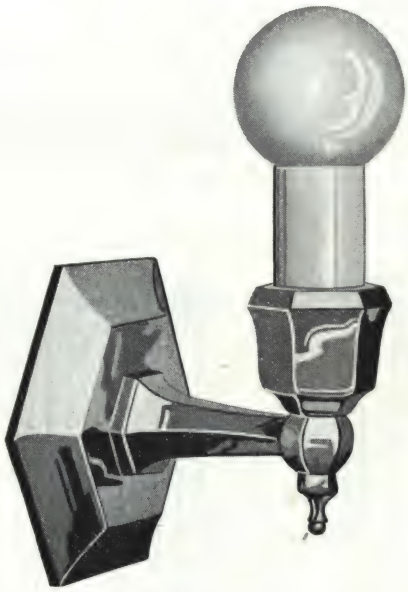
PARKER BATHROOM ACCESSORIES

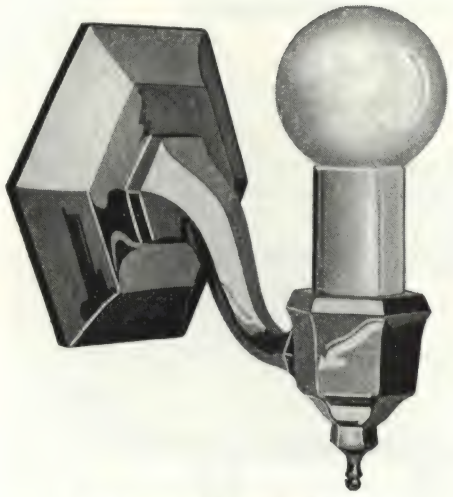
LIGHTING FIXTURES

Finished in chromium plate, nickel plate, nickel silver or white enamel

No. 5000 Lighting Fixture
Projection from wall 4½ in.
Height 5½ in.



No. 5002 Lighting Fixture
Projection from wall 4 in.
Height 4½ in.



No. 5001 Lighting Fixture
Projection from wall 4½ in.
Height 6¼ in.

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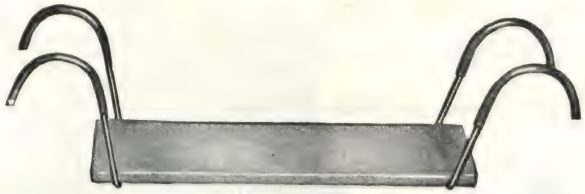
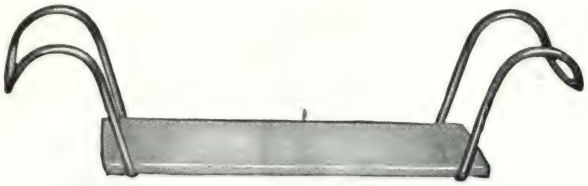
PARKER BATHROOM ACCESSORIES

1923 Chas. Parker

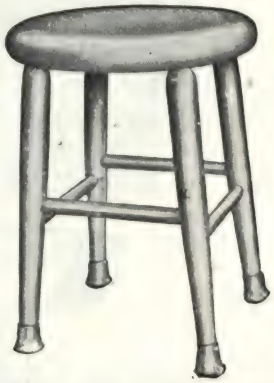
BATH SEATS, STOOLS AND CHAIRS



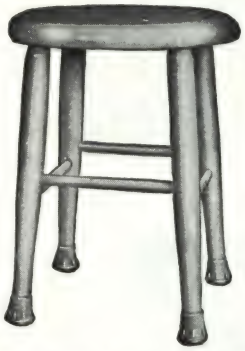
No. 2505. Bath Seat
Size 6x20 in.
Hangers nickel plated, rubber covered
Seat white enamel or oak



No. 2515. Bath Seat
Hangers nickel plated, rubber covered
Seat white enamel or oak



No. 2504. Bath Stool (All White)
(No. 2502 is same stool in color)
Height 15 in.
Diameter of seat 12 in.



No. 2503. Bath Stool (All White)
(No. 2501 is same stool in color)
Height 14½ in.
Diameter of seat 11½ in.

No. 2514. Bath Chair (All White)
(No. 2518 is same chair with colored seat)
Height over all 29 in.
Height from floor to seat 16½ in.
Size of seat 14x12 in.

No. 2519. Bath Stool (All White)
(No. 2520 is same stool with colored seat)
Height 15 in.
Size of seat 14x12 in.

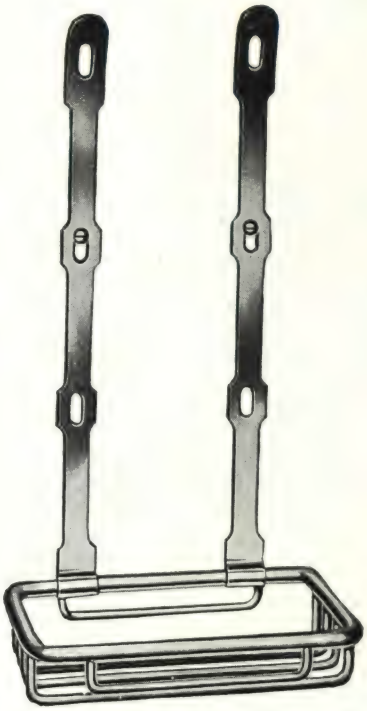
Continued on next page

PARKER BATHROOM ACCESSORIES

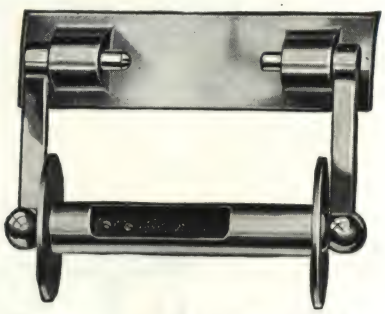
PARKER BATHROOM ACCESSORIES AS PER U. S. GOVERNMENT SPECIFICATIONS NO. 448

Finished in Chromium Plate, Nickel Silver or Nickel Plate

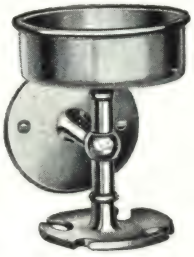
Government No. 10. Hook



Government No. 5. Soap Holder

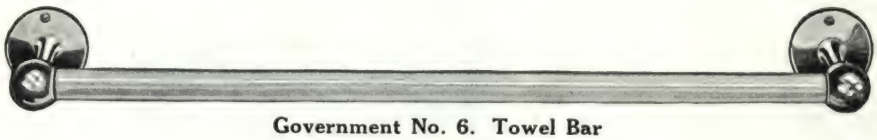


Government No. 9. Paper Holder



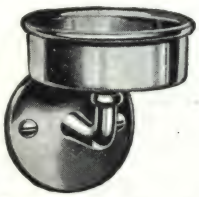
Government No. 2. Tumbler and Toothbrush Holder

Government No. 4. Soap Holder

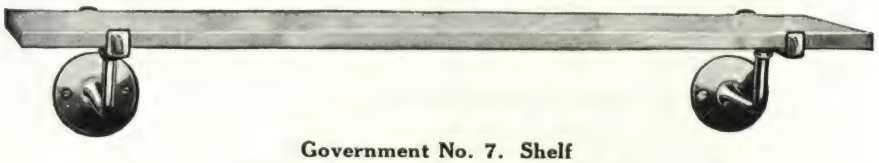


Government No. 6. Towel Bar
Length 24 in., diameter 1 in.

Government No. 1. Soap Holder



Government No. 3. Tumbler Holder



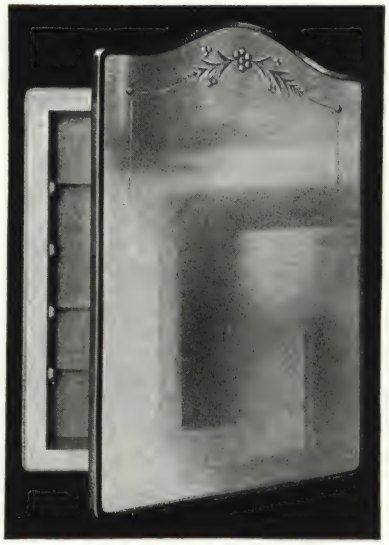
Government No. 7. Shelf
Length 27 in., width 5 in., thickness ½ in.

Continued on next page

UNITED STEEL MEDICINE CABINETS

Manufactured by
UNITED METAL BOX CO., INC.
473-491 President Street, BROOKLYN, N. Y.

For Our Page on Mail Boxes, see Manufacturers' Index

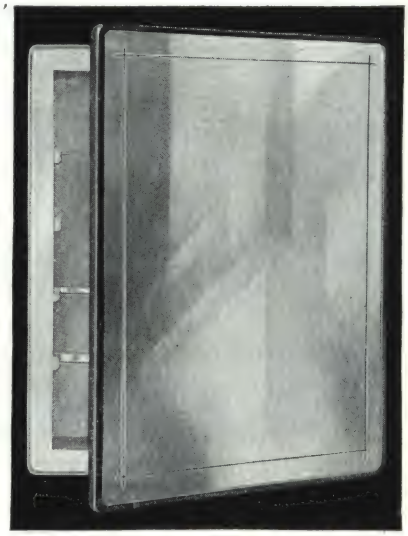


Series 7500

Steel Bathroom Cabinets

The "United" line of steel bathroom cabinets is complete. It ranges from the simple, clean-cut white enamel cabinet to the luxurious Venetian type cabinet. It includes open shelf cabinets, clothes hampers, utility cabinets, and the beautiful 3-wing vanity cabinets.

The Venetian type cabinet has been greatly improved. A one-piece channel frame completely encloses and protects the handsomely engraved mirror. This channel frame is made of cold rolled steel or when chromium plating is desired, of solid brass. The door is removably mounted on the cabinet by ball tip hinges and has a brass link to limit outward swing of the door and an easy working adjustable brass catch.



Series 6500

Series 1500

Constructional Features of All "United" Cabinets

Indestructible—Entire cabinet is made of heavy gauge steel and protected against rusting.

Dustproof Interior—Front of cabinet is made from one piece and the door fits snugly to exclude dust and dampness.

Hinges—The cabinets are made with concealed hinges, and are specially mounted so that the door will not tear loose or sag with rough usage.

Doors—All doors are of built up hollow steel construction specially made for rigidity without excess weight.

Adjustable Shelves—Bulb edge glass shelves are furnished with each cabinet, and are supported by permanent, attached shelf clips.

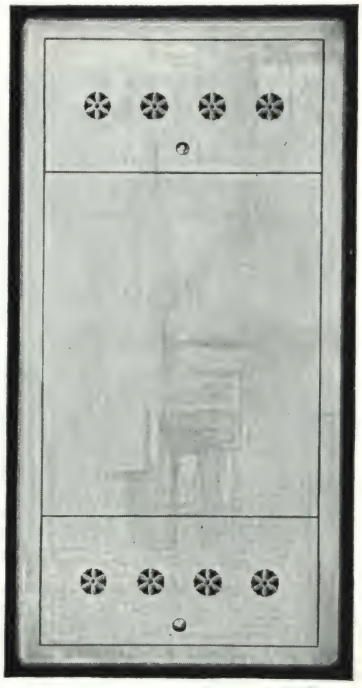
Substantial Door Knob and Catch—Door knob where used is of ornamental glass, and all doors are secured by means of concealed bullet catches.

Best Quality Plate Glass Mirrors—Mirrors are of high grade double plate glass mounted on inside of door and completely encased and protected.

High Grade Enamel Finish—Cabinets are finished in a permanent smooth pyroxylin finish.

Literature

Write for literature on complete line.



Clothes Hamper

CATALOGUE NUMBERS AND DIMENSIONS

Cat. No.	Wall opening, in.	Over all, in.	Mirror, in.	Cat. No.	Wall opening, in	Over all, in.	Mirror, in.
1500	14½x18½	17x21	10x14	7500	14½x18½		17⅛x23 11/16
1500A	14½x18½	17x21	12x16	7501	16½x20½		19⅛x25 11/16
1501	16½x20½	19x23	12x16	7502	19 x25	Venetian	21⅜x29 15/16
1501A	16½x20½	19x23	14x18	7503	16½x22½	Mirror	19⅛x27 11/16
1502A	19 x25	21x27	16x22	6500	14½x18½	Cabinets	17⅛x22
1503	16½x22½	19x25	14x20	6501	16½x20½		19⅛x24
X1601A	16½x22½	19x25	14x14	6502	19 x25		21⅜x28
X1602A	19 x25	21x27	16x16	6503	16½x22½		19⅛x26
X1604A	16½x26½	19x29	14x18	2000	16 x36¼	18¾x38¼	Clothes hamper
				1000	14½x36	17 x38½	Utility cabinet

Cabinets can be furnished for surface mounting.

X—Open shelf type.

STEEL & WIKE COMPANY

Manufacturers of Kleer-Vu Insulated Medicine Cabinets

535 North 13th Street
PHILADELPHIA, PA.

BRANCH OFFICES
NEW YORK, N. Y., 234 Bridge Street, Brooklyn—Telephones, Triangle 2912-5840
CHICAGO, ILL., 224 W. 63rd Street

Product

KLEER-VU INSULATED SANITARY MEDICINE CABINETS.

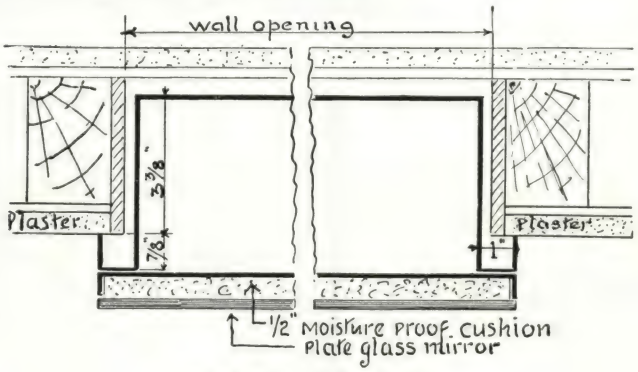
PATENTED KLEER-VU COPYRIGHTED

Reg. U. S. Pat. Office
No. 1682584

Description

Kleer-Vu Insulated Medicine Cabinets derive their name from the fact that they provide full vision over the entire surface of the mirror front, without screws or bolts through the face, and that they are insulated against breakage through normal use.

Each mirror is imposed on an insulating composition which is entirely invisible, and is held in place permanently by small corner plates of brass, plated in chromium and so polished as to be practically non-apparent against the silver background of the mirror.



Detail Plan of Installation

Complete and Sanitary

Kleer-Vu line of cabinets is complete for the reason that for every medicine cabinet there is a wall mirror of identical design, which is specified by simply using the letter M as a prefix to the catalogue number. Because these mirrors are frameless, unusually sanitary in fact and appearance, they are admirably adapted to use in hospital lavatories, nurses' homes, public buildings and sanatoria, as well as residences.

Plate shows construction and means for invisible hanging.

Finish and Hinges

All etchings in matte finish, except 1830E, which is part matte and part high lighted, giving new and particularly beautiful effect. All square top cabinets are reversible for either hand.

Standard hinging for curved top cabinets is at left-hand side. Other hand is special.

Specifications

Body and Door—Patent leveled furniture steel.

Corner Clips—Brass, chromium plated, insulated with rubberized cork.

Door—Insulated with ½-in. moistureproof and shockproof composition.

Shelf Brackets—Adjustable at 1½-in. intervals.

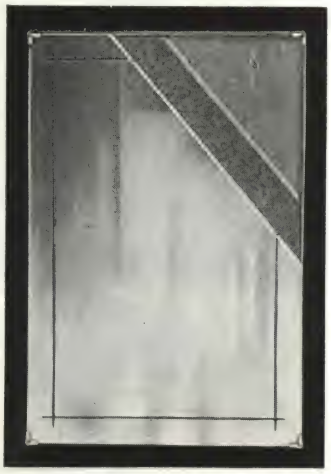
Mirrors—¼-in. polished plate with all edges polished. All mirrors have narrow bevel, except 1830 and 2032 styles, which carry wide bevel.

Shelves—Glass with bulb edge.

Finish — Pyroxylin, with primer baked to insure flexible durable finish, in a smooth satin.

Access Type—Can be furnished for any Kleer-Vu Model. The back is hinged, thus doing away with heavy buck usually employed for this purpose. Screwdriver operation only.

Construction Features—All Kleer-Vu Cabinets are made on the same new principle—all-glass door, all utility being concealed behind the mirror.



Phantom View of Kleer-Vu Door and Mirror Construction
Provision made for hanging square top mirrors horizontally or vertically

Models — Recess model made in all designs illustrated, and indicated in table.

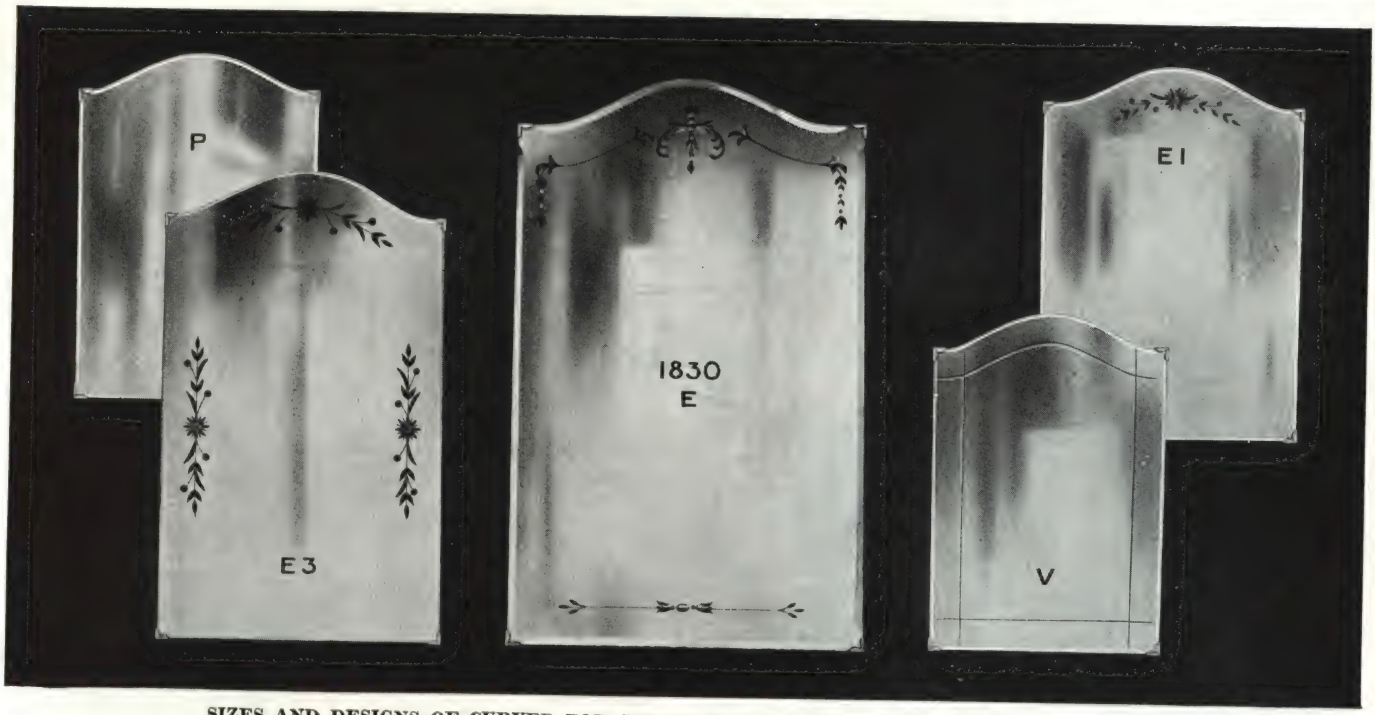
Open shelf model or "D" type has short door as shown.

Hanging wall model or "H" type used where recessing is not practical.

Note: All cabinets furnished with nickeled screws and cup washers for erection and packed in individual cartons. The 1830 and 2032 sizes are equipped with special door stop, finished in chromium.

Triplicate Mirror
Cabinets with triplicate mirrors can be furnished in any Kleer-Vu design center mirror, same as medicine cabinet sizes, with 10-in. wings

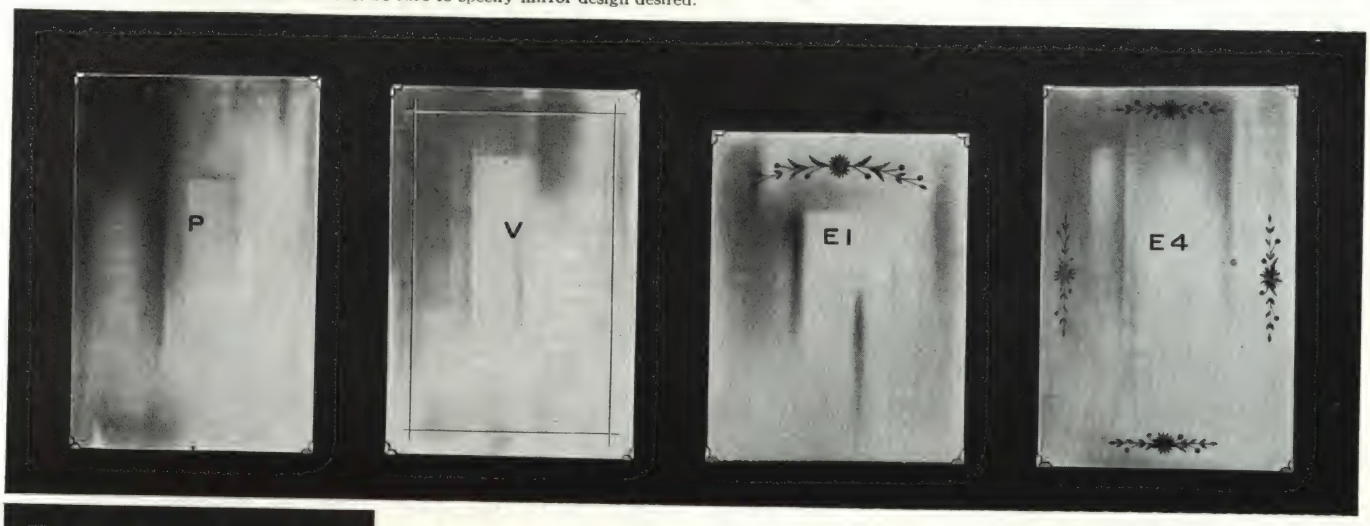
Continued on next page

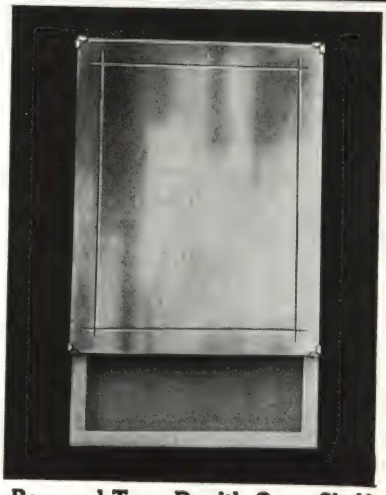


SIZES AND DESIGNS OF CURVED TOP, RECESSED TYPE, KLEER-VU MEDICINE CABINETS AND WALL MIRRORS

Cat. No.	Mirror, in.	Mirror designs				Wall opening required, in.
1420½	14x20½	P	V	E1	.....	12½x16½x3½
1622½	16x22½	P	V	E1	.....	14½x18½x3½
1626½	16x26½	P	V	E1	E3	14½x22½x3½
1830	18x30	P	V	E	.....	15¾x26 x3½
2032	20x32	.....	V	.....	.....	17¾x27½x4¼

After Cat. No. be sure to specify mirror design desired.



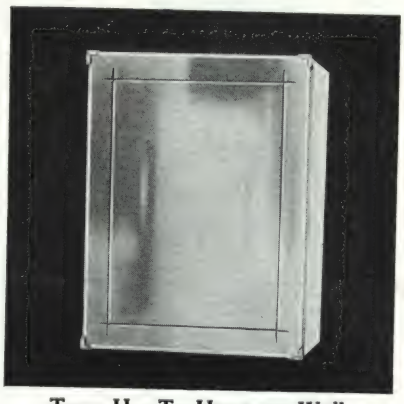


Recessed Type D with Open Shelf

SIZES AND DESIGNS OF SQUARE TOP KLEER-VU MEDICINE CABINETS AND WALL MIRRORS

Cat. No.	Mirror, in.	Mirror designs				Wall opening, in.	Over all, in.
Recessed Type							
1418	14x18	P	V	E1	E4	12½x16½x3½	
1620	16x20	P	V	E1	E4	14½x18½x3½	
1624	16x24	P	V	E1	E4	14½x22½x3½	
1827½	18x27½	P	V	E1	E	15¾x26 x3½	
2024	20x24	P	V	E1	....	18½x22½x3½	
Recessed Type D with Open Shelf							
D1418	14x18	P	V	E1	E4	12½x22½x3½	14x24
D1620	16x20	P	V	E1	E4	14½x24½x3½	16x26
D1624	16x24	P	V	E1	E4	14½x28½x3½	16x30
Type H—To Hang on Wall							
H1418	14x18	P	V	E1	E4		14x18x4½
H1620	16x20	P	V	E1	E4		16x20x4½

After Cat. No. be sure to specify mirror design desired.



Type H—To Hang on Wall

WELDED PRODUCTS CORPORATION

SUCCESSORS TO ECONOMY ELECTRICAL MFG. CO.

Designers and Manufacturers of "Welco" Steel Cabinets, "Electro-Kabinets," Wall Mirrors and Featured Fixtures

TELEPHONE
BENTON 8072

16th-17th on Cleveland Avenue
KANSAS CITY, MO.
REPRESENTATIVES IN THE PRINCIPAL CITIES

Products

"ELECTRO-KABINETS"; "WELCO" STEEL CABINETS.

Also "Welco" Radiator Enclosures, Recessed Wall Hampers, "Seco" Incinerators, Arched Steel Shower and Toilet Partitions and Steel Furnishings. Welco Welders (our make and marketed nationally) are used in manufacturing the cabinets in our factory.

Welco
TRADE-MARK

"Electro-Kabinets," Recessed

A finer service—desirable for homes, apartments, hotels, offices, etc.—as this modern cabinet includes lighting fixtures. Assures correct lighting for mirror and saves building expense installing fixtures and outlets.

Special Features—Two light fixtures, switch (for lights only), and convenience plug all wired and serviced from only one outlet box located at bottom center of buck. Chromium plated brass fixtures standard of our design and manufacture.

"Electro-Kabinets" bear Underwriters' and Union labels.

Construction— Electrically welded cabinet, 18 gauge furniture steel. One-piece door and front; positive door stop. Mirrors: finest French plate glass—plain and polished bevel with "cushion" packing. Shelves: bulbed edge glass, and vitrolite. Finish: "Durotex" durable, high gloss; discolor, stain and craze tested.

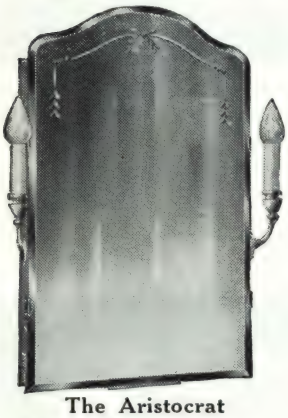
Standard finish: white. Colors quoted.

(Welco Cabinets and "Electro-Kabinets" also furnished with chromium frames.)

Venetian models furnished with etching, plain, modernistic motifs, with curved and square tops.

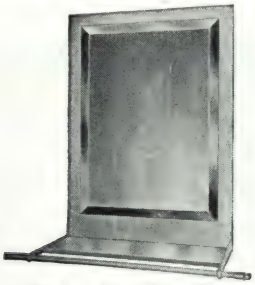
Models can be furnished with bathroom accessories: towel shelf, strop hook, razor blade slot, bottle opener, etc.

Metal bucks with hinges supplied with cabinets for access to pipe shaft.

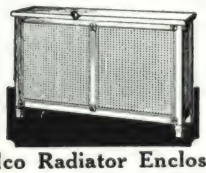


The Aristocrat

Model A "Electro-Kabinet"



Welco Combination



Welco Radiator Enclosures
(Custom built.) Also Shields

Welco Medicine Cabinets, Recessed

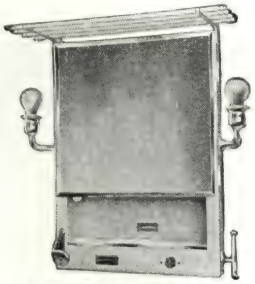
Welco Recessed Cabinets have construction features described above, but are without the electrical fixtures and wiring. Ideal where lighting fixtures are already installed.

Welco Combination Model is a wall mirror with shelf bracket. Concealed hangers.

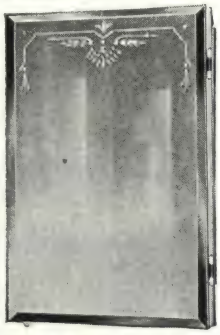
Service

Blue prints furnished. Attached with four wall screws. For "Electro-Kabinets" only three wires (labeled) to connect. Shipped promptly in tested wood boxes. Trade discounts and quantity prices upon application. Special cabinets a specialty. Write for catalogue—please mention style preferred.

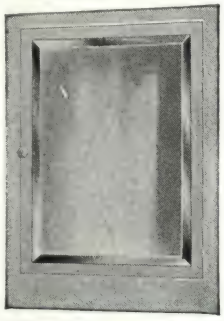
The Baroness



Hotel DeLuxe Model



The Belleclaire



Welco Model N

DIMENSIONS AND PRICE LISTS

Model	Mirror size, in.	Over-all dimension, in.	Wall opening required, in.	Wall recess, in.	Approximate shipping weight, lb.	List prices: Plain mirror	List prices: Bevel mirror
Electro-Kabinets							
Aristocrat	16 x26	16 x26	14x18¾	2⅝	52	.....	$38.00
Aristocrat	18 x28	18 x28	16x20¾	2⅝	57	.....	45.00
Regent	16 x26	16 x26	14x18¾	2⅝	52	.....	38.00
Regent	18 x28	18 x28	16x20¾	2⅝	57	.....	45.00
A-1	12 x16	15⅜x21¾	14x18¾	2⅝	38	$23.70	24.50
A-2	14 x18	17⅜x23¾	16x20¾	2⅝	44	25.00	26.00
B-1	12 x12	15⅜x21¾	14x18¾	2⅝	37	23.25	24.00
B-2	14 x14	17⅜x23¾	16x20¾	2⅝	42	24.25	25.00
C-1	12 x12	15⅜x21¾	14x18¾	2⅝	28	23.75	24.50
C-2	14 x14	17⅜x23¾	16x20¾	2⅝	30	24.25	25.00
*Hotel Standard	14 x14	17⅜x23¾	16x20¾	2⅝	45	24.50	25.60
*Hotel DeLuxe	14 x15	15⅜x21¾	14x18¾	2⅝	38	.....	25.10
*Hotel DeLuxe	16 x17	17⅜x23¾	16x20¾	2⅝	45	.....	27.20
Claremore	14 x14	17⅜x23¾	16x20¾	2⅝	43	.....	26.10
Welco Medicine Cabinets							
Belleclaire	16 x22	16 x22	14x18¾	3⅝	33	.....	18.00
Belleclaire	18 x28	18 x28	16x20¾	3⅝	40	.....	22.00
Astor	16 x22	16 x22	14x18¾	3⅝	33	.....	18.00
Astor	18 x24	18 x24	16x20¾	3⅝	40	.....	22.00
Mayfair	16 x26	16 x26	14x18¾	3⅝	43	.....	23.00
Mayfair	18 x28	18 x28	16x20¾	3⅝	46	.....	28.00
N-1	12 x16	15⅜x21¾	14x18¾	3⅝	20	11.75	12.55
N-2	14 x18	17⅜x23¾	16x20¾	3⅝	24	12.50	13.50
R-1	12 x12	15⅜x21¾	14x18¾	3⅝	19	11.50	12.25
R-2	14 x14	17⅜x23¾	16x20¾	3⅝	23	12.00	12.75
Chase	14 x15	15⅜x21¾	14x18¾	3⅝	20	.....	13.35
Chase	16 x17	17⅜x23¾	16x20¾	3⅝	24	.....	14.95
Baroness	17½x28	31x28x17½	16x20¾	3⅝	70	.....	50.00
Diana	17¼x28	31x28x17¼	16x20¾	3⅝	70	.....	50.00
Wall Mirrors							
Combination	14 x18	15⅜x21¾	.....	.....	15	9.90	10.80
W-1026V	16 x26	16 x26	.....	.....	15	.....	18.50
W-1028V	18 x28	18 x28	.....	.....	15	.....	22.00
W-2022V	16 x22	16 x22	.....	.....	15	.....	14.00
W-2024V	18 x24	18 x24	.....	.....	15	.....	18.00
W-3031V	31x28x17¼	31x28x17¼	.....	.....	15	.....	40.00

Accessories Extra Net

Towel shelf, $2.25. Combination towel and strop hook, 75¢. Razor blade drop, 30¢. Bottle opener, 50¢. Hinged metal buck, $1.00. Black vitrolite shelf, 50¢. White vitrolite shelf, 35¢.
*White vitrolite shelf furnished. Chromium plated accessories except towel shelf.

"WHITE-STEEL" SANITARY FURNITURE CO.

Originators, Designers and Pioneer Manufacturers of Enameled Steel Bathroom and Medicine Cabinets, Mirrors and Toilet Fittings

GRAND RAPIDS, MICH.

NEW YORK, N. Y., HARRY PARKER, 10 East 43rd Street
Telephone, Vanderbilt 2745
DETROIT, MICH., R. B. RICHARDSON, 2557 Union Trust Building
Telephone, Randolph 2994
PHILADELPHIA, PA., E. P. DOYLE, 20 So. 15th Street
Telephone, Rittenhouse 5289, 5290
CLEVELAND, OHIO, F. E. WARNKE, 5005 Euclid Avenue
Telephone, Henderson 8175

BRANCHES IN ALL LARGE CITIES

Quality

For more than a quarter of a century, "White-Steel" Bath and Boudoir Cabinets have been conscientiously built for quality—not price.

The highest possible standards have been maintained in design, materials, fabrication and finish and to satisfy every taste, "White-Steel" Cabinets are made in a wide range of models, sizes and colors.

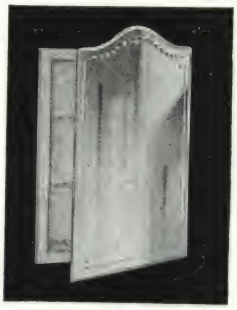
This triple mirror creation comes in two styles, with curve or square top mirrors and adapts equally well for tub, vanity and medicine cabinet use.

Specifications below.

"WHITE-STEEL" REGISTERED

No. 103-SW

Style	No.	Center mirror, in.	Side mirrors, in.	Over-all size, in.			Hole in wall, in.			Glass shelves
				Width	Height	Depth	Width	Height	Depth	
Curved top	101-SW	16x24	8x22	33¼	24	5	13½	19½	3¾	2
	102-SW	16x28	8x26	33¼	28	5	13½	23½	3¾	3
	103-SW	20x30	10x26	41¼	30	5	17½	23½	3¾	3
Square top	201-SW	16x24	8x22	33¼	24	5	13½	19½	3¾	2
	202-SW	16x28	8x26	33¼	28	5	13½	23½	3¾	3
	203-SW	20x30	10x26	41¼	30	5	17½	23½	3¾	3



Nos. 101, 102, 103

No.	Mirror size, in.	Hole in wall, size, in.			Glass shelves
		Width	Height	Depth	
101	16x24	13½	19½	3¾	2
102	16x28	13½	23½	3¾	3
103	20x30	17½	23½	3¾	3
201	16x24	13½	19½	3¾	2
202	16x28	13½	23½	3¾	3
203	20x30	17½	23½	3¾	3

Note: All series Nos. 101 and 201 including triple mirror cabinets can also be supplied with ½-in. wide solid brass, chromium plate frame around mirrors. For cabinets with frame add letter "C" to style numbers.

Mirrors when closed completely conceal cabinet body.

Models F have enameled finish door frames.

Models FC have solid brass, chromium plate door frames.

Full door models that conceal cabinet body and give appearance of mirrors when closed.

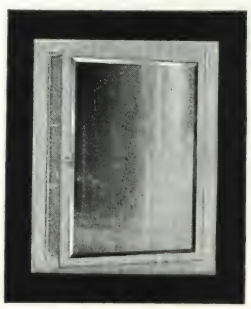
Nos. 201, 202, 203

Nos. 10-F, 1014-F, 20-F, 30-F

No.	Mirror size, in.	Over-all size, in.		Hole in wall size, in.			Glass shelves
		Width	Height	Width	Height	Depth	
10-F and 10-FC	14x20	15⅜	21⅜	13½	19½	3¾	2
1014-F and 1014-FC	14x24	15⅜	25⅜	13½	23½	3¾	3
20-F and 20-FC	18x24	19⅜	25⅜	17½	23½	3¾	3
30-F and 30-FC	24x30	24⅝	30⅝	22¾	28¾	3¾	4

Nos. 10-FC, 1014-FC, 20-FC, 30-FC

No.	Mirror size, in.	Over-all size, in.		Hole in wall size, in.			Glass shelves
		Wdth.	Ht.	Wdth.	Ht.	Dpth.	
10	12x18	15⅜	21⅜	13½	19½	3¾	2
1014	12x22	15⅜	25⅜	13½	23½	3¾	3
20	16x22	20½	26½	17½	23½	3¾	2
2024	16x26	20½	30½	17½	27½	3¾	3
30	20x26	25¾	31¾	22¾	28¾	3¾	3
1012½	12x12	15⅜	21⅜	13½	19½	3¾	2
14	12x16	15⅜	25⅜	13½	23½	3¾	2
2022½	16x16	20½	26½	17½	23½	3¾	2
3032½	20x20	25¾	31¾	22¾	28¾	3¾	2



Nos. 10, 1014, 20, 2024, 30

CORNER CABINETS (TO FIT IN CORNER)

No.	Mirror size, in.	Wall space each way from apex, in.	Over-all size, in.		Entire depth, face to corner, in	Shelves
			Wdth.	Ht.		
10-CC	12x18	12¾	15⅜	21½	9	2
20-CC	16x22	16	20½	26⅝	11¼	2
30-CC	20x26	19⅞	25¾	31⅞	14	3

Nos. 10CC, 20CC, 30CC

Nos. 1012½, 14, 2022½, 3032½

A. P. W. PAPER COMPANY

Manufacturer of Onliwon* Interfolded Toilet Paper and Paper Towels

ALBANY, N. Y.

BRANCH OFFICES

ATLANTA, GA., 161 Spring Street, N. W.
BOSTON, MASS., 79 Milk Street
BUFFALO, N. Y., Ellicott Square
CHICAGO, ILL., 9 So. Clinton Street
CLEVELAND, OHIO, 1847 Union Trust Building
CINCINNATI, OHIO, Kemper Lane and McMillan Street
DALLAS, TEX., 811 Santa Fe Building
DENVER, COLO., Box 2483
DES MOINES, IOWA, 329 51st Street
DETROIT, MICH., Box 1478
HARRISBURG, PA., Box 264
INDIANAPOLIS, IND., Box 1223
KANSAS CITY, MO., 303 Minor Building
LOS ANGELES, CALIF., Pacific Finance Building
LOUISVILLE, KY., 1102 Starks Building
NEW HAVEN, CONN., Box 28
NEW ORLEANS, LA., E. C. PALMER CO., 515 Lafayette Street
NEW YORK, N. Y., 23 E. 26th Street
PHILADELPHIA, PA., 1201 Chestnut Street
PITTSBURGH, PA., 1536 Oliver Building
ST. LOUIS, MO., Box 743
ST. PAUL, MINN., 1492 Holton Avenue
SAN FRANCISCO, CALIF., 1011 Balboa Building
SPRINGFIELD, MASS., 234 Chestnut Street
SYRACUSE, N. Y., 224 Union Building
TOLEDO, OHIO, Box 175
WASHINGTON, D. C., 1st and H Streets, S. E.

Code 606
Gunmetal

Code 611
White Enamel

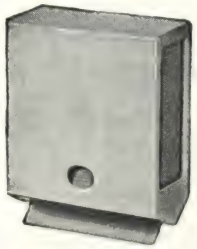
Code 622
Chromium Finish

Metal Surface Type Cabinet

Especially desirable for buildings having public lavatories. Will not rust or tarnish.

Has lock and key. Indicator tells when to refill. Adjustable to space formerly occupied by roll or other fixture.

Dimensions: 5½ in. wide, 8 in. high, 2¾ in. deep. Capacity: 1250 sheets of Onliwon Toilet Tissue



Code 615
Without Door

Code 616
With Door

Porcelain Surface Type Cabinet

Suitable for use in hotels and private residences. Made from solid piece of porcelain. Opening for filling on right side.

Dimensions: 5¾ in. wide, 6¾ in. high, 3 in. deep. Capacity: 1250 sheets of Onliwon Toilet Tissue.

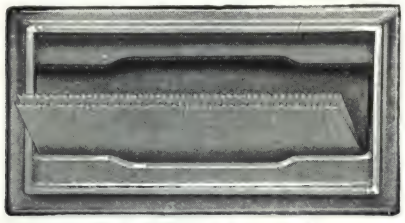
Code 616 carries chromium plated door with Corbin lock

Code 617

Porcelain Surface Type Cabinet (Sloping Type)

Adapted for use in hotels and private residences. Sloping top adds to appearance of fixture and prevents placing of cigars or cigarettes. Made from solid piece of porcelain. Opening for filling on right side. Available with or without chromium plated door and Corbin lock.

Dimensions: 5⅝ in. wide, 7⅝ in. high, 3 in. deep. Capacity: 1250 sheets of Onliwon Toilet Tissue



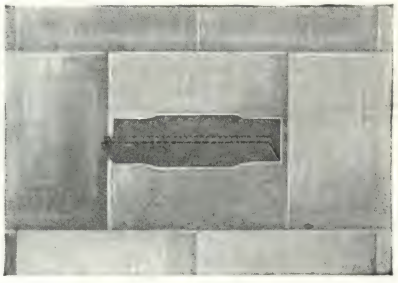
Code 623 and Code 624

Porcelain Recess Type Cabinet with Flange

This cabinet is cast in a single piece of porcelain Replaces 3x6-in. standard tile. Can be used with wall finished in either plaster or tile. Available in colors to match the tile. American Encaustic Tile Company flange.

Code 623—2⅝ in. deep. Capacity, 250 sheets Onliwon Toilet Tissue.

Code 624—2⅞ in. deep. Capacity, 500 sheets Onliwon Toilet Tissue



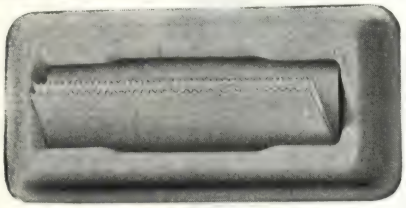
Code 621 and Code 627

Porcelain Recess Type Cabinet

One-piece porcelain. Designed to place in recess with face flush with surface of wall.

Code 621—for standard 6x6-in. tile. Recess required: 5¾ in. wide, 2⅝ in. high, 3⅜ in. deep. Capacity: 500 sheets Onliwon Toilet Tissue.

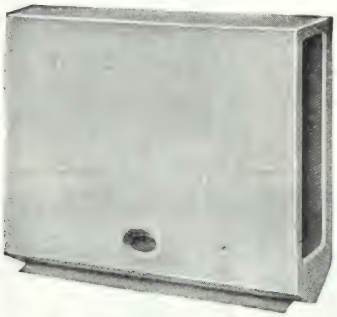
Code 627—for standard 3x6-in. tile. Recess required: 5¾ in. wide, 2¾ in. high, 3⅜ in. deep. Capacity: 500 sheets Onliwon Toilet Tissue



Code 629

Enameled Recess Type Cabinet

Heavily enameled cast iron Indestructible. Manufactured by American Enameled Products Co. Available in colors to match tile. Replaces standard 3x6-in. tile. Is 1¾ in. deep. Capacity: 250 sheets of Onliwon Toilet Tissue



Code 659 Without Door
Code 660 With Chromium Plated Door and Corbin Lock

Porcelain Surface Type Towel Cabinet

Designed for use in public lavatories finished in white tile or marble, especially in fine hotels, department stores and theatres.

One-piece porcelain with opening for filling on right-hand side. Bullseye signals for refilling. Fastenings furnished for any type of wall. Accommodates towels 11¼x14¾ in.

Dimensions: 12¾ in. wide, 10½ in. high, 4 in. deep.

Capacity: 150 Onliwon Paper Towels

*Reg. U. S. Pat. Off.

Demand

A.P.W.

TRADE MARK REGISTERED IN U.S. PATENT OFFICE

Hygienic

Towels and Toilet Tissues

World's Oldest and Largest Manufacturer of Interfolded Products

Code 651 White Enamel
Code 652 Gunmetal

Metal Surface Type Towel Cabinet

For hotels, railroad stations, department stores, and buildings having public lavatories. Carries lock and key. Bullseye signals when supply of towels is needed. Accommodates towels 11¼x14¾ in.

Dimensions: 12 in. wide, 13 in. high, 3⅛ in. deep.

Capacity: 150 Onliwon Paper Towels

Code 653, White Enamel. *Code 654*, Gunmetal. They accommodate towels 9x14¾ in. Especially recommended for schools.

Dimensions: 9¾ in. wide, 13 in. high, 3⅛ in. deep.

Capacity: 150 Onliwon Paper Towels

MAID-EN-WHITE

Porcelain Enamel Finished Cast Iron Bathroom Fixtures

MADE BY

THE AUTOYRE COMPANY

(AUTO-WIRE)

OAKVILLE, CONN.

NEW YORK OFFICE AND SHOWROOMS, 300 Madison Avenue

A Complete Line in Two Types

Maid-En-White Porcelain Enameled Bathroom Fixtures are furnished in two types—*Semi-inset Type* for building into the wall during construction and *Attached Type* to be screwed to the finished wall.

A more than sufficient variety of colors is carried in stock to completely equip any bathroom.

Both the Main-En-White Porcelain Enameled Semi-inset and the Attached Bathroom Fixtures are made of a special process gray cast iron covered with a snow-white or colored genuine porcelain enamel that is fused into the iron under intense heat in the same manner as for the better grade bathtubs and kitchen sinks.

Advantages of Maid-En-White Fixtures

They are unbreakable—of importance to contractor and owner alike. The reason is the special gray iron base, giving great strength with light weight. It is covered with genuine porcelain enamel that gives it a glass-hard, smooth, non-porous, surface.

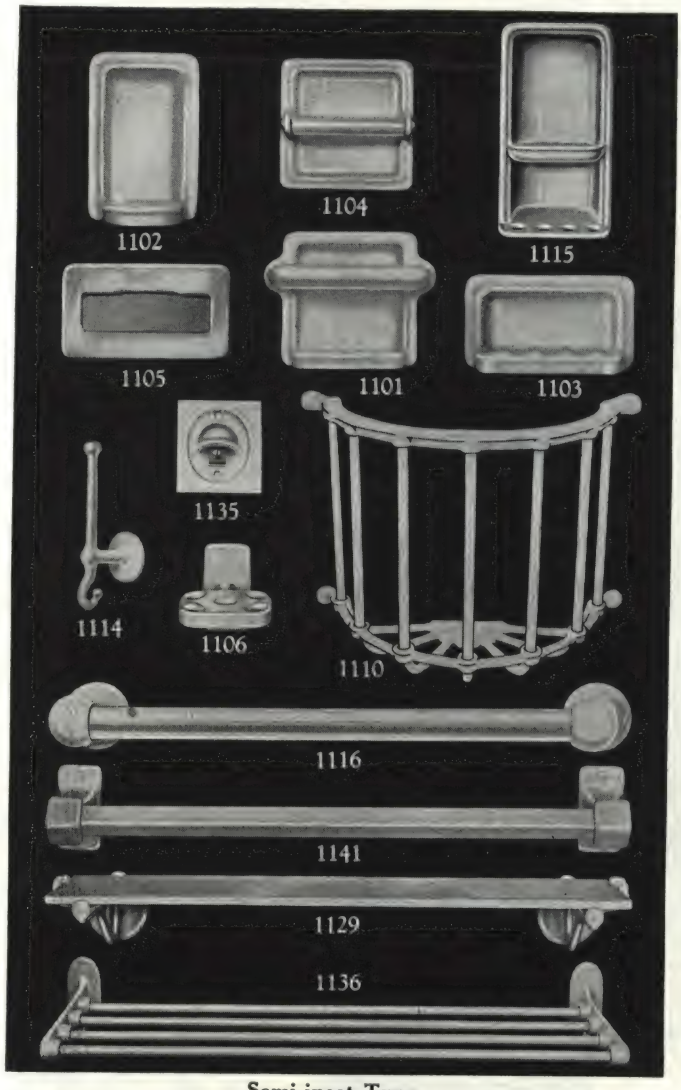
Installation

Semi-inset Type—Semi-inset Fixtures are easily and quickly set. Their overlapping flanges eliminate rubbing of joints with tile and add to their attractiveness.

Attached Type—Attached Fixtures are easily and quickly attached by means of screws furnished with each fixture, together with a special cap, colored to match, which fits into the recess over the screw after the fixture is in place. This attractive cap eliminates unsightly screwheads.

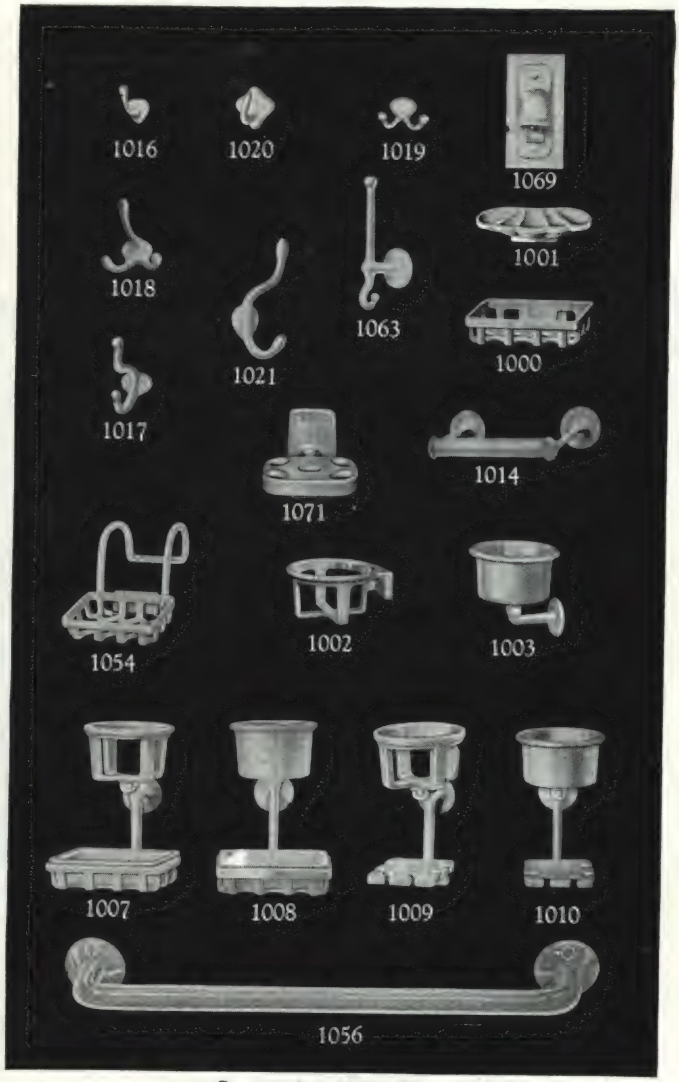
Specifications

When writing specifications, mention our trade-name "Maid-En-White" as manufactured by THE AUTOYRE COMPANY, Oakville, Conn., and include a list of the fixtures desired, stating whether Semi-inset or Attached Type and giving the catalogue numbers.



Semi-inset Type

Note: Items Nos. 1116, 1141, 1129, 1136 are made in 18, 24 and 30-in. lengths. These items and Nos. 1110 and 1135 may also be had in the Screw Attached Type



Screw Attached Type

EQUIPMENT & SUPPLY COMPANY, INC.

Sole Distributors of Jantzen Towel Stands and Cabinets

51 Madison Avenue, NEW YORK, N. Y.

For our pages on Adjustable Steel Paneldor see Manufacturers' Index

Products

"JANTZEN" TOWEL STANDS and CABINETS. (Patent No. 1697654. Other patents pending.)

Also Hine Bookstack System and Steel Furniture for banks and public buildings.

Advantages of "Jantzen" Towel Stands and Cabinets

"Jantzen" Stands and Cabinets have all the combined advantages of other towel-dispensing fixtures without any disadvantages. They are designed for all-inclusive interchangeable service in dispensing the various sizes and makes of folded paper towels, so that the owner is not confined to the purchase of one make of towel, as is the case with cabinets furnished by the towel makers.

"Jantzen" fixtures are equipped with adjustable interior fittings by which all makes of interfold paper towels may be dispensed with equal convenience. This feature provides complete interchangeable service, as any number of different types of folded towels may be inserted and dispensed in successive order by merely regulating the adjustable fittings.

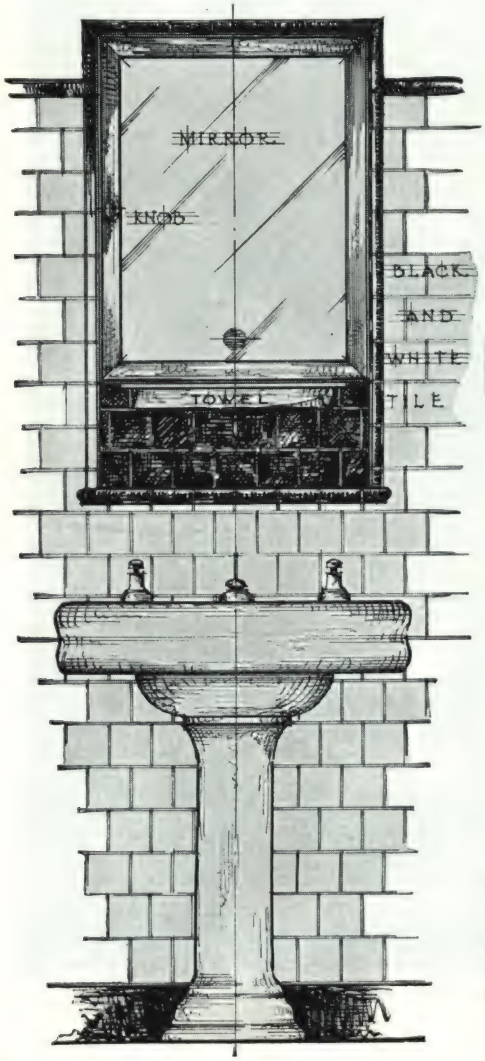
Specifications of Construction

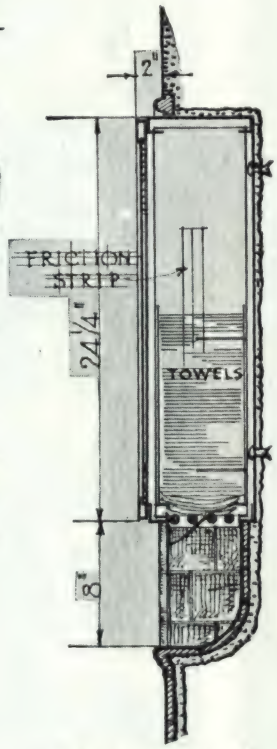
All stands and cabinets embody the highest grade of material and workmanship throughout. Built of heavy gauge steel, reinforced to insure rigid construction; finished in any color of baked enamel; hardware and binding strip around vanity shelf; plate glass mirror; black and gold marbleized or steel top and base.

The stands, as distinguished from the cabinets, are complete units consisting of a mirror, vanity shelf, and a compartment for waste towels—all combined in a single unit. The size of a single unit stand, wall or double faced, is: 20 in. wide, 13 in. deep, and 72 in. high.

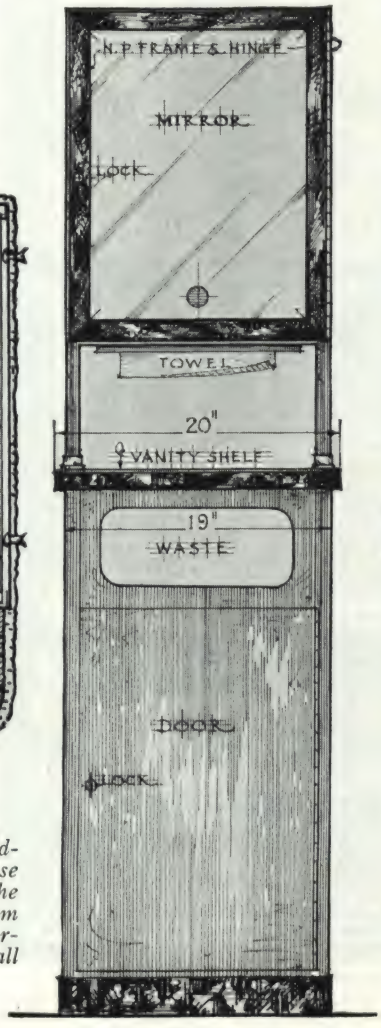
The cabinets, considered as single units, consist of the mirror cabinet with adjustable towel container but without compartment for waste towels. All "Jantzen" Cabinets are identical in every detail and provide the same service, whether attached to the surface of the wall or recessed.

The size is 20 in. wide, 7 in deep, and 24 in. high in over-all dimensions.

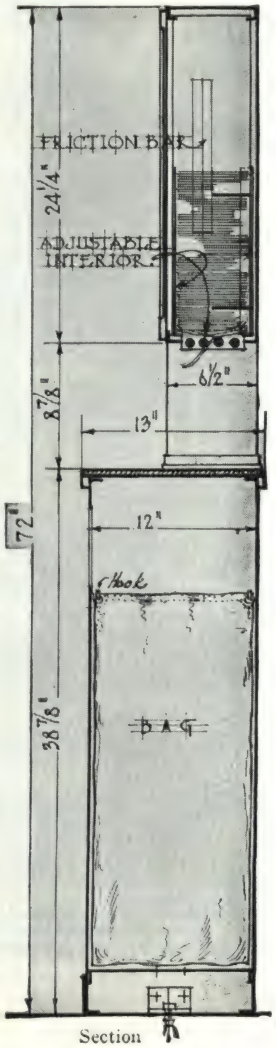




The universal adjustment feature of these cabinets assures the owner absolute freedom in the selection and purchase of towels at all times.



Front



Section

MORGAN PAPER COMPANY DIV.

UNITED STATES ENVELOPE CO.

LITITZ, PA.

BRANCH OFFICES

NEW YORK, N. Y., 339 Broadway
BOSTON, MASS., 159 Summer Street
CHICAGO, ILL., 222 West Adams Street
PHILADELPHIA, PA., Drexel Building

Products

"UNITY" INTERFOLD TOILET PAPER and CABINET; "MORGANFOLD" INTERFOLD TOILET PAPER and CABINET; "BI-FOLD" INTERFOLD TOILET PAPER and CABINET; "SPRINGFIELD OVAL" TOILET PAPER and FIXTURE; "KING" TOILET PAPER and FIXTURE.

Also, manufacturers of Perforated and Plain Rolls with Fixtures; Package Papers; Japanese Crepe Toilet Papers; "Pyramid Oval"; "Narrow Oval"; "Oval King"; White and Manila Tissues.

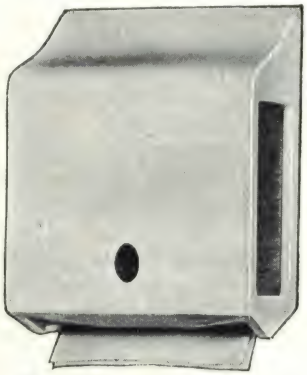
"Unity" Interfold Toilet Paper and Cabinets

Cabinets—Furnished in nickel or chromium plated, or enameled in olive green, white and colored tints to match tile in bathrooms. Made in pressed steel, also vitreous porcelain enamel and porcelain, both recess and projecting type.

Paper—A high grade quality tissue, strong in texture, with the Morgan velvet finish.

Packed 1000 sheets 4½x5 in. to a package, and 100 packages to the carton.

No. 44 Projecting
Economical, convenient, sanitary. For use in office buildings, hotels, factory buildings and institutions. Size, 4¾ in. wide, 6¼ in. high, 3⅛ in. deep. Capacity, 1000 sheets



No. 45 Porcelain Projecting
Beveled top prevents placing cigars or cigarettes on top. For hotels and fine residences. Size, 5⅝ in. wide, 7 in. high, 3⅝ in. deep. Capacity, 1000 sheets

"Unity" Interfold Cabinets

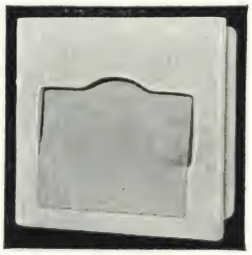
"Morganfold" Interfold Toilet Paper and Cabinets

Cabinet—Furnished in nickelplated, olive green and white porcelain, both recess and projecting type.

Paper—The usual "Morgan Standard" quality of tissue is available, and will be maintained in this form of toilet tissue.

Packed 500 sheets 4½x9 in. to package, 100 packages to carton.

No. 49 Metal Projecting
For office buildings, hotels, factory buildings and institutions. Size, 4⅛ in. wide, 5¾ in. high, 3 in. deep. Capacity, 1000 sheets



No. 50 Porcelain Recess
Adapted to modern tile construction in hotels and fine residences. Size, 6 in. wide, 6 in. high, 3 in. deep. Capacity, 500 sheets

No. 51 Porcelain Projecting
Adapted to modern tile construction in hotels and fine residences. Size, 6 in. wide, 6 in. high, 3 in. deep. Capacity, 1000 sheets

Three Types of "Morganfold" Cabinets

"Bi-Fold" Interfold Toilet Paper and Cabinets

Cabinets—Furnished in nickelplated, olive green and white enamel, white porcelain, and chromium.

There is a type to meet every situation in office buildings, public places, factories, and the finest residence where the box type may be selected.

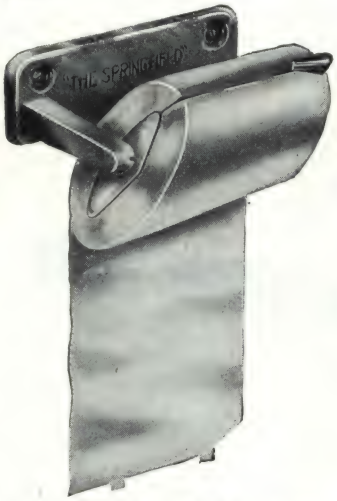
Paper—The "Morgan Standard" quality of tissue for use in the "Bi-Fold" cabinet is available. Size of sheets, 4½x5½ in., 5x5½ in., also 4x5½.

No. 59 "Bi-Fold" Projecting Cabinet
Size, 5 in. wide, 7 in. high, 2½ in. deep. Capacity, 1000 sheets

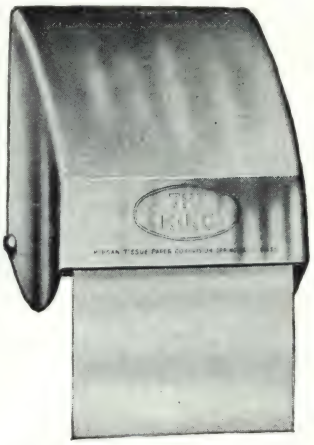
"Springfield Oval" Toilet Paper and Fixture

Fixture—Made of pressed steel. A most satisfactory device for economical, convenient and sanitary distribution of toilet paper. The single sheet delivery insures against waste.

Paper—Manufactured especially for use on this fixture. A very high grade toilet tissue. Offered in several grades to meet varying trade demands. Insist on genuine "Springfield Oval" paper.



No. 42½ "Springfield Oval" Fixture
For office buildings, hotels, factories and institutions



No. 48½ "King" Fixture
Made of heavy pressed steel. For use in railroads, office buildings, hotels, factories and public institutions

"King" Toilet Paper and Fixture

Fixture—An automatic lock fixture which cannot be opened until supply of paper has been used. Distributes one sheet at a time, preventing waste.

Package of Paper—The package consists of sheets attached to each other. By removing one, another falls into position, being exposed nearly its entire length. Tissues used in the "King" are manufactured especially for this fixture and are offered in several grades.

Service to Architects, Engineers, Builders and Owners

Upon request, we will be pleased to confer and co-operate with architects, engineers, contractors and owners regarding the equipment of buildings with our products.

PALMER PRODUCTS, INC.

Manufacturers of Toilet Paper and Paper Towel Fixtures

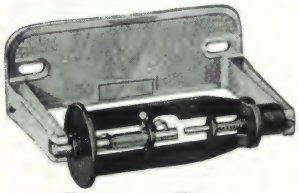
MAIN OFFICES, FACTORY AND LABORATORIES
WAUKESHA, WIS.
(Adjacent to Milwaukee)

For our page on Liquid Soap Dispensers, see Manufacturers' Index

MULTI-SERVICE TOILET PAPER AND PAPER TOWEL FIXTURES

Nearly a million of these fixtures are in operation in plants, like Studebaker Corporation, several General Motors units, Pennsylvania R. R. Co., Union Pacific R. R. Co., State, county and city institutions, schools, hospitals, hotels, office buildings, Y.M.C.A.'s, etc., in all parts of the world.

Economy Toilet and Towel Fixtures



Economy Fixture

Provide a regulated, waste-eliminating service, with *standard roll toilet paper and paper towels*—equally as economical as the most efficient cabinet type of equipment—*at about half the cost.*

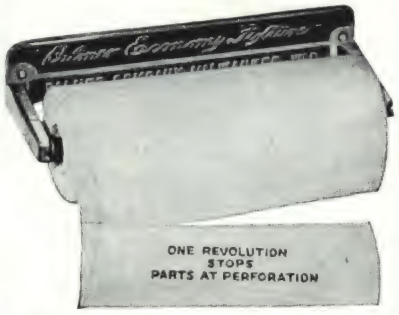
These fixtures are substantially built of gray iron, heavily nickel-plated, assembled as one complete unit (no loose spindle) and are equipped with a spring tension, operating much like a roller shade. The roll of paper revolves to a stop, paper parts at perforation and roll returns to original position for next operation—delivering one or two sheets at a time.

Advantages—*Self-locking* and *foolproof*—roll cannot be removed, or fixture opened, until roll is used up.

Neat and *attractive* in appearance—it harmonizes with all modern lavatory equipment.

Guaranteed satisfaction—fixture is guaranteed indefinitely against defective material or poor workmanship; spring is guaranteed for the lifetime of fixture.

Saves 25 to 50% in paper consumption—compared with ordinary roll fixtures or cabinet tissues.

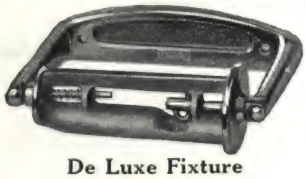


Economy Fixture with Towels

Uses standard roll paper—obtainable in highly competitive market, generally at about 50% less than folded tissue or towels.

De Luxe Toilet Fixture

Supplies the same economical, regulated, waste-eliminating service as the Economy fixture, with standard roll toilet tissue, but operates by means of a counterweight in place of a tension spring—the spindle being off balance and returning the roll of paper to original position after delivering one or two sheets.



De Luxe Fixture

This fixture is plain and designed in good taste, for exclusive hotels, apartment houses and hotels, theaters, clubs and other buildings, where a plain unlettered fixture of exclusive design is preferred.

This De Luxe fixture *is made of brass*—durably plated in nickel or crodon (chromium) finish.

It is also one complete assembly (no loose spindle)—is self-locking, theftproof and foolproof; and functions no matter which way the paper roll is attached.

No-Waste Toilet and Towel Fixtures

These are lower priced fixtures, but also furnish a regulated, waste-eliminating delivery with standard roll toilet paper and towels.

The No-Waste Fixture functions in the same manner as the De Luxe, by means of the spindle being off center and operating as a counterweight; but the spindle is a detachable unit. Fixture is self-locking, theftproof and foolproof—made of gray iron—heavily nickelplated, attractive and ornamental in design.

We also make fixture for oval toilet tissue.

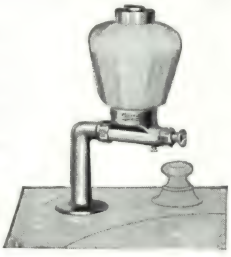
No Waste Fixture

MULTI-SERVICE LIQUID SOAP DISPENSING EQUIPMENT

Refer to our other page (see Manufacturers' Index) for more complete descriptions and information regarding the Palmer line of individual soap dispensers and soap tank equipment.

The *quickly replaceable bowl feature* is particularly desirable. It makes it unnecessary to remove the bracket from the wall or lavatory, or send the broken parts into the factory for replacement of broken glass bowls; and yet the bowls when attached are as permanently in place as though cemented into the bracket.

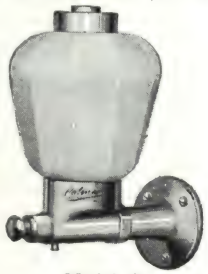
The *replaceable valve unit* is a further exclusive and individual feature—and is obtainable only in the Palmer Dispenser. It is not necessary to remove the bracket from the wall or lavatory, in order to replace the valve at any time that it becomes worn or is otherwise out of service. The valve unit may be removed and sent to the factory for repair, or may be replaced with a new unit without any inconvenience.



Model G
Lavatory Bracket

Palmer Soap Valves for soap tank systems have become recognized as highly dependable and satisfactory in operation; and are standard equipment with large organizations, like the Western Electric Company, B. F. Goodrich Rubber Company, and others.

We also manufacture soap powder dispensers.



Model A
Standard Wall Bracket

NORTHERN PAPER MILLS

Manufacturers of Bathroom and Lavatory Equipment

Home Office:
GREEN BAY, WIS.

Branch Offices
Resident representatives in principal cities

Products

NORTHERN FOLDED TOWEL CABINETS
NORFOLD TOWEL CABINETS
NORTHERN CABINET TISSUE FIXTURES
NORFOLD AND NORTHERN FOLDED TOWELS
NORTHERN INTERFOLDED CABINET TISSUE
NORTHERN BLEACHED CABINET TISSUE
HOMETOWL CABINETS FOR PERSONAL TOWEL SERVICE

Norfold Towel Cabinet

The Norfold cabinet gives the finest towel service. The compact cabinet 13″x10″x3½″ protrudes only 3½″ from the wall with no sacrifice of capacity.

The drawn steel cabinet is finished in heavy, baked-on Vitreous enamel, chrome plate or gunmetal green. The great strength of the drawn steel gives a durable cabinet with a firm, non-chipping finish. Rounded corners give added beauty and prevent injury to anyone brushing against the dispenser.

The Norfold pressed steel cabinet comes in white enamel or gunmetal green. Pressed steel dispensers are less expensive.

Both cabinets work on the same principle. Simple, positive, gravity feed eliminates troublesome wheels, levers and springs. Slots on each side indicate when to refill.

Northern Folded Towel Cabinet

Dimensions of this cabinet are 14½x7½x6¼. It is made of heavy gauge pressed steel. The deep stamped corrugation gives it great strength and long life. Comes in heavy baked enamel finished either in white or gunmetal green. Holds standard folded towels.

The cabinet is a strong simple box. There are no wheels, levers or springs to get out of order. Slots in each end indicate when to refill.

The entire front of the cabinet swings out so refilling is a simple matter of one motion.

The cabinet feeds only one towel at a time, effecting a real economy. A simple, strong lock keeps towel supply under lock and key.

Every Northern towel and tissue cabinet comes equipped with screws for mounting. Slots in the back permit adjustment of screws to fit any standard arrangement of holes.

All the metal towel and tissue cabinets, except the Hometowl fixture, come equipped with a strong, simple lock and keys. Hometowl cabinet has no lock.

Both towel and tissue sheets are interfolded. The withdrawal of one sheet leads the front edge of the next one out of the cabinet ready for service.

Northern Cabinet Tissue Dispensers

The compact Vitreolite Northern Cabinet Tissue fixture measures only 3x4⅞x5⅞ inches. Made of drawn steel, it has great strength and durability. It is made with a baked vitreous enamel finish or a non-tarnishing chrome plate. These unusually hard finishes resist scratching and stains and may be easily cleaned with a damp cloth.

Visible feed through the side slots makes it easy to see when paper supply is low. The cabinet is easily refilled when wholly or partly empty. The entire front drops forward when unlocked and cabinet takes a complete package of 1000 sheets while there are still 200 sheets unused.

The pressed steel cabinet operating on the same principle is made in the square design. It is finished in gunmetal green or white enamel.

Paper for Northern Cabinet Tissue fixtures is silky smooth in finish. Each package contains 1000 sheets 4½x4½ cut 500 sheets 4½x9. They are dispensed fully extended from the cabinet.

Porcelain Dispensers

In addition to the metal cabinets, porcelain dispensers can be supplied in both recess (built in) and projecting types. Both measure 6x6 inches across the front. They occupy the wall space of two standard tile. The recess type requires a wall opening 3 inches deep. The projecting type extends 3 inches from the wall. It attaches to the surface of the wall by two screws.

These dispensers are made entirely of porcelain — built of one piece construction with a heavy glazed finish. They contain no working parts to get out of order. Paper is inserted through the front opening and is dispensed one sheet at a time.

Northern Hometowl Cabinet

The Northern Hometowl cabinet is unique in the towel field. It is designed for a personal towel service in private executive offices and washrooms.

This compact easily mounted cabinet measures only 10⅞x5⅞x2¼ inches. It fills from the top and dispenses from the front. It has no mechanical parts. Five colors are supplied to match colored walls and equipment — Jade Green, Prussian Blue, Canary Yellow, English Red, and White.

CHICAGO HARDWARE FOUNDRY CO.

ELECTRICAL DIVISION
EXECUTIVE OFFICE AND FACTORY
NORTH CHICAGO, ILL.
Representatives in Principal Cities of United States and Canada

LOCAL REPRESENTATIVE

Sani-Dri

Products

SANI-DRI, New "SF" Model, a fast electrical drier for hands and face.

SANI-DRI, the Modern Hair Drier, for swimming pools and shower rooms.

Also Beauti-Air, a new electrical drier (hair, hands, face) for the home or apartment bathroom. Special folder on request.

The Company

The CHICAGO HARDWARE FOUNDRY CO. is a $3,000,000 organization with plants covering more than 20 acres. It is headed by men of high integrity and position, and its reputation for quality products has been built on forty-three years of successful, honorable merchandising.

Guarantee

All Sani-Dri and Beauti-Air units are unconditionally guaranteed for a period of one year from date of purchase. If by any chance a defect should develop in any part during that period, that part will be replaced without charge, formality or delay.

Service and Sales

Branch offices are maintained in all principal cities of United States and Canada. The sales and service organization is combined under one representative head in each district and proper service is assured at all times. The name of your nearest district representative will be furnished promptly on request, if not stamped above.

Underwriters' Laboratory Approval

All Sani-Dri units have been thoroughly tested and listed as standard.

Sani-Dri Installations

Are in many prominent office buildings, schools, parks, theatres and large industrial plants from coast to coast and the manufacturer will gladly forward names of near-by users upon request.

THE NEW "SF" SANI-DRI—TWO MODELS

Features

"Dries Quicker Than a Towel"—The new "SF" Sani-Dri operates instantly and the element heats at once; has greater speed and broader increased air flow, which quickly evaporates all moisture, leaving the skin soft, smooth and "chap-free."

Quieter Operation—Mechanical vibration has been eliminated by a perfected lighter weight, finely balanced aluminum fan, and the use of rubber insulation on motor mounting.

New "All-position" Swivel Nozzle—This feature adds many new advantages for the user. New nozzle has a pleasing shape and generous size which was designed to accommodate the increased air flow. It has a finish of clean, genuine porcelain enamel inside and out.

Convenient Drying for All—The convenient swivel nozzle, together with new drier height, allows the small child or tallest adult to dry comfortably while standing in a natural position. No stooping or stretching.

Face and Neck Drying—Is now just as convenient as drying the hands, because the nozzle swings easily to any angle—not just up or down.

No distasteful force of air into the eyes or nostrils when drying face. The nozzle is shaped to direct air force under chin, where air spreads V-like, to dry both sides of face.

Pedestal Model "SF" Sani-Dri

Handsome in its gleaming white genuine porcelain enamel. Right in height, fast and thorough in service. Foot-pedal operated. Easily installed; uses little current. (Wall model "SF" Sani-Dri is pictured on following page)

Protects User from Water—This nozzle shape was scientifically designed to prevent blowing of water on the user. Cannot spatter user's eyeglasses.

Protects Wall—Front position of the nozzle prevents water being blown on walls or mirrors.

Clean Top Always—The position of the nozzle eliminates the possibility of water dropping on top of drier.

Has Smooth Flat Top—On which the user can place purse, compact or package within sight.

Conserves Space in the Washroom—The two new models provide an excellent choice for any size room. New height and shape of the pedestal model frequently permits installation between washbowls. New wall type may be attached to wall when clear floor space is desired.

For positioning suggestions see "SF" and "SFW" details on second page following.

Protected Heating Element—The Sani-Dri element is so positioned that it is fully protected from water or injury. It, of course, is placed close to the point of drying to provide the proper amount of heat without excess current.

Nozzle Screen—Is placed at the inner end of the nozzle instead of the outer, thus eliminating the possibility of accumulating dirt inside the nozzle. Screen also deters mischief.

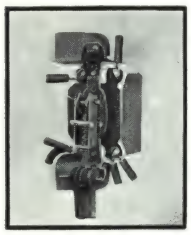
Continued on next page

Sani-Dri Mechanical Efficiency and Long-life Construction

These are factors easily discernible in the new "SF" Sani-Dri. Every part from outer case to internal mechanism has been tested and proven right for its purpose. The new "SF" Sani-Dri is built for permanent sanitation, for continuous use and lasting satisfaction. The best proof is in the quality of its details.

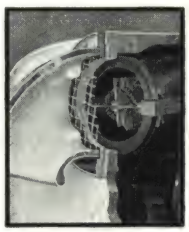
Entire Outer Covering of Sani-Dri—Is of genuine porcelain enamel over the highest quality heavy gray cast iron. It will last as long as the washbowls—even the building itself.

Motor—A 1/6 hp. Westinghouse Universal type, specially designed and specially built for years of constant use. It is operated at approximately half capacity—a factor which will certainly extend the long life of the motor.



Switch

Switch — Is a double capacity, Underwriters' approved, snap type toggle switch which has been tested to a *million makes and breaks.* Two springs and a castillated nut protect the switch against undue tension or mischief.



Heating Element
Showing protecting screen and scientific position of the long-life heating element

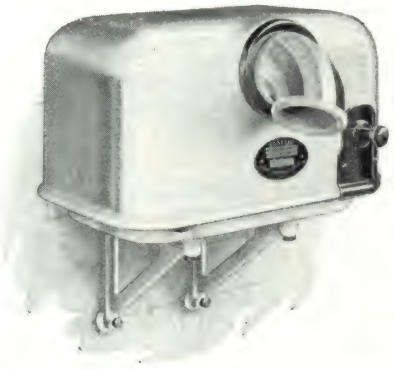
The Fan—Is a scientifically designed, multi-blade twin fan of hard rolled, non-rusting aluminum. Lighter, faster and greater capacity, giving a doubled air flow.

Heating Element—Was specially designed and tested to the equal of four years of use. A simple, inexpensive emergency fuse protects it against excess voltage variance.

Ward Leonard Resistor—Long-life type. Controls speed of motor and maintains a proper balance of heat and air for speedy drying.

Foot Pedal and Nozzle Ring—Are of solid brass, richly plated and rustproof. Note pictured resting knob under pedal; an added protection so that pedal cannot be snapped off.

Foot Pedal



Wall Model "SFW" Sani-Dri

In genuine porcelain enamel and has all the features of the "SF" model, excepting that instead of foot-pedal control, the "SFW" has a fool-proof, internal spring push button and automatic cut-off. Easily attached to walls and very desirable in rooms where clear floor space is wanted. Porcelain enameled wall brackets are provided. Costs little to operate. (Pedestal model pictured on preceding page.)

Sanitation, Service and Economy

The New "SF" Sani-Dri provides a faster, better service for the washroom. Not only dries faster, but dries more thoroughly, the natural way, by evaporation. Prevents chapping and leaves the skin soft and smooth.

Eliminates constant filling of towel boxes; reduces janitor expense. Banishes unsanitary soiled towels and the litter of paper baskets; reduces fire hazard. Improves washroom appearance and provides permanent sanitation.

Gives a continuous "always there" service. Costs little to operate. Saves 60% to 90% of towel bills and quickly pays for itself in savings.

Wiring for Sani-Dri

Sani-Dri is so rapidly becoming the accepted method of efficient, economical drying that wiring for its present or future installation should be provided on all new construction.

For the sake of handier, more efficient service it is advisable, wherever possible, to install driers near same wall as washbowls and facing same direction.

Sani-Dri can be connected at regular outlet, or in the instance of floor outlet, bring service wires up through bottom of pedestal. (For wire recommendation, position suggestions and current consumption, see details on following page.)

For Hair Drying—Install the "SFW" Sani-Dri

For speedy, economical hair drying install the new wall model "SFW" Sani-Dri (pictured above). Because of the greater speed, stronger air flow, new nozzle and other features, this new "SF" Wall Sani Dri has quickly replaced our preceding hair drier in popular demand.

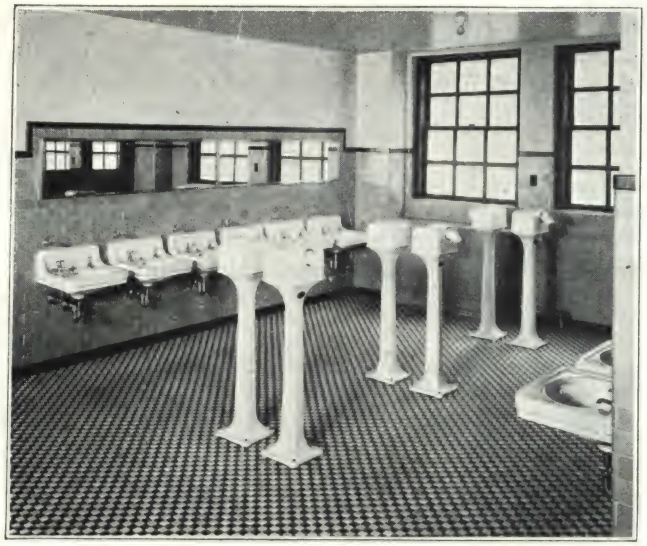
It is a full size, single-unit type drier, created for permanent installation and trouble free, continuous service.

As a hair drier it is easily equal to three outlets of the old-fashioned blower type . . . uses less current, saves towels, time and annoyance . . . and serves more people because it dries faster.

This "SFW" Sani-Dri is the ideal hair drier for high grade swimming pool or shower room use. It has full outer construction of genuine porcelain enamel and a "foolproof" automatic cut-off that times the dry and prevents current wastage. No tubes, no clumsy attachments—nothing to get "out of order."

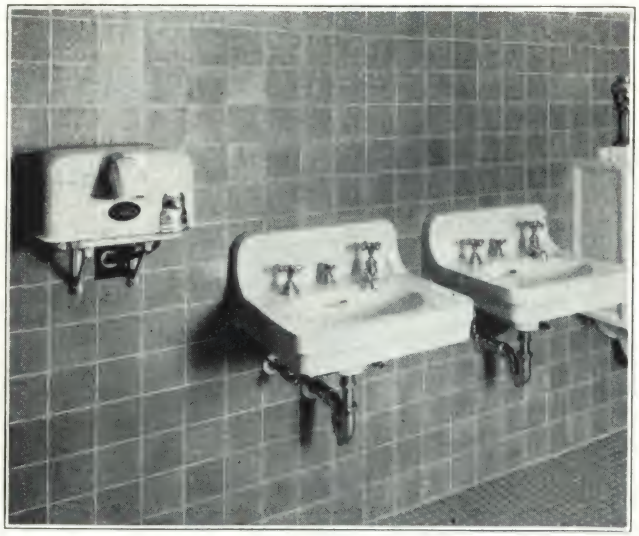
For installation details, see following page. Current consumption, wiring recommendations are the same for all models of the "SF" series.

Continued on next page



Installation of New "SF" Pedestal Model Sani-Dri Sloane Memorial Y. M. C. A., New York, N. Y.

Showing the new "SF" pedestal model Sani-Dri in a larger size room, where washbowls are installed on both walls. (For other positioning suggestions, particularly for smaller washrooms, see details below)

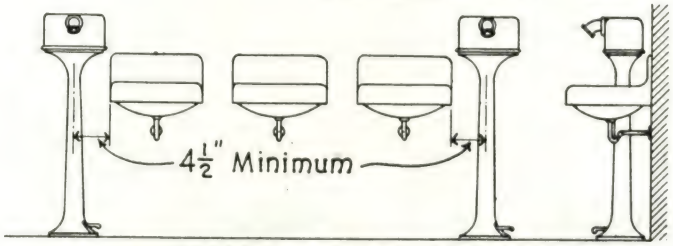


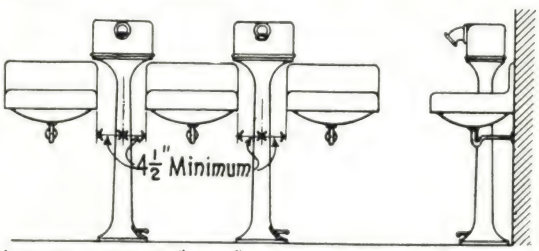
Installation of "SFW" Wall Model Sani-Dri, New Building, Genesee Valley Trust Co., Rochester, N. Y.

A typical installation of "SFW" wall model Sani-Dri in the washrooms of a new building. This model was especially designed for use in rooms where clear floor space is desired. (Installation details below)

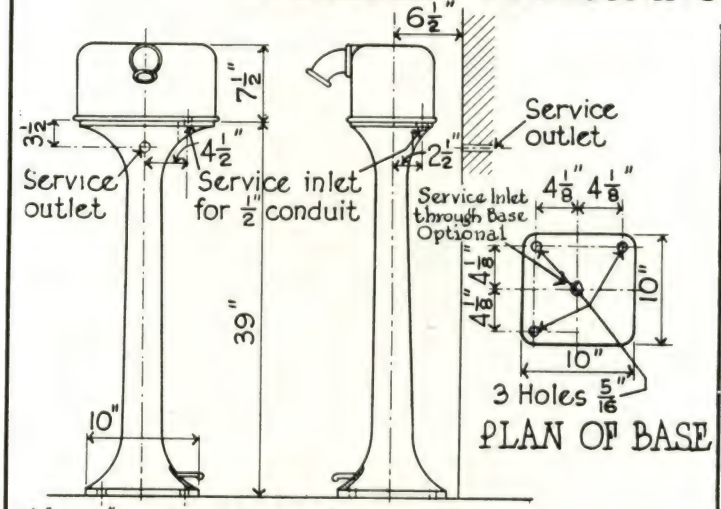
WIRING AND POSITIONING DETAILS

"SF" Sani-Dri Pedestal and Wall Model



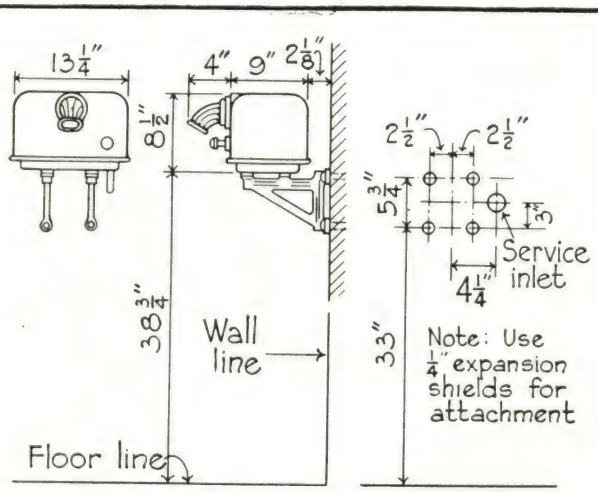


SUGGESTED POSITIONING PLANS FOR "SF" SANI-DRI



PLAN OF BASE

"SF" INSTALLATION DETAIL



WALL MODEL INSTALLATION

TABLE OF RECOMMENDED WIRE SIZES

For 1 machine use No. 14 wire
For 2 machines use No. 12 wire
For 3 machines use No. 8 wire
For 4 machines use No. 6 wire
For 5 machines use No. 6 wire
For 6 machines use No. 4 wire

CURRENT CONSUMPTION OF "SF" (PEDESTAL) AND "SFW" (WALL MODEL) SANI-DRI

Current consumption of heating element..... 12. amp.
Current consumption of motor*..... 1.5 amp.

Total current consumption of "SF" and "SFW" Sani-Dri. 13.5 amp.

*Universal motor—110 volts. May be had in 220 volts also.

ESTABLISHED 1906

BOBRICK MANUFACTURING CORPORATION

Manufacturers of Liquid and Powdered Soap Dispensers

215 Fourth Avenue
NEW YORK, N. Y.

111-117 South Garey Street
LOS ANGELES, CALIF.

Products

Sop-O-Zon Liquid and Powdered Soap Dispensers; Sop-O-Zon Gravity Feed Liquid Soap Systems; Valves, Tanks and all necessary fittings.

Construction

Dispensers furnished in bronze, pressed steel and alloys. Standard finish in nickelplate, highly polished. Genuine Crodon finish for all products from stock.

Write for detailed specifications and catalogue.

Complete Service

Soap dispensers are our main business—not a side line.

Reasons for Specifying Bobrick's Equipment

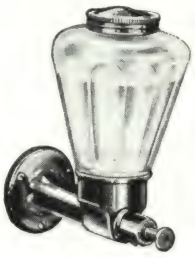
The Company—The most complete line of dispensers obtainable is the result of 24 years of experience and continuous manufacturing.

Patents—Owned and controlled by us. This fact insures your clients against litigation.

Guarantee—All products unreservedly guaranteed to operate to the complete satisfaction of the user.

Stocks—Immediate delivery from New York, Chicago, Los Angeles, and by over 300 distributors in the United States and Canada.

No. 7
Opal, Clear or Metal Globes
Bronze and Nickel Silver



No. 9
Pressed Steel

No. 10
Porcelain-on-Steel
Standard Colors

No. 15
Push-up Type Brass

No. 25
Powdered Soap Dispenser
White Metal

No. 8
Opal, Clear or Metal Globes
Bronze and Nickel Silver

No. 801
Bronze
Obtainable in Art Metal design

No. C862
Factory

No. C860
Wall

No. C863
Shower Bath

Bronze and Nickel Silver Soap Valves

No. C860
Art Metal

No. C868
Long Spout

No. 86-91
High Pressure

No. C866
Pullman Type
Obtainable in Art Metal

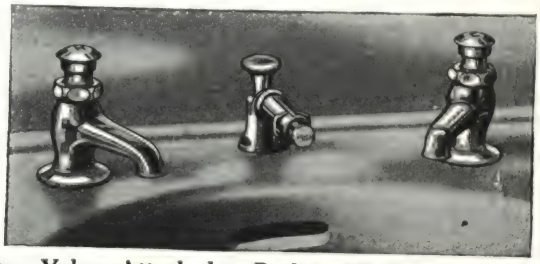
Metal Tank
C920—1 gal.
C901—3 gal.
C902—5 gal.

White Enamel Tank
No. C903—2½ gal.

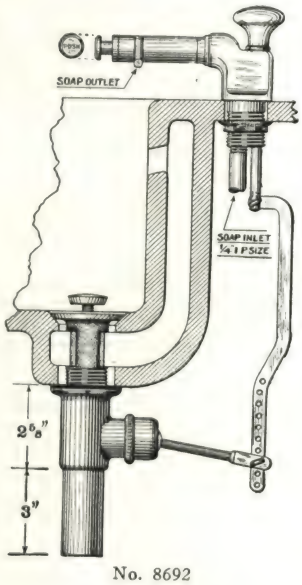
White Enamel Tank
C904—1 gal.
C905—2½ gal.

Vitreous China Tank
No. C814—1 gal.
No. C815—2 gal.
No. C816—5 gal.

No. 8694



Soap Valves Attached to Push and Pull Pop-up Waste



No. 8692

THE GERSON-STEWART CORPORATION

Manufacturers of Liquid Soap Systems and Softasilk Liquid Soap

CLEVELAND, OHIO

Softasilk
TRADE-MARK
(Registered)

Product

SOFTASILK GRAVITY LIQUID SOAP SYSTEM for factories, hotels, clubs, public buildings, schools, hospitals, institutions, etc., with over fifteen years of satisfactory performance.

Advantages of the System

With the perfected valve, the Softasilk Gravity Liquid Soap System has become a necessity in solving the soap problem in washrooms. It is easily installed in old or new buildings at low cost. The liquid soap is fed by gravity from a tank, through a pipe to valves directly over each basin. In new buildings, the pipe is concealed, with only the valve exposed, as shown on the illustration below. The *most important part* of the system is naturally the discharge valve. Particular attention is called to the Softasilk Valve, its sightliness, sturdiness, simplicity in construction, accessibility. The Softasilk Valve is operated by pushing the button which displaces a measured amount of soap. The important feature is that the opening and closing are alternate, and there is, therefore *no point in the travel of the piston at which a continuous flow may be obtained.*

There are only two washers in the valve, neither of which moves, and there is very little wear. The front nut is securely locked, but may be easily removed, and a washer replaced in a few minutes. The Softasilk Valve is beautifully chrome finished.

What It Does

A push of the button delivers a measured amount of liquid soap directly into the palm, eliminating all contact with the dispenser. There is nothing to fool with, and it is easy to operate. It gives 16,200 pushes to each gallon of soap.

What It Saves

The Softasilk Gravity System saves one-third of the soap bill by eliminating waste in using, and waste in filling small individual dispensers; saves breakage of individual glass containers, and the time required to fill and clean same; avoids constant annoyance of replacement of individual containers.

Tanks

The tanks, as shown in the illustration, are made with a view of giving lifelong service, beauty and ease in cleaning. They are welded as one piece, and finished inside and outside in white vitreous enamel. A gauge shows the level of the soap at all times. Stock sizes are 1, 3 and 5 gallons. Special sizes and individual colors to order.

Softasilk System Tank

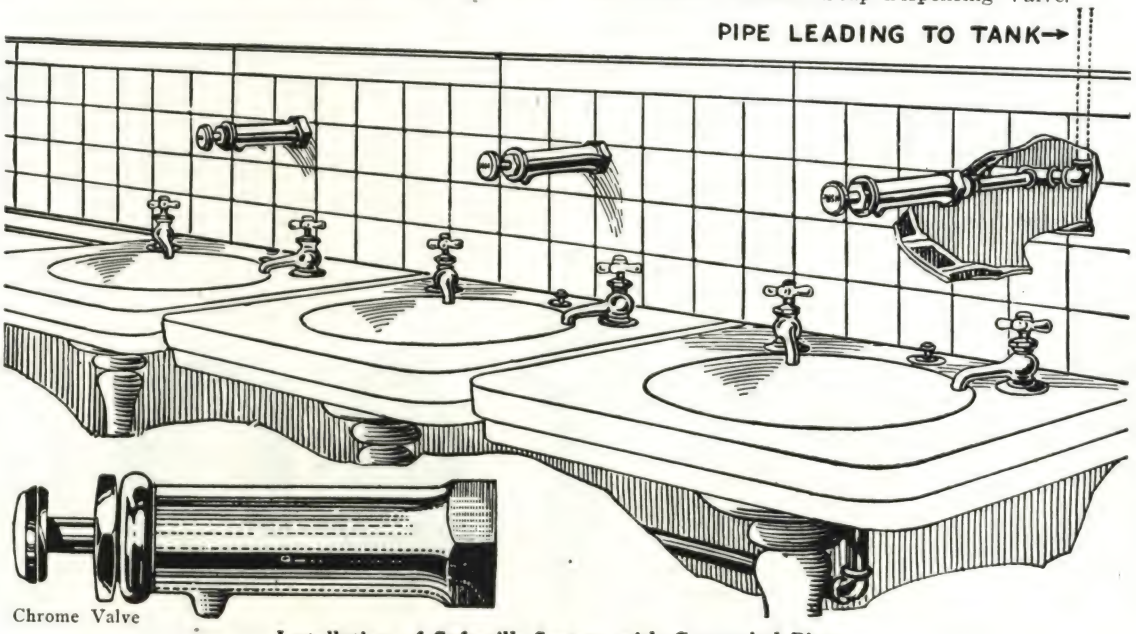
Complete Service and Guarantee

THE GERSON-STEWART CORPORATION supplies valves, piping, fittings, tanks, etc., complete. All carefully finished. By giving us sketch of the equipment to be provided for, we can quickly recommend the proper installation, and quote, advising the best way to install. There is no charge for this service.

The proof of the success of the Softasilk Gravity Valve is our unqualified guarantee of *"After Sales Satisfaction,"* or no cost.

Softasilk Gravity Specifications

Furnish and erect complete a liquid soap system with outlets at every washroom and shower, located as directed. This system shall include vitreous enamel tanks, capacity ½ gallon per fixture. Shut-off cock below each tank; galvanized pipe and fittings as specified for cold water and delivery valves, and shall be the Softasilk Gravity System, as made by THE GERSON-STEWART CORPORATION, Cleveland, Ohio. All piping to be concealed. The lines from the tanks shall be ⅜-in. pipe, with ⅜-in. branches to the dispenser. Tanks are to be placed as shown on the plans. Over each lavatory furnish and install one chrome Softasilk Soap Dispensing Valve.



Installation of Softasilk System with Concealed Pipes
Pipes and tanks may be exposed on wall, or concealed, as conditions warrant

THE IMPERIAL BRASS MFG. CO.

Manufacturers of the Watrous Liquid Soap Specialties

1222 West Harrison Street

CHICAGO, ILL.

Products

WATROUS LIQUID SOAP FIXTURES.

Also, Watrous Duojet Water Closets, Combination Lavatory Fixtures, Lavatory Wastes, Self-closing Faucets.

For Imperial Window Washing Devices, Safety Belts, Builders' Hardware and Watrous Flush Valves, see Manufacturers' Index.

Watrous Individual Liquid Soap Fixtures

These high quality fixtures are regularly specified by leading architects everywhere and are standard on all Pullman cars.

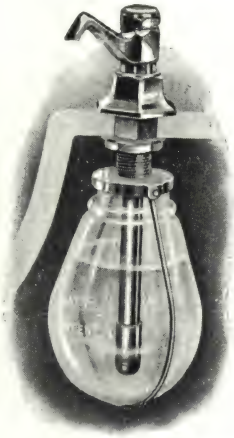
M-815 fixture has a reversible joint in the wall bracket to invert bottle for easy filling. M-801 and M-819 fixtures are for top of lavatories.

All soap fixtures shown are regularly furnished in high grade nickelplate, or in chromium plate or white metal if desired.

The architect's attention is directed to M-819 and M-817 Art Crodon Fixtures. They harmonize perfectly with the new "Art" lines of lavatory fittings by leading manufacturers.

No. M-815. Wall Type Fixture

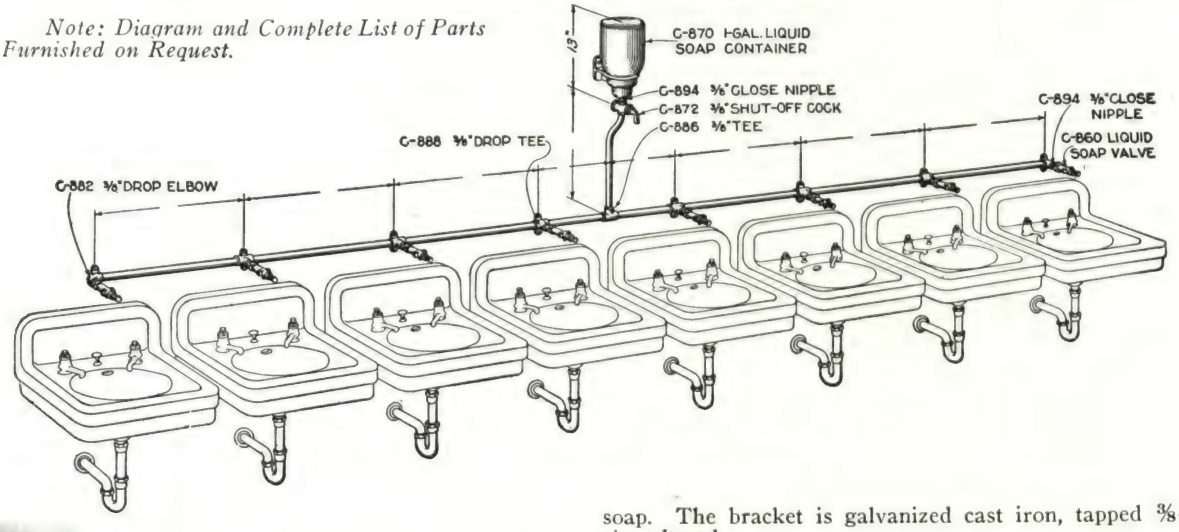
No. M-801. Lavatory Type Fixture

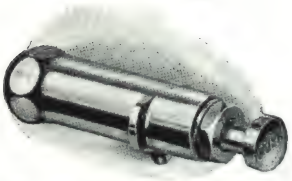


No. M-819. Art Crodon Lavatory Type Fixture

Watrous Gravity Liquid Soap Systems

Note: Diagram and Complete List of Parts Furnished on Request.





No. C-860. Liquid Soap Valve

No. C-860 Liquid Soap Valve—Operated in a horizontal position. Threaded ⅜-in. iron pipe size, to fit one of our standard wall fittings. A push on the button delivers a measured quantity of liquid soap through the spout hole. Made of brass heavily nickel-plated, or chromium plated.

No. C-866

No. C-866 Liquid Soap Valve—Operated in upright vertical position. Provided with shank to fit 1¼-in. faucet hole in lavatory top. Shank is equipped with a ⅜-in. iron pipe coupling nipple and nut for connecting to the piping which can be concealed underneath lavatory. Made of brass heavily nickelplated, or chromium plated. Can be furnished with chain stay for plug.

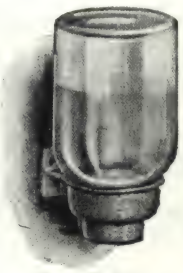
No. C-870 Liquid Soap Container — Has glass container holding 1 gal. liquid soap. The bracket is galvanized cast iron, tapped ⅜-in. iron pipe thread.

No. M-817

No. C-901 Liquid Soap Tank—Made in three sizes, 1, 3 and 5-gal. capacities. Gauge drops when tank is three-quarters empty. Made of black iron with welded seams and aluminum finish. Tapped ⅜-in. iron pipe thread. No. C-920—1 gal.; No. C-901—3 gal.; No. C-902—5 gal.

No. C-903 Liquid Soap Tank—Tank has a 2½-gal. capacity. It is white enameled and equipped with a calibrated gauge, indicating contents in quarts. Made of Russionized iron with welded seams. Tapped ⅜-in. iron pipe.

No. M-824 Liquid Soap Tank—Similar to No. C-903, but made of vitreous china with removable cover.



No. C-870

No. C-901

No. C-903

PALMER PRODUCTS, INC.

Manufacturers of Liquid Soap Dispensers

MAIN OFFICES, FACTORY AND LABORATORIES

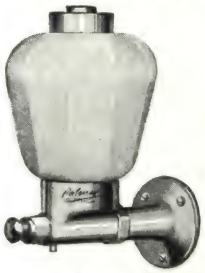
WAUKESHA, WIS.

(Adjacent to Milwaukee)

For our page on Toilet Paper and Paper Towel Fixtures, see Manufacturers' Index

MULTI-SERVICE LIQUID SOAP DISPENSERS

Individual Dispensers



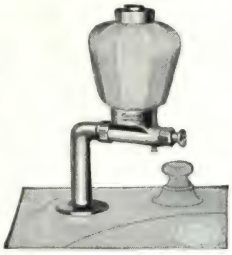
Standard Wall Bracket

These individual dispensers are equipped with a dependable push-in style of valve, guaranteed to give satisfactory service, and built to withstand abuse and hard wear. They will not leak nor clog—nor do they stick. Attractive in design and appearance. Made of strong, metal parts, heavily nickelplated, or *chromium plated* where desired. All parts subjected to hard wear and service are of nickel silver, requiring no plating and retaining original luster indefinitely.

Foolproof—Dispensers are as nearly 100% foolproof as it is possible to make them, substantially built, and designed to discourage tampering or manipulation. Soap receptacle is locked by special key, and valve parts are not removable except with a tool provided for the purpose.

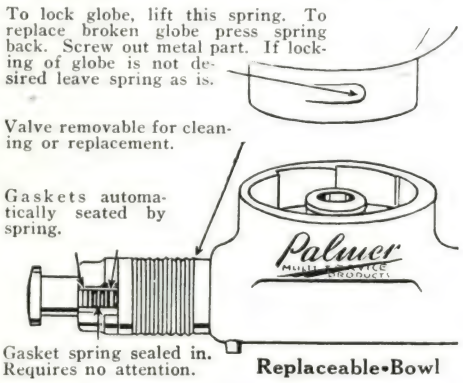
A Style for Every Requirement—Standard wall brackets, extra long wall brackets, forked lavatory brackets to be attached under flange of water faucet, lavatory bracket to be attached in opening of lavatory, concealed screw style for high grade installations, etc.

Write for full descriptive literature.



Lavatory Bracket

Replaceable Bowl Feature—This exclusively Palmer patented feature makes Palmer equipment preferable. Bowls, when attached to brackets, are as permanently in place as though cemented into the bracket; but in case glass becomes broken, it is an easy matter to remove remaining parts from the bracket and install a new glass bowl, obtainable from the factory without the necessity of removing bracket from the wall or sending broken parts to the factory for repair.



Replaceable-Bowl

Valve Units Removable—Another exclusive Palmer improvement is the removable valve unit with which these Palmer Individual Soap Dispensers are equipped. Valve unit may be removed, with special tool provided for the purpose, for repair or cleaning out; and new valve units may be insalled when old valves are worn out, without removing dispenser or bracket from wall, or sending equipment to the factory.

Spring Seated Gasket—Takes the place of ordinary packing material around the plunger rod of the dispenser valve, and the exclusively Palmer design of this spring-seated feature indefinitely guards against leakage at this point: and eliminates the necessity of repacking, unavoidable at intervals in competitive equipment.

Note: We make portable equipment for surgical and other hospital use. Also powder soap dispensers.

MULTI-SERVICE LIQUID SOAP TANK SYSTEMS

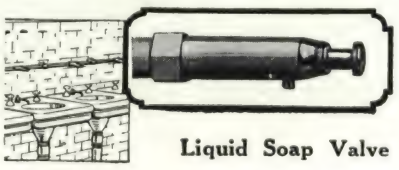
System for Serving Any Number of Washbasins

Opal Glass Tank

Provide a sanitary, dependable, and economical soap service, supplying a fresh, uncontaminated supply of pure liquid soap to each individual user, and serving any number of washbasins from one centrally located container.

Piping may be concealed in walls, while building is under construction; and in such cases galvanized pipe of ⅜-in. iron pipe size should be provided, with a nipple extending out of the wall at each washbasin, placed so as to be half-way between the center and left-hand faucet of the basin; and a further nipple extending out of the wall at the point where the tank is to be attached—usually about 36 in. above the soap valve but, in any case, placed so as to allow for the height of the tank and approximately 18 in. above that for convenient filling. Nickelplated brass ⅜-in. pipe should be used for exposed installations, and such equipment may be permanently attached without defacing walls or plumbing fixtures.

Palmer Liquid Soap Valves—Recognized as *dependable* and have become standard equipment with many nationally known critical buyers, after extensive tests conducted in their own engineering departments. The valves are made up in brass, nickelplated or chromium plated, as desired. They are entirely foolproof, with no gaskets or packing to replace. Exclusive design and knife-edge shuf-off assure positive closing, and valve is guaranteed not to leak nor clog.



Liquid Soap Valve

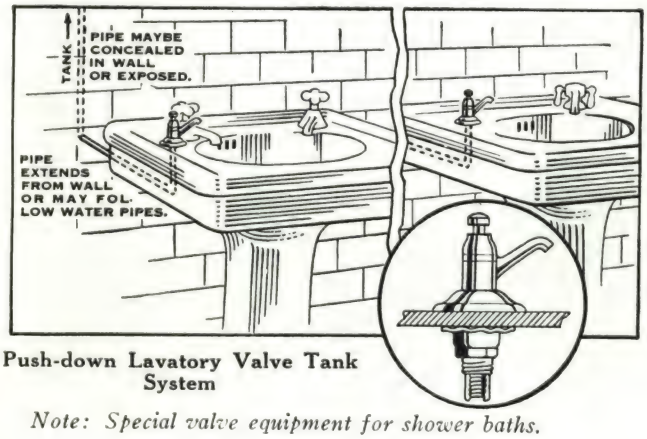
Palmer Liquid Soap Tanks—Available in heavy rust-resisting terne plate, in two sizes and equipped with lifetime gauge. The No. 1 metal tank has a capacity of 3 gal.; the No. 2 metal tank, holds 1 gal.

The No. 3 tank is an ornamental white opalescent glass tank with highly nickelplated or *chromium* brass fittings (illustrated to the right), and also equipped with lifetime gauge. Capacity, 1½ gal.

Metal Tank

Push-down Lavatory Valve Systems

With valves installed in special opening in lavatory, or in left-hand faucet opening where single combination hot and cold water faucets are used. Piping may follow water pipes, or extend out of wall, or installation may be made with exposed nickelplated brass pipe. Ideal for pedestal lavatories placed away from wall. Uses same tanks as system described above; and same valve unit incorporated in individual dispensers described at upper left—the unit which may be replaced without removing entire attachment.



Push-down Lavatory Valve Tank System

Note: Special valve equipment for shower baths.

THE PROCTER & GAMBLE CO.

Ivory Soap Dispensers

CINCINNATI, OHIO

Ivory Soap Dispensers

For public washroom installation only.

The Ivory Soap Dispenser is designed to meet the most exacting requirements of public washroom installations in hotels, office buildings, industrial plants, hospitals, clubs and restaurants. (It is *not* sold for use in residences.)

Construction

All metal parts made of a special aluminum alloy. Original luster easily retained by an occasional rubbing with a dry cloth. Virtually airtight and moistureproof.

Design

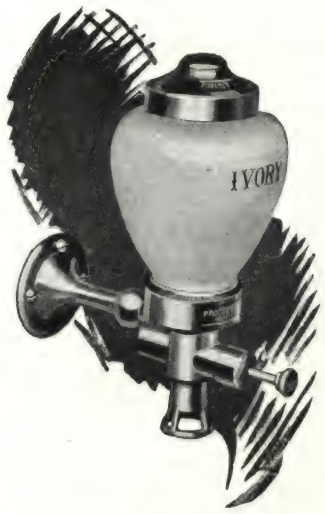
Graceful proportions. (Dimensions indicated on sketch below.) Permanent beauty—will not rust, tarnish or corrode. Shapely bowl of heavy glass holds the flaked soap.

Operation

Dispenser self-contained. Occupies minimum space. Foolproof. Wet hands do not come in contact with discharge orifice, and hence it cannot become clogged. Always delivers.

Installation

Can be fastened to either vertical or horizontal surfaces in a few minutes. Gooseneck bracket supplied at no extra cost for installation on lavatory. See line drawing for methods of installation.



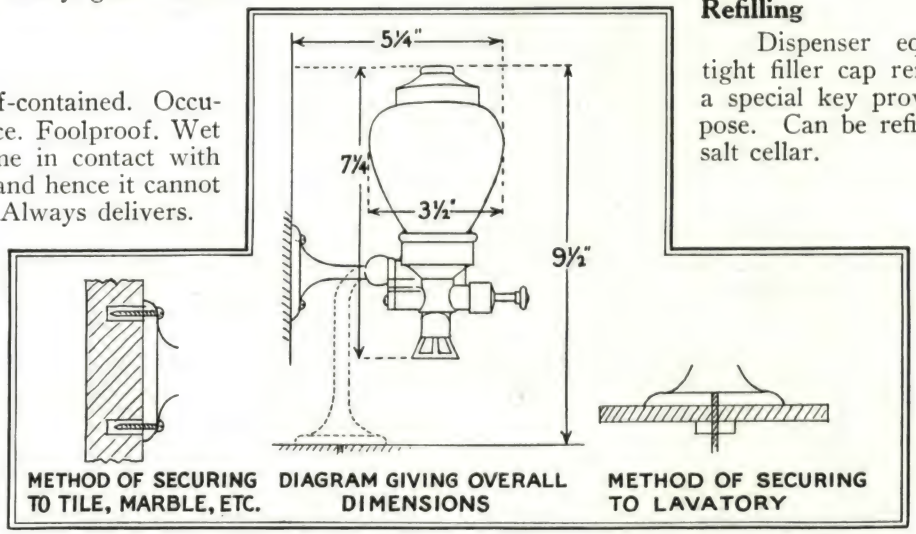
Ivory Soap Dispenser, Standard Wall Type

Economy

Careful tests have shown that use of the Ivory Dispenser assures a reduction of one-third to one-half in soap costs. A single push of the plunger delivers enough flaked Ivory for a generous lather. Dispenser is leakproof—no soap is wasted.

Soap

Ivory Soap in uniformly fine, free flowing flakes is provided for dispenser. Comes in pound boxes with handy metal spout for easy filling of dispenser. Ivory's 99 44/100% purity and its rich lathering and free-rinsing qualities are universally known and appreciated.



METHOD OF SECURING TO TILE, MARBLE, ETC. — DIAGRAM GIVING OVERALL DIMENSIONS — METHOD OF SECURING TO LAVATORY

Refilling

Dispenser equipped with airtight filler cap removable only with a special key provided for the purpose. Can be refilled as easily as a salt cellar.

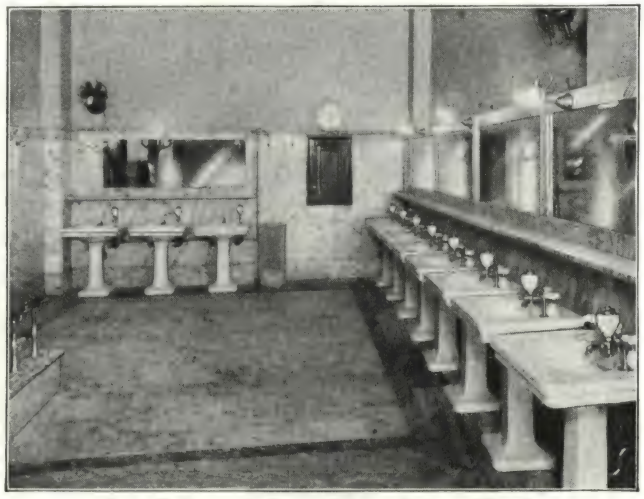
Prices

Special contract prices for large installations mailed upon request.

Patented

Dispenser can be purchased only from PROCTER & GAMBLE.

Wall Installation, Riggs National Bank, Washington, D. C.



Installation on Lavatories, Sinton Hotel, Cincinnati, Ohio

WEST DISINFECTING COMPANY

Manufacturers of Liquid Soap Dispensing Systems

16 Barn Street, LONG ISLAND CITY, N. Y.

BRANCHES AND OFFICES

ALBANY, N. Y. · ATLANTA, GA. · BALTIMORE, MD. · BIRMINGHAM, ALA. · BOSTON, MASS. · BUFFALO, N. Y. · CALGARY, ALTA. · CHICAGO, ILL. · CINCINNATI, OHIO · CLEVELAND, OHIO · COLUMBUS, OHIO · DALLAS, TEX. · DENVER, COLO. · DETROIT, MICH. · INDIANAPOLIS, IND. · KANSAS CITY, MO. · LOS ANGELES, CALIF. · LOUISVILLE, KY. · MILWAUKEE, WIS. · MONTREAL, QUE. · NEWARK, N. J. · NEW HAVEN, CONN. · NEW ORLEANS, LA. · NEW YORK, N. Y. · OMAHA, NEB. · PHILADELPHIA, PA. · PITTSBURGH, PA. · PORTLAND, ORE. · PROVIDENCE, R. I. · RICHMOND, VA. · ROCHESTER, N. Y. · ST. JOHN, N. B. · ST. LOUIS, MO. · ST. PAUL, MINN. · SALT LAKE CITY, UTAH · SAN FRANCISCO, CALIF. · SEATTLE, WASH. · SPRINGFIELD, MASS. · SYRACUSE, N. Y. · TOLEDO, OHIO · TORONTO, ONT. · VANCOUVER, B. C. · WASHINGTON, D. C. · WINNIPEG, MAN.

FACTORIES: LONG ISLAND CITY, N. Y. and MONTREAL, QUE.

Products

SOAPARATUS LIQUID SOAP DISPENSING SYSTEMS.

Scope of West Service

WEST DISINFECTING COMPANY is an organization with a national reputation for the quality of its products, which are disinfectants, chemicals, liquid soap and liquid soap dispensing equipment.

This concern has a large, advantageously located plant, with facilities for quantity production, and scattered throughout the country in the larger cities are service organizations equipped to co-operate with clients to their complete satisfaction.

The experience of this company in installing soap dispensing systems in buildings of every type offers architects, builders and owners a service that will prove of exceptional value. Advice can be given on problems that might prove troublesome, and complete data on problems similar to your own is at your disposal for new construction or for installation in buildings already erected and occupied.

In addition to a proper layout, proper apparatus and proper soap, there is still a very important element that architects and owners should consider—that of future service.

WEST DISINFECTING COMPANY is firmly established with a line of products having a strong national demand, and showing a yearly increase of business that augurs well for the future.

West Soaparatus Liquid Soap Dispensing System Installed in a Theater

Soaparatus Tanks

The Soaparatus Tanks are made of vitreous china, vitreous enamel on welded sheet iron or white enamel on rustproof sheet metal. They are designed to cover as little wall space as is commensurate with good proportion and pleasing appearance.

The vitreous china soap tank is considered superior to the others, because its appearance conforms perfectly with washroom fixtures, and it is more readily kept clean.

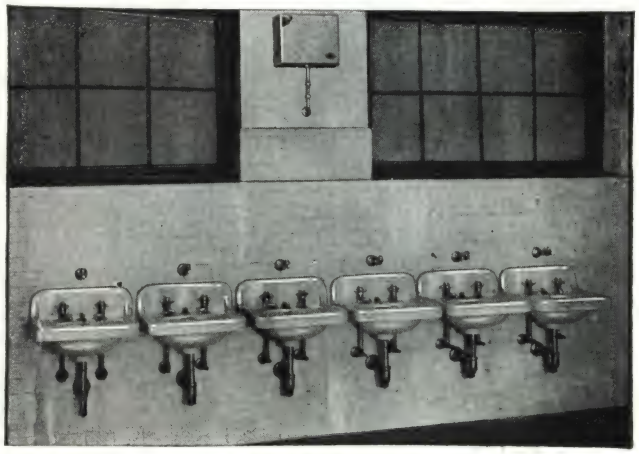
They are made in five sizes: 1, 2, 3, 5 and 10 gallon. The dimensions are shown below.

If it is desired, the entire system, including nickel-plated piping, unions, shut-offs and all parts, can be made at our factory to be shipped complete and assembled for exposed installation.

TANKS

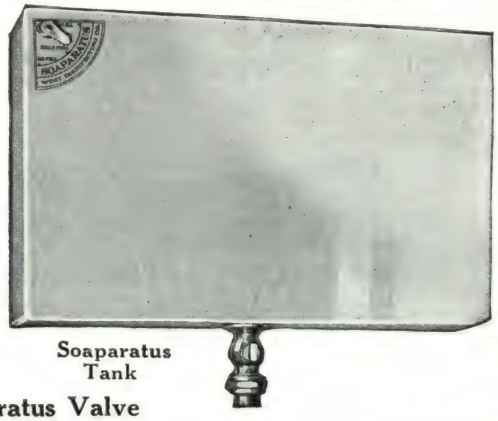
No.	Fluid content, gal.	Height, in.	Width, in.	Depth, in.
Vitreous China Soaparatus Tanks				
1	1	8⅝	10	4⅜
2	1⅜	9¼	12¾	4¼
3	2⅛	9¾	15¾	4½
5	3⅞	12¾	16¼	5½
Monel Metal Tanks				
2	2	12	13	3⅞
3	3	12	15	3⅞
5	5	15	16	5½
Metal Tin Tanks				
1	1	8½	9⅛	3¾
2	1¾	9¾	12	3⅞
3	2½	10½	15	3⅞
5	4¼	12	15¾	5¼
10	10	18	22	6

Hotel Installation



School Installation

Continued on next page

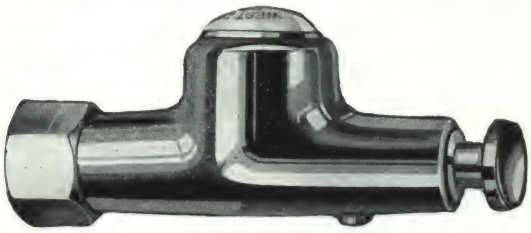


Soaparatus Tank

Soaparatus Valve

Designed primarily with one end in view—mechanical efficiency. It was then refined to harmonize in appearance with the finest plumbing fixtures.

The patented air chamber, within the dome on the upper side of the valve, contains just enough air over the soap to start a gravity discharge of the soap in the dome when the plunger is pushed. A slight push of the plunger shuts off the supply from the main reservoir by closing the inlet. A continued push emits a discharge of soap from the dome. This flows gently into the hand without splashing or squirting and without suds. The amount of soap released is the pre-determined amount proper for a satisfactory hand wash, and is released by one push of the plunger.

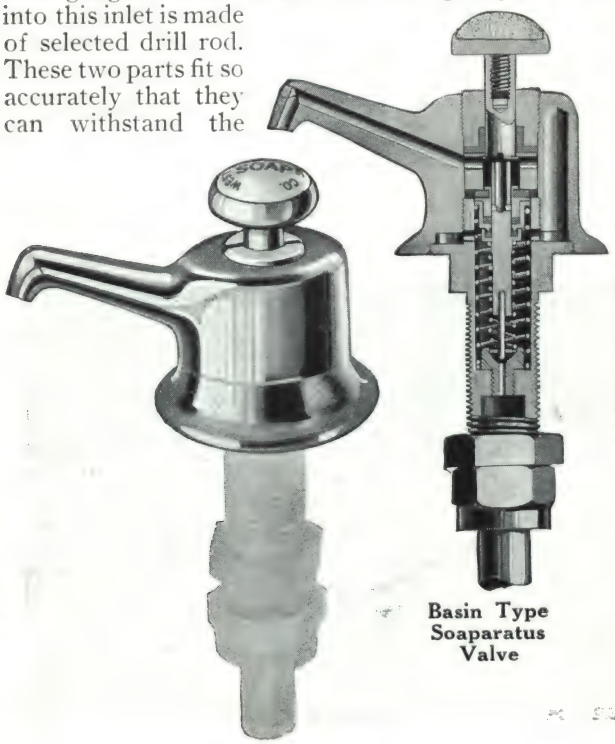


Soaparatus Valve

Another feature of the Soaparatus Valve is the plunger rod and inlet. This inlet is made of tool steel gauged within .00025 in. The plunger which fits into this inlet is made of selected drill rod. These two parts fit so accurately that they can withstand the pressure of more than 150 lb. without causing the valve to leak. This careful gauging is carried through on every part of the valve so that the assembled product is as nearly mechanically perfect as possible.

The Soaparatus Valve has been adapted also to a basin fixture. Many architects are making provision for a liquid soap valve on, or through, the wash basin. This Soaparatus basin fixture is a simple adaptation of the standard valve to meet this condition.

The Soaparatus Valves are finished in nickel or chromium to conform with the other fixtures.



Basin Type Soaparatus Valve

Soap

Liquid soap is being piped through buildings because, by this method, an uninterrupted supply of soap is assured; because liquid soap is more conveniently used than cake soap; because it is more sanitary; and last, but important, it is more economical.

West Disinfecting Company was a pioneer in the liquid soap industry, and has maintained its leading position because it manufactures only pure cocoanut oil liquid soaps of a standard high quality. To assure proper lathering and soothing qualities, it is necessary that the soap should be treated and retreated, aged and tested before it is allowed to leave the factory.

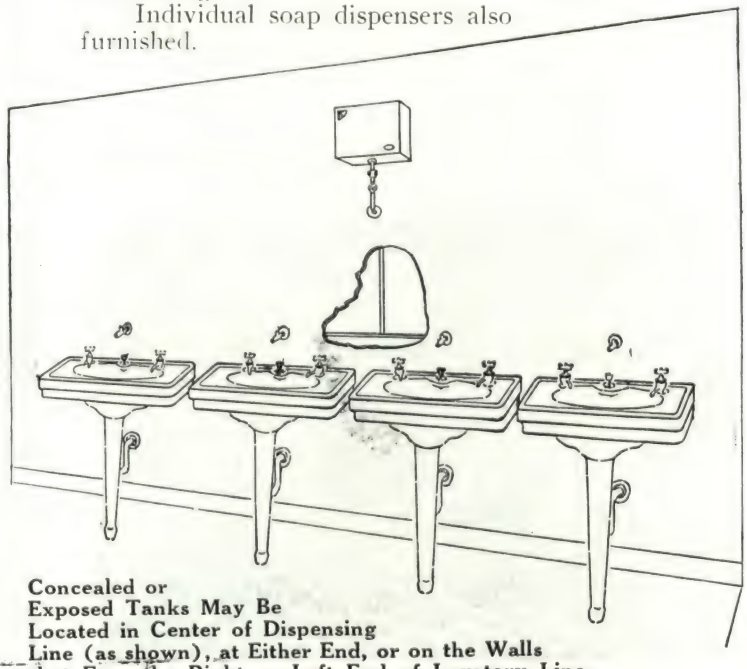
Installation

The Soaparatus system, due to its flexibility, is admirably adapted to varying conditions of installation. One tank may be used to supply any number of valves, and extensions may be made as required, provided they are at a level at least a foot lower than the location of the supply tank in order to provide proper gravity flow. When installed in connection with new construction, where provision has been made in the plans or where existing conditions will permit, the piping from the tank to taps may be concealed, creating an exceptionally neat appearance. In cases where it is impossible to conceal the piping a thoroughly attractive installation is provided by the use of nickelplated piping throughout.

Engineering Service

We maintain an Engineering Department Service—consultation with architects and engineers or owners of buildings.

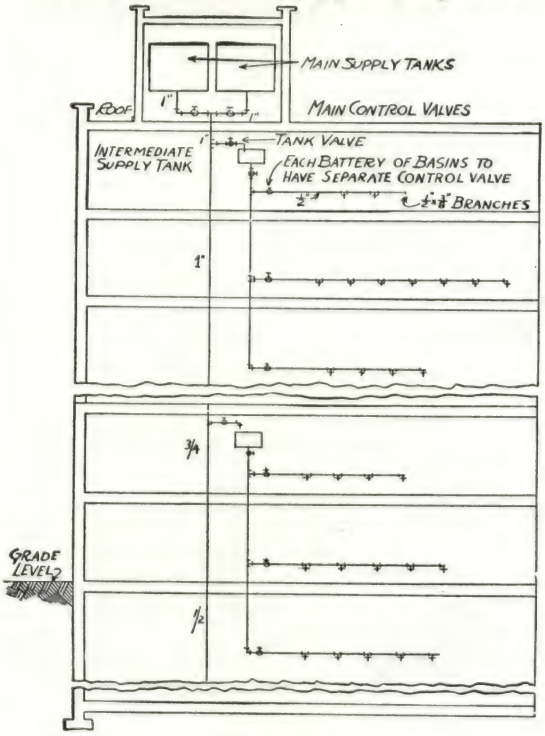
Individual soap dispensers also furnished.



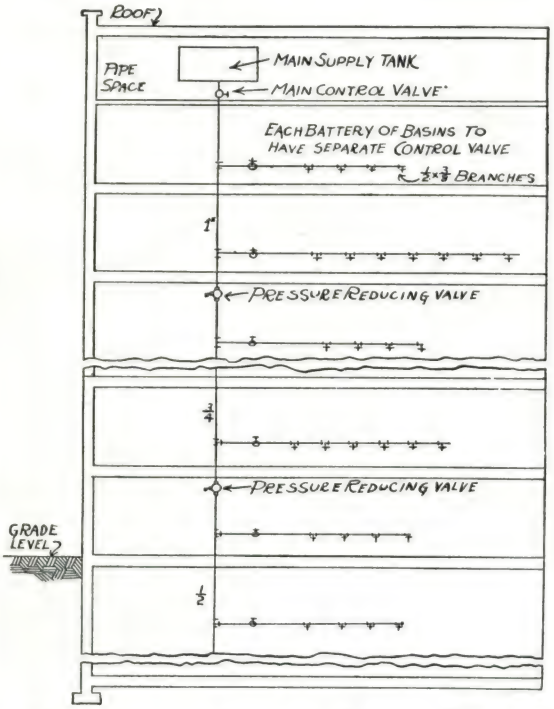
Concealed or Exposed Tanks May Be Located in Center of Dispensing Line (as shown), at Either End, or on the Walls that Face the Right or Left End of Lavatory Line

Continued on next page

Typical Layouts for Soaparatus Systems

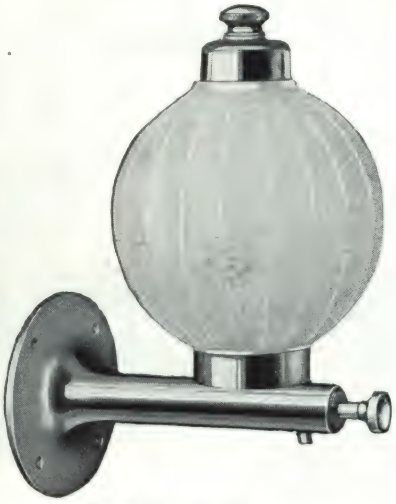


Preferred Layout, Using Double Supply Tank and Relay Tanks to Reduce Pressure



Alternate Layout, Using Single Supply Tank, and Pressure Reducing Valves, Instead of Relay Tanks

Model No. 1 Dispenser

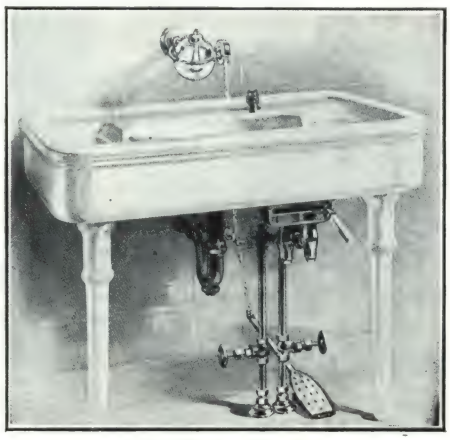


Model No. 51 Dispenser

Model No. 4 Dispenser

Individual Pump Valve

Shower Bath Dispenser



Treadle Dispenser

U. S. SANITARY SPECIALTIES CORPORATION

Originators "Soaperior" Liquid Soap Systems

435 South Western Avenue, CHICAGO, ILL.

BRANCH OFFICES

NEW YORK, N. Y., 59-63 East 12th Street

BIRMINGHAM, ALA., 3 South 20th Street

Products

"Soaperior" Gravity Liquid Soap Dispensing Systems and Individual Dispensers for hotels, theaters, clubs, banks, schools, hospitals, institutions, public buildings, factories, etc.

Also Paper Towel and Toilet Paper Fixtures and other Sanitary Requisites.

The Company

For more than a dozen years, the U. S. Sanitary Specialties Corporation has blazed the trail in developing new methods and appliances in the field of sanitation. Scientific control of production is guided by a busy laboratory and research department. Three plants, Chicago, New York, and Birmingham, make for prompt service.

"SOAPERIOR" GRAVITY LIQUID SOAP DISPENSING SYSTEMS

Description

A small investment and practically no maintenance cost provides sanitary hand-washing facilities in the lavatory. Perfect hygiene and efficient soap supply service are insured. A measured quantity of clean liquid soap is delivered to each user.

"Soaperior" Soap System consists of an elevated, adequately sized soap tank installed above the horizontal soap line. From this, liquid soap is piped to especially designed hexagon, foolproof valves located over each basin—batteries or single lavatories.

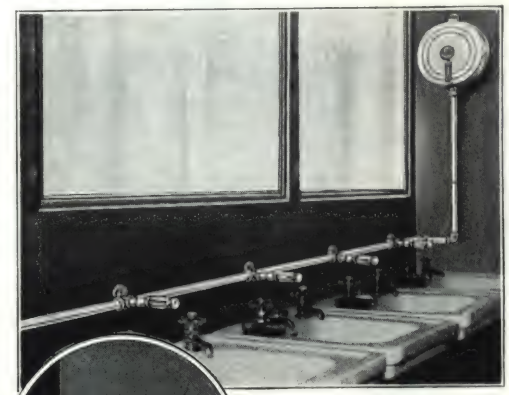
Where practical, a single large soap tank (35, 65 or 110 gal.) may be installed on top floor of pent house, the soap piped to each washroom.

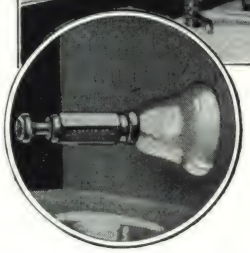
Installation of all-metal gravity soap systems insures permanency, obviates breakage, eliminates frequent fillings of dispensers, etc. Pipe is concealed in wall or exposed if desired. Over factory wash troughs, exposed pipe is clamped to water line.

Exclusive Patented Valve

The "Soaperior" Hexagon Soap Valve is the *heart* of the gravity system. (Cutaway view at top of page shows the reasons for dependability, leakproof and foolproof features.) Discharges only a measured quantity of soap—14 to 16 drops. Soap cannot flow in a continuous stream.

"Soaperior" Valve incorporates an exclusive patented feature. The rear union (B) holds unusual pressure and acts as an individual shutoff cock, permitting removal of the body of valve for cleaning, and allowing other valves on the line to remain in use.





Installation

Tank may be exposed in washroom (above) or concealed in accessible space or closet (left)

Construction

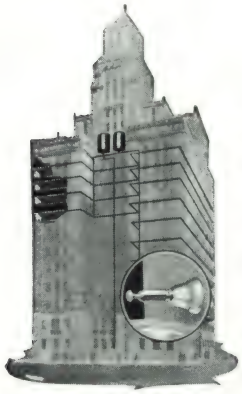
Because it stands up under heavy duty requirements and does not corrode or form verdigris, white metal was selected for the "Soaperior" Hexagon Soap Valve. Chromium plating insures lasting finish. Push button comfortably fits the hand. Piping may be chromium or nickel plated brass for installations where piping is exposed—galvanized or black iron where concealed.

Guarantee

Every "Soaperior" Soap Valve and Individual Dispenser carries a year's guarantee against mechanical defect.

Specifications

Furnish and install a Liquid Soap Supply consisting of an elevated soap tank located adjacent to each battery of basins, from which soap lines (concealed or exposed) shall run to liquid soap valves located over each wash basin. Valves shall include cone shut-offs and check in rear union (catalogue No. 103 U. S. Sanitary Specialties Corporation of Chicago). Tanks figures No. 100, 101 and 102 (see next page) catalogue U. S. Sanitary Specialties Corporation of Chicago shall be equipped with glass gauge protected by three steel bars. Tank figure No. 203 shall be equipped with float gauge and vertical indicator. Tank Fig. 200 (see next page) shall be equipped with float gauge and strainer. Tanks shall be located so that top when installed is not less than 18 in. below finished ceiling. Pipe and fittings standard ⅜ in. I. P. S.



Mayo Clinic Building, Penthouse Installation—250 Valves

"SOAPERIOR" PENTHOUSE TYPE INSTALLATIONS

Description

This system provides for central source of soap supply stored in special tanks in the upper part of a large building.

The "Soaperior" hexagon valve is well adapted to use with this system due to the check seat in its rear union which absorbs pressure.

Pressure regulators may be used, however, every three or four floors and will be furnished on specification.

Piping is concealed back of the walls and equipped at various points with shut-off valves.

Tank Specifications

Cone bottom, float gauge with indicator. Necessary faucet opening. Heavy iron stand. Necessary fill opening. Constructed of heavy steel. Tank finished in green enamel, stand in black japan. Equipped with funnel top under opening with long tube extending to tank bottom to prevent foaming of soap, also screen to prevent introduction of foreign substances. Guaranteed leakproof. Capacities: 35, 65 and 110 gal. Dimensions and weights: 35 gal., 23½x24x 36 in. over all; 12-in. stand; weight, 32 lb. 65 gal., 23½x36x48 in. over all; 12-in. stand; weight, 64 lbs. 110 gal., 30x36x48 in. over all; 12-in. stand; weight, 78 lb.

Continued on next page

Tanks for "Soaperior" System

Fig. 203—A handsome hexagonal tank of porcelized enamel; gauge shows soap level. Capacities 1, 2½ and 5 gal.

Fig. 100—Round spun tank, white or gray baked-on enamel.

Fig. 101—Round spun monel metal (not shown, shaped like Fig. 100) complete with glass fluid gauge; capacities 1, 2, 3 and 5 gal.

Fig. 102—Circular vitreous china, with glass fluid gauge; capacity 1 and 2 gal.

Fig. 200—Tank heavy metal gray enameled, equipped with float gauge. Capacities 1, 2, 3, 5 and 10 gal.

Fig. 201—Monel metal, same specifications as Fig. 200. For penthouse installations.

Fig. 300—(See illustration opposite page.) Tank of heavy steel, finished in green enamel; sizes 35, 65 and 110 gal.

Fig. 200

"Soaperior" 121 Dispenser

"Soaperior" Hexagon Valve foolproof mechanism. One-piece bracket of non-corrosive white metal, heavily nickeled or chromium plated; 18-oz. corrugated opalescent, clear crystal globe. Also furnished equipped with all-metal globe, nickel or chromium plated. Filled through opening at top.

Dimensions: projection over all, 6⅛ in.; height, 7¼ in. Weight, 1.6 lb.

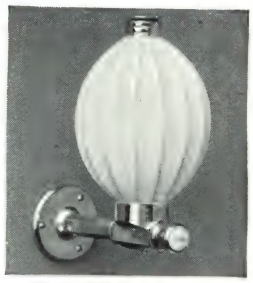


Fig. 121

Fig. 100

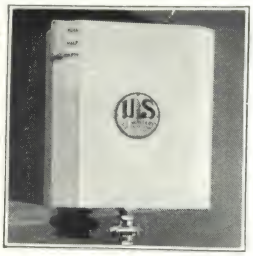


Fig. 203

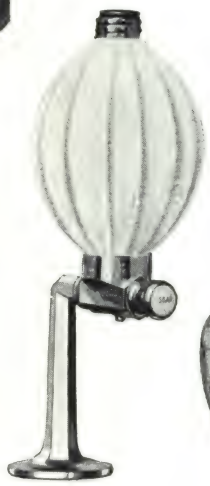


Fig. 122

"Soaperior" 122 Dispenser

"Soaperior" Model 122 is identical with Model 121, except that it is equipped with right angle bracket (made in one piece) to permit attaching to top of washstand through cock-hole.

Dimensions: height, 10¾ in. above bowl, 4 in. below; projection, 6¾ in. Weight, 2.3 lb. Capacity, 18 oz.

Fig. 125

Perfection 125 Dispenser

Leakproof push-up type dispenser made of white metal heavily nickel plated. Clear crystal machined glass globe. Cone type shutoff keeps the channel free from hardened soap.

Dimensions: height, 6½ in.; projection, 5½ in. Capacity of globe, 14 oz. Weight, 1 lb.

"Soaperior" Model 124 Dispenser (Pullman Type)

Where desirable to locate valves on basins instead of walls, specify Model 124. Made of white metal, chromium plated. All the features of "Soaperior" Hexagon Valve. Can be adjusted for high pressure installations. Lavatories should be furnished with opening drilled 1 in. square in top as directed.

"Soaperior" 123 Dispenser

Made of brass or white metal, nickel plated. Container is concealed beneath wash basin. Only the top of pump is exposed. Filled through top by removing button cap.

Fig. 124

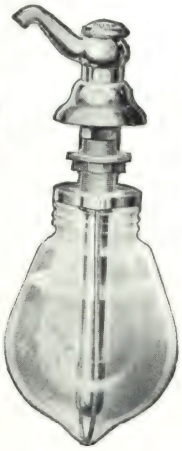


Fig. 123

Fig. 126

Combination Pop-up Waste Plug and Liquid Soap Valve, Fig. 126

Combination pop-up waste plug and liquid soap valve attachment connected to gravity tank pipe line system. All piping is concealed. Makes it possible to install soap valve at same point as waste plug, making it unnecessary to drill special holes in basin or attach dispenser to wall. Waste operating rod fits all standard waste connections.

"Soaperior" Portable Hospital Dispenser Model 104

Heavy rugged metal body makes dispenser impervious to wear. Pedestal, hexagon shape, finished white porcelain enamel. All exposed metal parts chromium plated. Double foot pedal and swivel arm serves two basins. Globe corrugated, made of heavy white opalescent glass.

Mechanism precision tooled — plunger made entirely of metal. Valve designed so that release of pressure on pedal draws back soap through suction. Exclusive continuous flow feature. Positive shutoff.

Dimensions: height, 50 in.; diameter of base, 14 in.; clearance of spout, 39½ in.; arm reach, 12½ in. Globe capacity ½ gal.

"Soaperior" Hospital Dispenser Model 104B with Treadle Attachment

Consists of a soap tank (Figs. 100, 102 or 203), connecting pipe, "Soaperior" Hexagon Valve (Fig. 103) and foot pedal attachment, which may be installed from either right or left side of basin.

Hands do not touch the device. Continuous flow of soap while foot remains on pedal. Positive shutoff when pressure is released. When not in use, foot pedal attachment may be raised to upright position.

Fig. 104

Fig. 104B

"Soaperior" Shampoo Distributor

For beauty parlors and barber shops. Made entirely of metal and incorporating foolproof "Soaperior" Valve mechanism. Consists of Fig. 100 or 203 tank (above) installed at elevation (either over battery of basins with metal pipe exposed or with rubber hose connected from tank to soap valve). Nickel plated valve at slight pressure on handle discharges shampoo in a continuous flow.

Fig. 402

HEAT GENERATION

American Chimney Corp.....D5141
Anthony Company D5224
Auburn Stoker Corp.....D5217
Automatic Burner Corp.....D5225
Bailey Meter Co.....D5265
Bass Foundry & Machine Co.....D5150
Bristol Co. D5266–5267
Brownell Co. D5151
Bryant Heater & Mfg. Co.—
Gas Fired Boilers.....D5199–5212
Gas Fired Furnaces.....D5121–5132
Burnham Boiler Corp.....D5152–5153
Campbell Heating Co.....D5134–5135
Carey, Philip, Co.....D5276–5277
Central Radiator Co.....D5156
Combination Boiler Co.....D5154–5155
Combustioneer, Inc. D5218–5219
Continental Chimney Co., Inc.....D5142
Crane Co. D5213
Crystal Oil Burner Corp.....D5226
Custodis, Alphons, Chimney Construction Co....D5143
Detroit Stoker Co.....D5220
Electrol Inc. D5228–5239
Enterprise Oil Burner Co.....D5227
Follansbee Brothers Co.....D5136–5139
Freeport Gas Machine Co., Inc.....D5114
Grinnell Co., Inc.....D5268–5273
Hardinge Brothers, Inc.....D5240–5241
Heinicke, H. R., Inc.....D5144
Holland Furnace Co.....D5133
Iron Fireman Mfg. Co.....D5222–5223
Johns-Manville D5278–5283
Johnson, S. T., Co.....D5242–5244
Keasbey & Mattison Co.....D5284
Keeler, E., Co.....D5157–5159
Kellogg, M. W., Co.....D5146–5147
Kewanee Boiler Corp.....D5160–5169
King Burner Co., Inc.....D5257
Maurer, Henry, & Son.....D5149
May Oil Burner Corp.....D5245–5256
McDonnell & Miller.....D5274
Mineral Felt Insulating Co.....D5275
Molby Boiler Co.....D5178
Mueller, L. J., Furnace Co.—
Gas Fired Boilers.....D5214
Gas Fired Furnaces.....D5140
National Warm Air Heating Assn.....D5120
Nu-Way Corp. D5258
Oil City Boiler Works.....D5170–5171
Peerless Heater Co.....D5215
Philfuels Co. D5116–5117
Pyrofax Div., Carbide and Carbon Chemicals Corp. D5118–5119
Ray Burner Co.....D5259
Richardson & Boynton Co.....D5172–5177
Ric-wiL Co. D5285
Rust Engineering Co.....D5145
Silent Automatic Corp.....D5260–5263
Smith, H. B., Co.....D5179–5190
Spencer Heater Co., Div. of Lycoming Mfg. Co. D5194–5195
Summerhays, Wm., Sons Corp.....D5148
Thatcher Co. D5191–5193
Titusville Iron Works Co.....D5196–5197
Whiting Corp. D5221
Wickes Boiler Co.....D5198
Williams Oil-O-Matic Heating Corp.....D5264
Wilson Sanitation Inc.....D5115
Wood, Gar, Engineering Co.....D5216

FREEPORT GAS MACHINE COMPANY, INC.

ESTABLISHED 1905

Manufacturers of Gas Machines—Jobbers in All Gas Appliances

FREEPORT, ILL.

Product

FREEPORT COLD PROCESS GASOLINE GAS MACHINE.

What the Machine Does

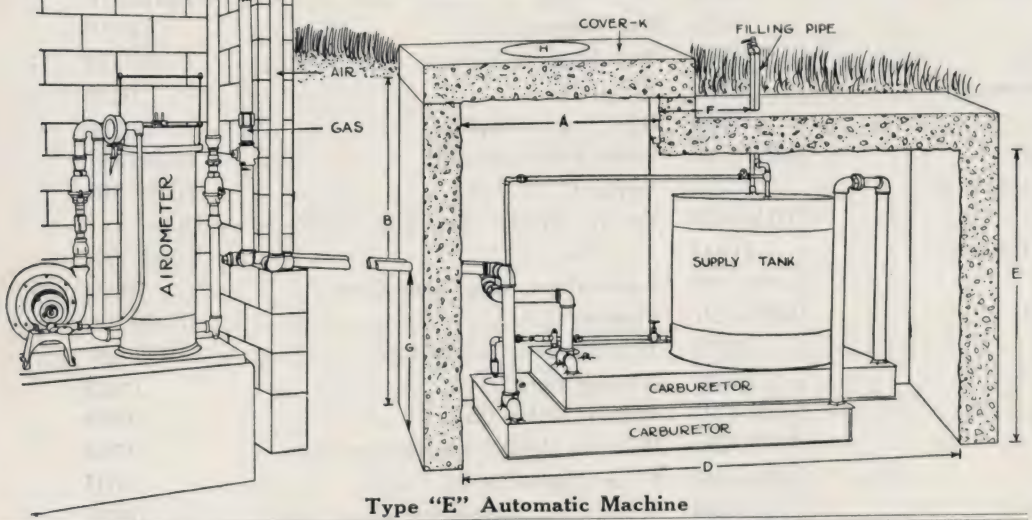
It generates a gas of superior quality by the vaporization of high test gasoline which burns with a clear blue flame of intense heat without smoke or odor. This gas is delivered instantly to the gas burning appliances and can be used with lower operating cost for every purpose that city gas is used in homes, schools, hospitals, clubs, hotels, and industrial plants.

What the Machine Consists of

Two principal parts: (1) Air supply equipment installed in the building. (2) A combined carburetor and mixing equipment and storage tank installed in a vault not less than 10 ft. from the building.

Air Supply Equipment—Consists of a motor driven blower with Airometer (see illustration) which produces a steady flow of air and is automatically controlled; or a motor driven blower controlled by switches from each room where gas is used. Where electricity is not available, the weight blower is used. If the electric current is variable, the combination motor driven blower and weight blower are installed in tandem.

Gas Carbureting Equipment—Consists of one or more flat oblong tanks and a storage tank. This part of the equipment is installed in a vault not less than 10 ft. from the building.



Type "E" Automatic Machine

Machine No.	Cu. ft. gas per hour	Blower space, ft.			Pipe, in.		Vault dimensions, in.								
		Type "E" Automatic	Straight Electric	Type "W" wt.	Air	Gas	A	B	C	D	E	F	G	H	K
1	100	1½ x 3½	2 x 3	5 x 8	1¼	1¼	39	96	42	72	48	9	36		
2	200	1½ x 3½	2 x 3	5 x 8	1¼	1¼	39	96	42	72	48	9	36		
3	300	1½ x 3½	2 x 3	6 x 10	1½	1¼	39	96	42	84	54	11	36	24-in.	Removable
5	500	1½ x 3½	2 x 3	6 x 10	2	1½	39	96	54	96	62	11	36	cistern	reinforced
6	600	1½ x 3½	2 x 3	6 x 10	2	2	39	96	54	96	62	12	36	cover	concrete
7	700	1½ x 3½	2 x 3	6 x 10	2	2	39	96	60	96	62	12	36		cover
8	800	1½ x 3½	2 x 3	6 x 10	2	2	39	96	60	96	62	12	36		
*10	1000	1½ x 3½	2 x 3	6 x 10	2	2	48	96	68	96	65	12	36		

*Machines of greater capacity furnished upon request.

The interior of the carburetor and mixer is broken up by parallel division plates or baffles in which wicking is placed, providing the greatest possible exposure of the gasoline to the action of the air.

Air furnished by the blower enters the carburetor, passes around baffle plates where it is thoroughly impregnated with the fumes of gasoline held in suspension by wicks, and is finally discharged at the burner in the form of a uniform gas ready for use. Test of gasoline required is 84 to 88 or what is commercially known as gas machine gasoline.

The storage tank and carbureting unit or units in a Freeport Machine are separate and distinct. It does not matter whether there are 5 or 1000 gal. of gasoline in the storage tank. Gas is made in the carburetor from a certain predetermined number of gallons of gasoline, thus giving a uniform gas at all times at the burner.

The gasoline feed is from the bottom of the supply tank into the combined carburetor and mixer. The richer or better gasoline coming down last neutralizes what would otherwise be waste.

The carburetor and supply tank are installed in a vault which preserves the materials of which they are made and gives access to the working parts at all times. This one feature, we believe, puts it in a class by itself and makes it a superior product.

Economy of Freeport Gas

The Freeport Gas Machine is economical to operate and is efficient and dependable in service. It is much cheaper than any bottled gas, acetylene, or electricity. The B.t.u. content is greater than city gas.

Durability

The entire plant is constructed of armco iron, one of the best rust-resisting irons on the market. All single and double seams are riveted and soldered. All parts are tested and proven tight.

Safety

The Freeport Gas Machines Types "E" and "W" are listed as standard Class "A" by the Underwriters' Laboratories, Inc., and are permitted by all fire insurance companies without increases in insurance rates.

The Freeport Machine is absolutely safe. It makes gas outside of the building, underground. It requires no heat to generate. There is no dangerous gas pressure. No gas is ever stored.

A Few Installations

Julius Fleischmann Residence, Cincinnati, Ohio (2 machines in use)--1927
Wilfred Sellers Residence, Elwood, Ind.—1925
Senator James Couzens Residence, Pontiac, Mich.—1927
Peoria Country Club, Peoria, Ill.—1927
Rockford Municipal Sanitorium, Rockford, Ill.—1915
Our Lady of Lourdes Hospital, Hot Springs, S. D.—1927
Kable Bros. Printing Co., Mt. Morris, Ill. (3 machines in use)—1922
Greenfield High School, Greenfield, Ohio—1924
Chadron Normal Schools, Chadron, Neb. (4 machines in use)—1911
Hillenbrand Casket Co., Batesville, Ind. (4 machines in use)—1923

WILSON SANITATION, INC.

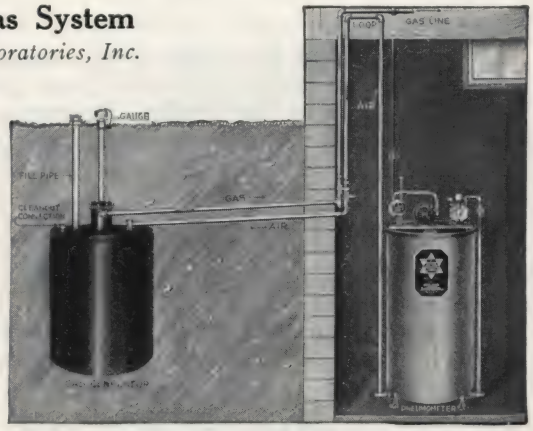
Manufacturers of Gasoline Gas Machines and Sanitation Equipment

MAIN OFFICE
BUFFALO, N. Y.
BRANCH OFFICE, 101 Park Ave., NEW YORK, N. Y.

A Dependable Economical Gas System

Listed as standard by Underwriters' Laboratories, Inc.

The Wilson Una-Gas System produces a vapor gas from "High-test" gasoline. The process is termed "cold saturation." The result is a cold fuel vapor quite similar to natural gas as it comes directly from a gas well. Heating of the burners before lighting is entirely unnecessary, you simply turn the burner, cook and light the gas. The Una-Gas System is entirely automatic in its operation, delivering gas of practically uniform quality, constant volume and low pressure. Given electric current and gasoline fuel it runs year after year with practically no attention whatever except the filling of the oil cups every few months.



Type D Una-Gas System
Approved and listed as standard by The Underwriters' Laboratories, Inc., of the National Association of Fire Underwriters

It's the Cost of Gas That Counts

In hotels, restaurants, camps and in laboratories and cafeterias of schools and colleges, as well as in industrial processes the cost of gas per 1000 cu. ft. is the paramount question because here consumption is usually high. On this point the Wilson Una-Gas System is strictly in a class by itself, because it utilizes comparatively common grades of high-test gasolines producing gas at an exceptionally low cost.

The Wilson Una-Gas System is sold under a binding guarantee as to quality and performance. Names of users in your line of contemplated use cheerfully furnished on request.

The Una-Gas System consists of a Pneumometer and air compressing unit and the generator unit where the compressed air is ingeniously saturated with gasoline. These processes are amply protected by patent applications in U. S. and foreign countries.

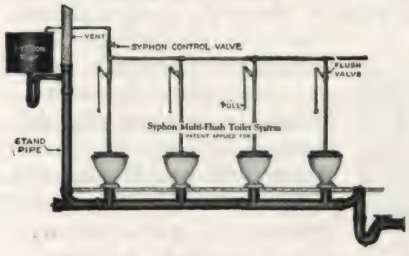
Standard Appliances Used

Modern ranges, water heaters, steam tables, coffee urns and other appliances are furnished by well known manufacturers, properly fitted for Una-Gas, and we supply various burners and valves for changing over old ranges, water heaters, etc. Complete data and engineering advice furnished on request.

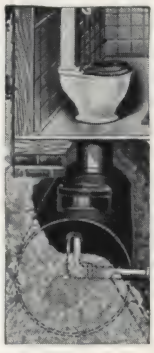
Wilson's Sanitation and Sewage Disposal Specialties

Syphon Multi-flush Toilets

For Camps, Parks, Factories, etc.—Provides all advantages of flush-toilets and introduces extensive economies through the fact that this system eliminates peak load and lessens the demand for water by 50%, accordingly reducing the size and cost of the septic tank and disposal plant.



"Roughing-In" and estimating specification sheets furnished on request.



Semi-dry Septic and Waterless Toilets

We build a complete line of Semi-dry Septic Toilets and Chemical Toilets in both single bowl and battery types. For use where water supply is not available and on contract jobs.

Specialties for Use with Septic System

ELECTRIC DRIVEN EFFLUENT LIFTERS.

INTERMITTENT DOSING UNITS, including assembled tank and syphon.

DIVERTING GATES AND EQUALIZING CHAMBERS.

CAST IRON AUTOMATIC SYPHONS for use in cement tanks.

Zigzag Super-Septic Tanks

A superior septic tank for the better grade buildings. Unequaled efficiency and most durable construction.

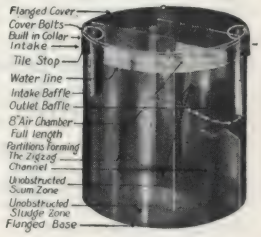
Positively eliminates "short circuiting" of sewage.

Delivers a clear effluent assuring long lived tile fields.

Made of Toncan Copper Mo-lybden-um Iron.

Many standard sizes.

Specification sheets furnished.

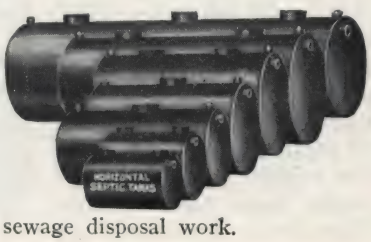


Grease Separators and Traps

The kitchen wastes from restaurants, hotels, camps, etc., contain large proportionate quantities of grease which will clog pipes, tile fields and septic tanks. Wilson's Quick Congealing Separator is the most effective means of separating grease from water.

Horizontal Septics

Our line of horizontal septics covers all sizes from 200 to 25,000 gal. capacity. We furnish complete engineering service through the assistance of our local sales and survey men. Fifteen years' experience in private and institutional sewage disposal work.



PHILGAS—GAS SERVICE BEYOND THE GAS LINES

PHILFUELS COMPANY

SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY

General Motors Building, DETROIT, MICH.

BARTLESVILLE, OKLA., Phillips Building, NEW YORK, N. Y., 120 Broadway

What Philgas Is

Philgas is real gas—natural gas—compressed and purified in special plants as it comes from the Oklahoma and Texas wells of the Phillips Petroleum Company. Philgas is a member of the hydro-carbon series and is known commercially as propane (C_3H_8). It is a gas at all temperatures down to —44° F., at atmospheric pressure.

When placed under nominal pressure, the gas is compressed to a liquid state—and as such, is shipped and distributed.

When pressure is released, the condensed gas automatically vaporizes and goes into the lines and gas appliances as a gas—not as a liquid.

Convenience and Utility Combine with Dependability in Philgas Service

Philgas Service provides a convenience that is now considered a necessity—a dependable, uninterrupted gas service for cooking, water heating, laundry hot plates and many other gas appliances—in homes and business enterprises that are located beyond the city gas mains.

Philgas Service is an *exact duplication* of city gas service available in districts not served by city gas. The customer uses Philgas and the gas appliances just the same as if connected with city gas lines—never has to order fuel, or manipulate equipment. There are no tanks to change and a continuous gas supply is maintained by Philgas Service without interrupting the use of gas, without requiring the attention of the user, and without entering the customer's home or place of business.

To carry the parallel of city gas service to completion, the user of Philgas is billed at monthly intervals for the exact amount of gas consumed—*after* it is burned.

Back of Philgas Service

Back of Philgas Service is a $150,000,000 organization which handles Philgas through its own facilities from the gas well to the ultimate consumer.

Philgas Service is rendered by PHILFUELS COMPANY, subsidiary of Phillips Petroleum Company. Phillips owns and operates 2800 oil and gas wells; 48 natural gasoline plants and refineries; 2200 railway tank cars; more than one million acres of oil and gas leases; pipe lines; has many thousands of retail gasoline outlets in the middle west; employs more than 6000 people. PHILFUELS COMPANY devotes its entire organization to the marketing of liquefied petroleum gases and during the year 1929 shipped in tank cars to its customers the equivalent of 1,150,000,000 cu. ft. of 530 B.t.u. gas.

Philgas Installation

The Philgas installation is very simple. It consists of a steel cylinder (A) inside of a cylindrical metal cabinet (B), located outside the customer's home or place of business. The entire installation stands on a concrete base (C). Resting on top of the steel cylinder is a regulator (D) which maintains a constant, low pressure on the gas entering the house.

From the regulator the gas passes through flexible hose (E), over the mercury seal (F) which is a low pressure safety guard, and thence through standard gas piping (G) to the appliances inside of the house. The metal cabinet is kept under lock and key (to prevent tampering by children or unauthorized parties), and is accessible only to the Philgas Service man.

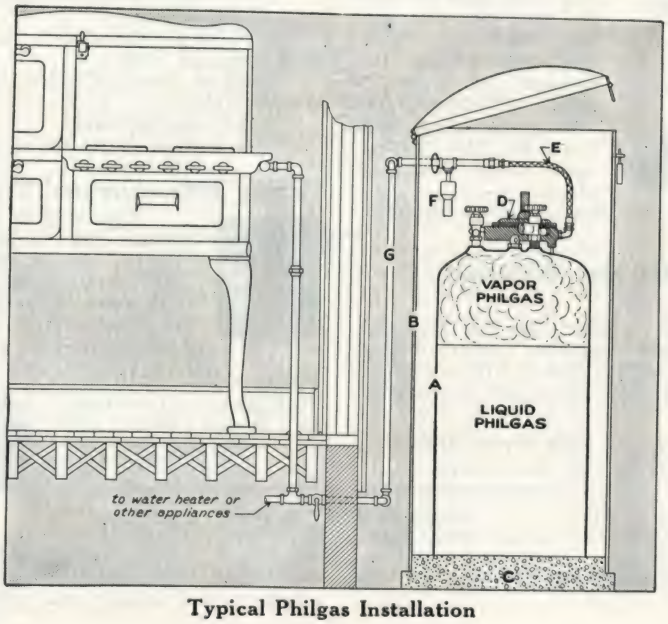
The equipment is entirely automatic in operation and requires absolutely no attention from the customer. Additional equipment required for unusually large gas loads is installed by Philgas Service without extra cost.

Piping and labor incident to installing Philgas Service is done by PHILFUELS COMPANY employees, and the cost of same is covered by the initial charge for Philgas Service within the limitations in respect to extra piping and other unusual conditions set forth in the Philgas Service Agreement.

How Philgas Service Functions

As previously mentioned—Philgas is compressed natural gas shipped in special tank cars to the local Philgas distributing stations. From the distributing stations Philgas is delivered at regular intervals in special tank trucks to the customer's installation. There the cylinder containing the unused Philgas is weighed—the difference between the previous weight and the present weight being the exact amount of gas consumed. The gas supply is then replenished from the tank truck. Again the Philgas container is weighed and the weight recorded.

This service is performed without any attention from the customer and without interrupting the use of the gas at any time. The gas is always ready—at the turn of a valve. The customer has an exact duplication of city gas service and pays for his gas monthly after it is burned.



Typical Philgas Installation

Continued on next page

Quickly Available

Philgas can be installed on reasonable notice. No ditching is required, no digging up of lawns. The installation requires only a small amount of piping from the container to the appliances. All necessary installation work is done by specially trained PHILFUELS COMPANY employees who know how to do the work correctly and in a workmanlike manner.

At certain seasons of the year installation work is exceptionally heavy and it is well to make arrangements for an installation as far in advance as possible.

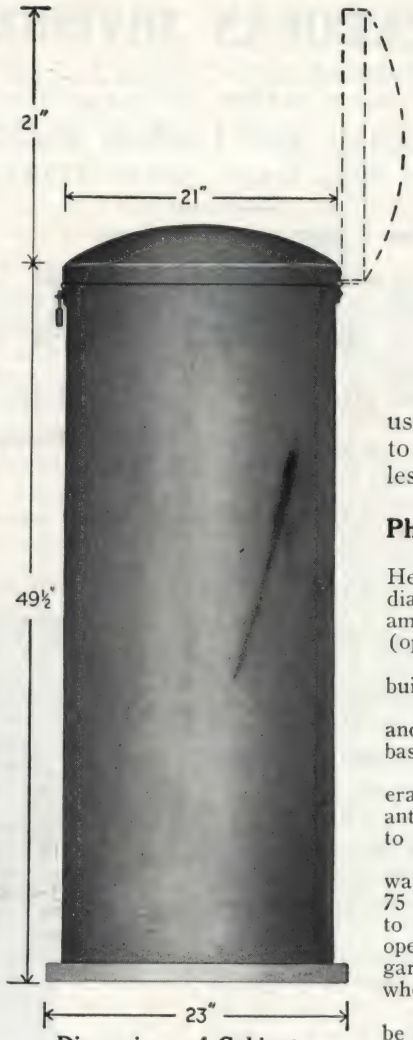
The local Philgas station can give you exact information in regard to time required for installations.

Applications of Philgas

The uses of Philgas are as varied as are the applications of gas heat.

All appliances used with Philgas must be approved by the PHILFUELS COMPANY, in order to insure maximum efficiency for the user. Philgas being much higher in B.t.u. content than manufactured or ordinary natural gas requires special adaptations in orifice and burner assembly to be used economically. In other respects the appliances are similar in appearance and in operation to regular city gas appliances.

A production model of each Philgas-approved appliance has been tested in the laboratory and in actual use to insure the purchaser complete satisfaction.



Dimensions of Cabinet

Among the great variety of common appliances, Philgas is used for:

- Cooking ranges
- Hot water heaters
- Gas-fired refrigerators
- Laundry hot plates, mangles
- Coffee urns
- Restaurant ranges
- Melting pots
- Bunsen burners
- Steam tables
- Singeing and drying torches
- Oil burner pilot lights
- Radiant type heaters

Philgas Installation Costs

Philgas Service costs only $36.50 cash (or can be purchased on a budget plan with a $5.00 down payment). For this charge PHILFUELS COMPANY delivers and installs all Philgas equipment necessary for supplying Philgas continuously to the pipe leading to the customer's appliances. This charge also gives the customer, only, right to use this equipment at its original location so long as Philgas is used therein.

Philgas Operating Costs

As with city gas the cost of operation depends exactly on the amount of gas used by the customer. Considering the efficiency of the approved appliances, Philgas on a heat value or B.t.u. basis compares to approximately $2.00 city gas of average 530 B.t.u. content, or to electricity at 2¢ per k.w.h. Thousands of satisfied users have found Philgas operating costs to be equal or less than those of much less convenient fuels.

Philgas Specifications

(1) Dimensions of Cylindrical Cabinet: Height of cabinet (closed), 53 in.; outside diameter of concrete base, 23 in.; outside diameter of cabinet, 21 in.; height of cabinet (open), 72 in.

(2) Cabinet must be placed outside of building and on top of ground.

(3) Cabinet cannot be completely enclosed and should be placed at least 5 ft. from any basement or foundation openings.

(4) Where Philgas is to be used for several appliances or where large gas loads are anticipated, consult the local Philgas office as to requirements for multiple installations.

(5) If cabinet is placed in recess in the wall, height of recess opening must be at least 75 in. in order to permit the lid of container to be opened and scales inserted for weighing operation. Consult local Philgas station regarding width of recess, which depends on whether multiple installation is required.

(6) Equipment must be placed so as to be reached by 50 ft. of hose from the nearest point to which delivery truck can approach.

(7) Roads leading to the installation must be of such character as to be easily accessible to the truck twelve months of the year.

(8) Any piping inside the building done by other than PHILFUELS COMPANY employees must be fitted with special compounds and the work done as specified by the local Philgas manager.

(9) PHILFUELS COMPANY reserves the right to locate Philgas equipment on customer's premises so as to require a minimum of piping to the points of use, but should any customer desire a location other than the point selected by the PHILFUELS COMPANY, his request will be granted upon payment of the additional expense incurred. This information is set out in detail in the Philgas Agreement.

(10) Philgas container is originally painted sage brush green, but can be painted by the user in any color desired.

(11) Philgas container may be masked with shrubbery if desired.

Where Philgas Can Be Obtained

Philgas Service is supplied in many different districts east of the Mississippi River. Constant expansion is taking place and additional districts are being opened in addition to those listed below. If you do not fall within one of the following territories write us for location of new districts.

Each Philgas distributing station serves a district within a radius of approximately 25 miles from the central plant. Below is listed each of the stations now in operation, together with general description of locations. Call or write any central, division or district offices for exact information on the territory served.

Near New York (North)
PHILFUELS COMPANY
Box 587
Mount Kisco, N. Y.
Telephone, Mt. Kisco 1319

Near Bridgeport, Conn.
PHILFUELS COMPANY
Box 76
Derby, Conn.
Telephone: Derby 472

Near Boston, Mass.
PHILFUELS COMPANY
Box 99
South Sudbury, Mass.
Telephone: South Sudbury 200

Near Albany, N. Y.
PHILFUELS COMPANY
Box 1188
Albany, N. Y.
Telephone: Albany 6-3644

Near Indianapolis, Ind.
PHILFUELS COMPANY
Box 166
Maywood, Ind.
Telephone: Belmont 3399

Near New York (West)
PHILFUELS COMPANY
Box B
Haskell, N. J.
Telephone: Pompton Lakes 896

Near Hartford, Conn.
PHILFUELS COMPANY
Box 227
Windsor, Conn.
Telephone: Windsor 791

Near Baltimore, Md.
PHILFUELS COMPANY
Box 63
Reisterstown, Md.
Telephone: Reisterstown 218

Near Utica, N. Y.
PHILFUELS COMPANY
Box 836
Richfield Springs, N. Y.
Telephone: Richfield Springs 137

Near Detroit, Mich.
PHILFUELS COMPANY
Box 94
Pontiac, Mich.
Telephone: Pontiac 4154

Near New York (Southwest)
PHILFUELS COMPANY
Box 502
Bound Brook, N. J.
Telephone: Bound Brook 1111

Near Providence, R. I.
PHILFUELS COMPANY
Box 160
Washington, R. I.
Telephone: Coventry 8

Near Washington, D. C.
PHILFUELS COMPANY
Box 272
Rockville, Md.
Telephone: Rockville 304

Near Cleveland, Ohio
PHILFUELS COMPANY
Box 491
Hudson, Ohio
Telephone: Hudson 40

Near Madison, Wis.
PHILFUELS COMPANY
Box 608
Madison, Wis.
Telephone Badger 6499

PYROFAX DIVISION

CARBIDE AND CARBON CHEMICALS CORPORATION
(UNIT OF UNION CARBIDE AND CARBON CORPORATION)
Carbide and Carbon Building
30 East 42nd Street, NEW YORK, N. Y.

Pyrofax Gas Service for Locations Not Served with City Gas

Pyrofax Gas Service supplies gas for cooking and other domestic purposes to country and suburban homes which are not served with city gas. It is also suitable for schools, colleges, industrial plants, hotels, hospitals and other institutions.

The cleanliness, speed and ease of regulation obtained by cooking with gas are unequalled by any other fuel. Those who have been accustomed to gas find the lack of it a great inconvenience, and its advantages are readily apparent to those who have never had the opportunity of using it. Domestic servants usually prefer gas for cooking.

Pyrofax has been developed to meet the needs of suburban and rural homes for an economical, efficient and dependable gas supply. Wide experience in distributing compressed gases has enabled the CARBIDE AND CARBON CHEMICALS CORPORATION to perfect every phase of local service.

What Pyrofax Is

Pyrofax is a compressed hydrocarbon gas (not a liquid) derived from natural gas. It is used like city gas although its heating value is much greater. It burns with a hot, sootless flame.

Pyrofax is supplied in steel containers under moderate pressure. Each Type R container of Pyrofax holds the equivalent of approximately 5000 cu. ft. of city gas; smaller cylinders are also available. Two containers are furnished with each installation; one is in reserve while the other is in use.

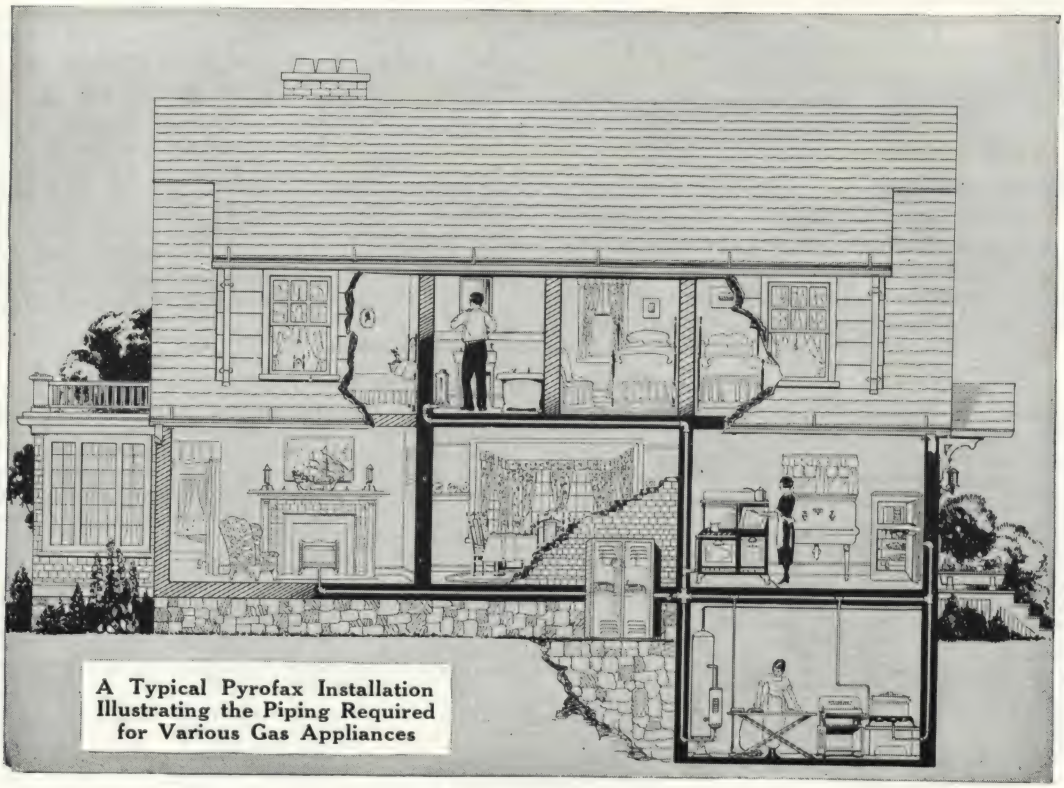
Pyrofax can be used with any standard gas range or other gas burning household appliance, permitting the homeowner to select domestic appliances from standard products of various sizes and prices. It is used with bunsen burners in laboratories and with all standard industrial burners.

Pyrofax Equipment

A Pyrofax installation consists of the following equipment:

(a) A substantial enameled steel cabinet containing the controlling equipment and connections for two containers of Pyrofax. The controlling equipment automatically maintains a constant gas pressure at all appliances.

Type A Pyrofax Equipment



A Typical Pyrofax Installation Illustrating the Piping Required for Various Gas Appliances

Continued on next page

The steel cabinet, 55½ in. high, 36 in. wide and 18 in. deep, is placed outside the house on a small concrete foundation in some inconspicuous location—usually against the rear wall. The cabinet is coated with triple baked enamel of dull green to harmonize with adjacent shrubbery or brickwork. The outfit shown below is the Type "A"; a smaller half-cabinet called the "BR" is also available for summer homes, camps, cottages, etc.

(b) Standard gas pipe, ½ or ¾ in., which conveys Pyrofax as a gas (not as a liquid) to the appliances.

(c) Gas burning appliances as required—kitchen range, laundry stove, clothes drier, mangle and hot water heater.

Installation of Pyrofax Equipment

The installation may be made by your own plumber or by our distributor in a few hours without disturbing the routine of your kitchen. Complete instructions are furnished with every Pyrofax outfit. Standard ½ or ¾-in. gas pipe and fittings are used—shellac only should be used on the joints. After the installation has been made and the equipment thoroughly tested, the gas is turned on and you are ready to "cook with gas." The cabinet is then locked and need not be opened until the first container is exhausted.

Pyrofax Unit Installed

Title to all the equipment except the two containers rests with the owner. The containers are lent free of charge—the customer is billed only for the gas contents. When a new container is installed the empty one is removed and returned to our nearest plant for refilling.

Standard Appliances Will Operate with Pyrofax

Leading types of gas appliances are adjusted at the factory for Pyrofax. All American Stove Company ranges (with or without the Lorain oven heat regulator), Chambers, Glenwood and Vulcan "Smoothtop" are some of the gas ranges adapted especially for use with this gas. However, any standard gas-burning appliance can be used with Pyrofax by a simple adjustment at the gas cock. This can be done by our representative when the equipment is installed.

Laundry stoves, room heaters, water heaters, hot plates or any other appliances can be supplied. In large homes and institutions standard hotel equipment can be used.

Underwriters' Approval and Insurance

The Underwriters' Laboratories, Inc., maintained by the National Board of Fire Underwriters to pass upon all equipment of this nature, has listed Pyrofax Equipment as "standard." This means that a Pyrofax installation does not increase the fire insurance rate.

Equipment, Installation and Operation Costs

The Type A equipment required for the use of Pyrofax costs $98.00 f.o.b. factory at Indianapolis, Indiana, exclusive of cost of initial supply of gas and cost of installation. Smaller, lighter duty equipment is available at lower prices. Equipment is supplied by leading household appliance dealers in all parts of the country. To this must be added the cost of the range and other appliances desired. The cost of installation should be included in the construction of the building, and can be estimated as the cost of piping the house for city gas.

The cost of cooking with Pyrofax for a family of four averages $4.00 to $7.00 per month. If other appliances are used, or if the family is larger, the cost is proportionately greater.

Specifications for Architects' Use

The following should be included in the plumbing specifications under the gas piping section:

This contractor shall supply and install, where shown on the architect's plans, one Type "A" Pyrofax Gas Equipment complete with outside cabinet as manufactured by the Carbide and Carbon Chemicals Corporation of 30 East 42nd Street, New York, N. Y.

Gas piping shall be of the sizes shown and located as indicated on the detail drawings. Piping shall be connected by this contractor (or by the local Pyrofax dealer) to the fixtures and all necessary adjustments on these fixtures for burning Pyrofax Gas shall be made by this contractor (or by local Pyrofax dealer).

Note: Any standard gas-burning appliance can be used with Pyrofax by a simple adjustment at the gas cock.

All appliances such as kitchen ranges, laundry stoves, clothes dryers, mangles, hot water heaters, etc., specified elsewhere in the plumbing specifications should be ordered "adapted for use with Pyrofax gas."

How and Where to Obtain Pyrofax Gas Equipment and Service

The diagrammatic map below shows the location of more than 600 plants, warehouses and sales offices of this Corporation and associated companies, established to serve customers in the United States and Canada.

Pyrofax gas is produced in the plants of the Carbide and Carbon Chemicals Corporation. Newly charged containers are shipped by the carload to hundreds of distributing stations throughout the country. Gas is delivered anywhere within 25 miles of one of these points. Consumers who live outside any of these delivery zones receive gas by common carrier from the nearest distributing station in smaller cylinders which are readily handled.

When the gas in one container has been exhausted, and the valve of the reserve container opened, the Pyrofax distributing station should be notified by telephone or postcard. The service representative will then deliver a fresh container, unlock the cabinet with his master key, uncouple and remove the empty container, place the full tank in the cabinet and connect it to the regulating system.

Write to the Pyrofax Division, Carbide and Carbon Chemicals Corporation, 30 East 42nd Street, New York, N. Y., for the name of the nearest dealer and nearest distributing station.

NATIONAL WARM AIR HEATING ASSOCIATION

A Co-operative Organization for Research and Education

3440 A. I. U. Building
COLUMBUS, OHIO

New Heating Developments

New standards of health and comfort in home heating have been established as a result of research sponsored by this Association. The Standard Code, a carefully drawn set of rules for the correct installation of warm air heating systems, has been adopted and given widespread application. It has been incorporated in the building ordinances of many large cities. New, accurate, and uniform warm air heater ratings have been put into effect.

This Symbol Denotes a Dealer Qualified to Install Warm Air Heat "According to the Standard Code"

The Association is a co-operative, non-profit organization of manufacturers interested in applying the most advanced scientific methods to warm air heating. In co-operation with the University of Illinois research has been carried on by the Association for the past twelve years; all laboratory tests being checked in the Association's Research Residence.

The Association furnishes free the following booklets: The Standard Code; Health and Comfort with Warm Air; and Warm Air Heating for Residences. Also Information and Sketch Blank, Warm Air Heating Agreement Form, and Standard Code Requirement Sheet.

Why Should Warm Air Be Specified

It Is the System That Produces Real Comfort—Comfort in the home consists of proper temperature, humidity and air motion. A warm air system is the only one that does anything more than produce temperature. It is, therefore, the only one that assures comfortable and healthful conditions in the home without special equipment or attention.

It Is Simple to Operate—A warm air system is simple in control, there being nothing but the arrangement of draughts to be considered. Various thermostatic controls are as easily applicable to warm air systems as to any others.

Its Performance Can Be Guaranteed—When a warm air system is specified to be installed "According to the Standard Code," its ability to maintain an inside temperature at 70 degrees can be depended upon. When so installed, it is the only system that can be guaranteed to produce home comfort.

It Is Economical to Operate—In many cases a warm air system requires less fuel for operation than other systems. Under no conditions of ordinary operation does it require more. With the exception of oil and gas, no special changes have to be made in the construction or arrangement of the furnace to operate on the various grades of both anthracite and bituminous coals, cokes, gas and oil.

It Gives Uninterrupted Service for Many Years and It Costs Less to Install—We believe it is the outstanding example of where the cheapest is unquestionably the best.

Standard Specifications

Owner's Responsibility—The owner shall obtain all necessary permits for the contractor to carry on the work. He shall see that no unnecessary restrictions interfere with the progress of the work and shall make payments promptly at the times agreed upon.

The owner reserves the right to reject any or all bids.

The owner or the general contractor shall do all cutting for pipes and registers, the same to be located by the heating contractor.

Heating Contractor's Responsibility—The heating contractor will refer all doubtful questions or misunderstandings, if any, to the owner for agreement, and in case of disagreement then to the architect, whose decision shall be final. Interpretation upon any point in question shall be obtained before proceeding with the work.

The heating contractor shall lay out his own work and be responsible for its fitting in place. He shall keep a competent foreman on the grounds when necessary and shall properly protect his work at all times, making good any damages that may come to it, or to the building, or to the work of other contractors from any source whatsoever, which may be chargeable to himself or to his employees in the course of their operations.

The heating contractor and his sub-contractors, if any, shall at all times co-operate with each other and with the contractors who may be employed by the owner or architect on the work. He shall install his material so as to meet the general convenience of all trades employed in the construction of the building, and shall time the delivery of materials and conduct his work in a manner so as not to cause delays or interfere with other contractors in the performance of their obligations.

No change in these plans and specifications will be allowed except upon written agreement signed by both the heating contractor and the owner.

These specifications with the accompanying plans and details (sheet ... to ... incl.) cover the purchase of all the materials as specified later (the same materials to be new in every case), and the installation of the same in a first-class manner within the above named building, located at ..... (street), ... (city), ... (state).

The heating contractor shall work in conformity with these plans and specifications and shall carry out their true intent and meaning. He shall in every detail install the heating system in accordance with the Standard Code Regulating the Installation of Warm Air Furnaces.

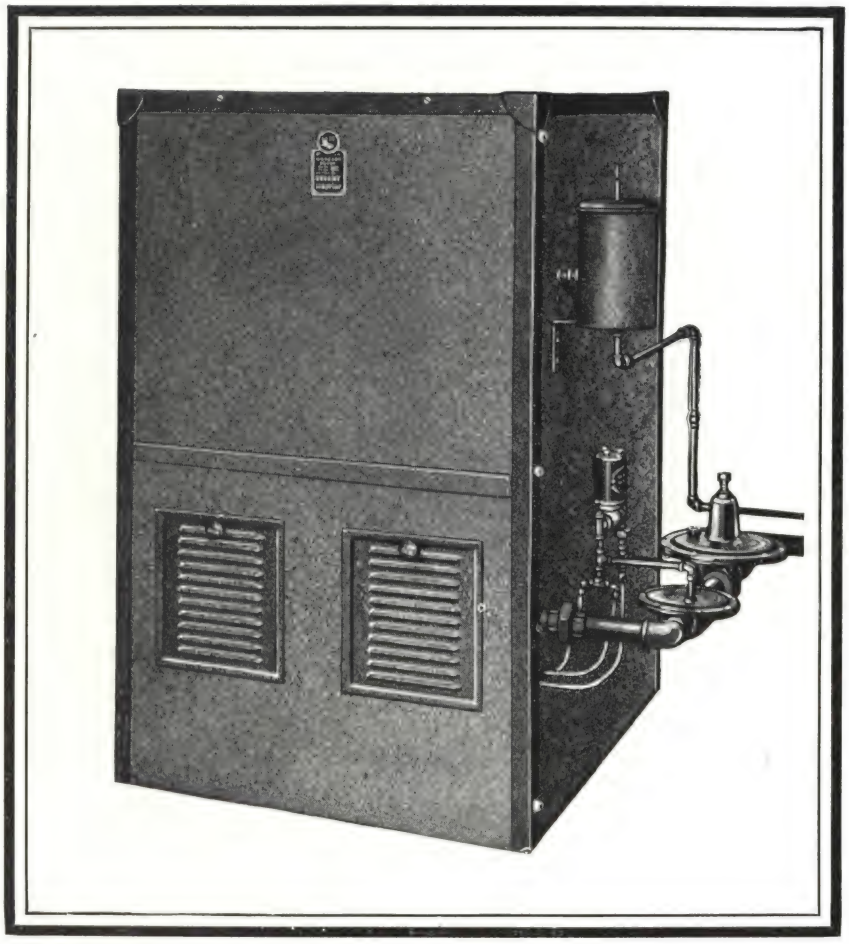
Furnace—The furnace to be used on this job will be .....
.....

Liability—The heating contractor shall be required to carry insurance covering the liability imposed by the Employers' Liability Law and Compulsory Compensation Act wherever this shall be required by any State law.

Guarantee—The heating contractor hereby assumes a guarantee to heat each room to an average temperature of 70° F., when the mercury on the outside is at zero, provided the user follows the directions for operating the furnace, and provided the heater is connected to a chimney of proper construction and capacity.

But nothing in the above guarantee can be construed as relieving the owner from full settlement for the installation because of failure to test due to no zero weather having been had.

THE PUP IS THE FURNACE MAN

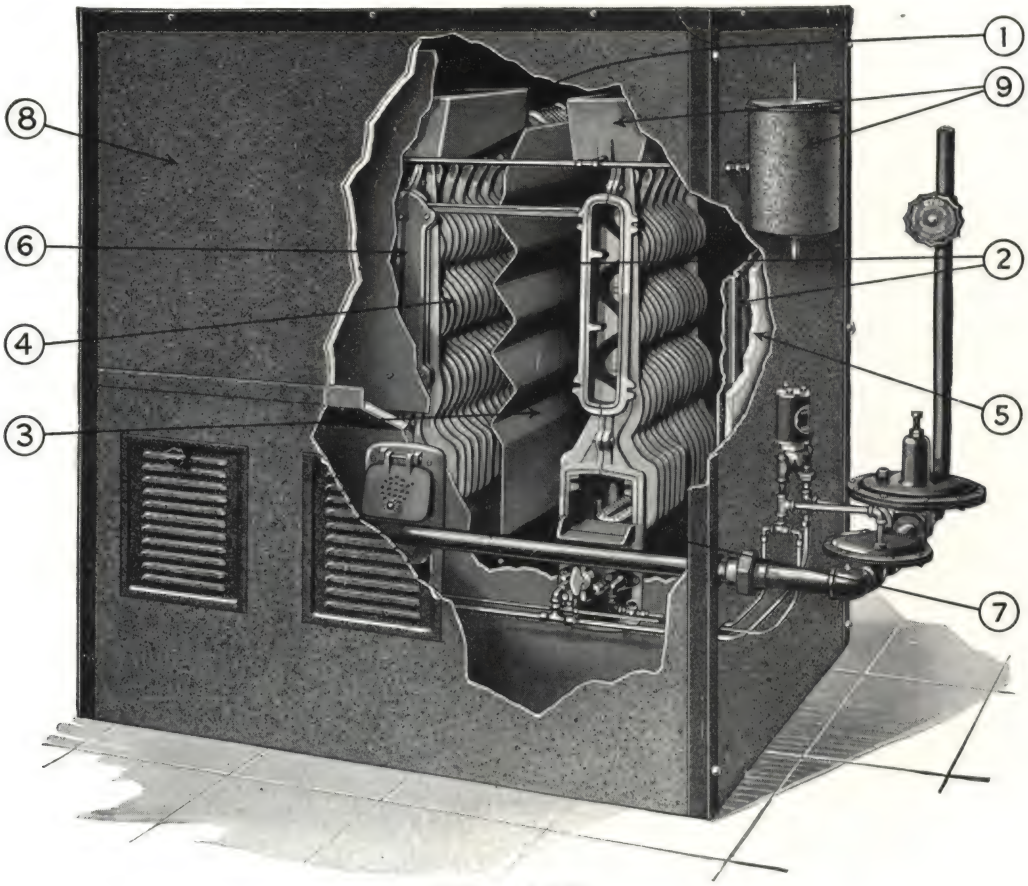


Handbook *on* Heating Buildings

with

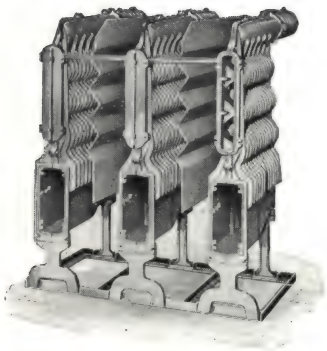
BRYANT GAS FURNACES

This Handbook on Heating Buildings contains a detailed description of all Models of Bryant Gas Furnaces and Controls, as well as technical information of value to the Architect and Heating Engineer.



CUTAWAY VIEW

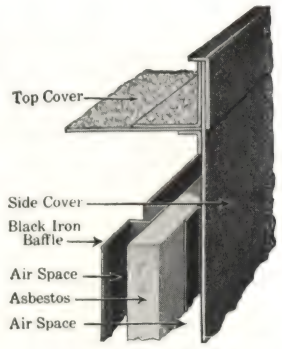
BRYANT WARM AIR FURNACE



THREE SECTIONS WITH BAFFLES

1. **UNIFORM DISTRIBUTION OF THE WARM AIR** is the result of a great deal of experimentation carried out in the Bryant laboratory in securing the correct relative location of the sections, jacket walls, and air inlets and outlets. A very uniform distribution of air flow and temperature is maintained over the entire area available for the attachment of warm air pipes.

2. **RADIATION SHIELDS** of black iron are placed midway between the sections and also between the sections and the cover. These shields intercept the radiant rays passing from one section to another and to the cover, thus adding two additional heating surfaces from which the warm air absorbs the heat.



TRIPLE INSULATED COVER

3. **LARGE FREE AREA** of furnace and bonnet is considerably in excess of the warm air leader area rating. This insures a pressure condition within the jacket, making an effective safeguard against reversal of flow of air through any of the warm air ducts.

4. **INDIVIDUAL CAST-IRON SECTIONS** with flue outlets extending outside of the furnace jacket are equipped with separate draft relief openings, thus insuring equal draft pull on all sections regardless of their location with respect to the flue manifold and chimney. A draft hood placed between the flue manifold and chimney is effective protection against down-drafts.

5. **TRIPLE INSULATED COVER** reduces radiation loss to a minimum (see lower right-hand illustration). Cover construction from inside out includes: (a) radiation shield; (b) air space; (c) heavy air-cell asbestos; (d) air space; (e) outside metal cover.

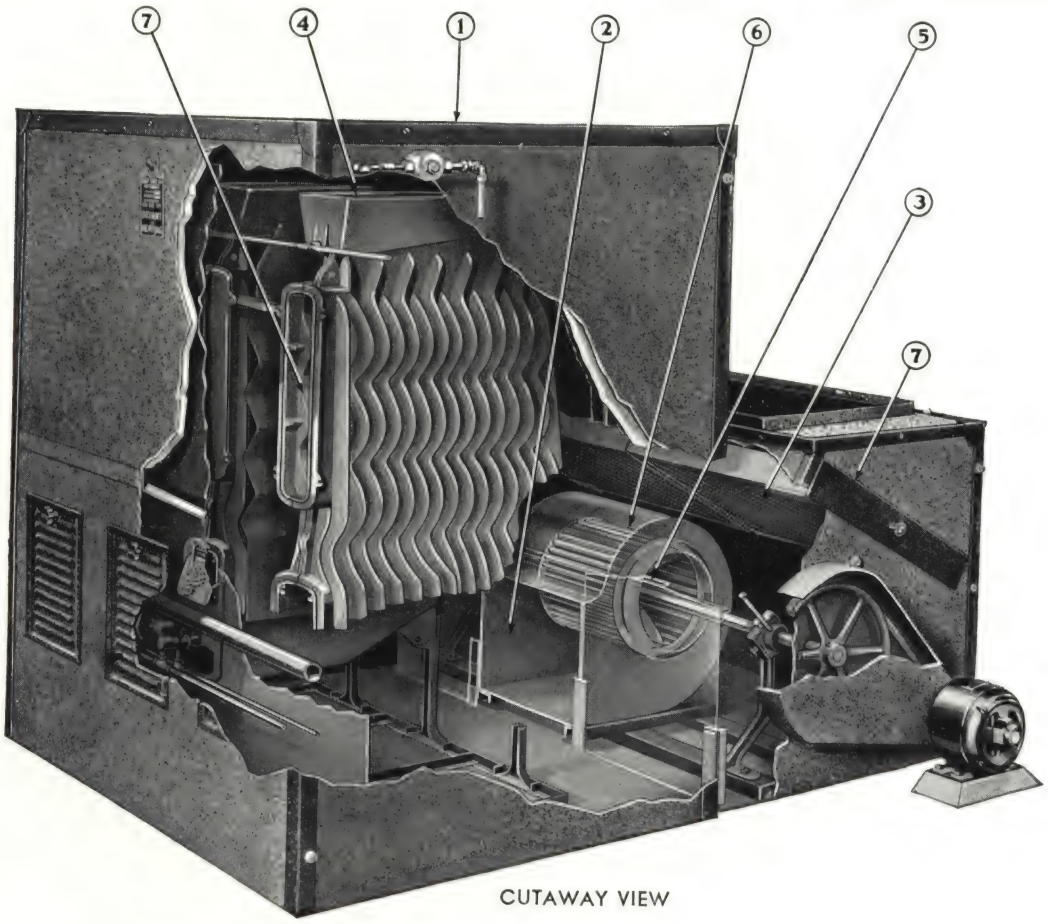
6. **CLEANOUT PANEL ON EACH SECTION** makes it possible to easily reach and clean all of the inside heating surfaces.

7. **SECTIONS HIGH ABOVE FLOOR** allow free passage of the cold air coming into the furnace.

8. **ENDURING CRYSTALLINE FINISH** adds to the handsome appearance of Bryant Furnaces. Manifold and burner cocks are enclosed.

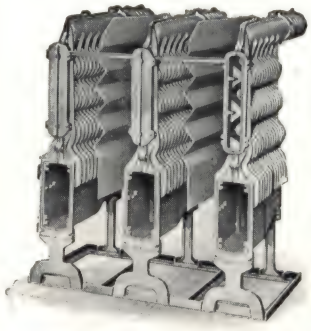
9. **BRYANT AUTOMATIC HUMIDIFICATION,** standard on all Bryant Furnaces, is adjustable for any degree of relative humidity that may be required within a wide range.

Continued on next page



CUTAWAY VIEW

BRYANT FORCED WARM AIR UNIT



THREE SECTIONS WITH BAFFLES

1. **LARGE VOLUMES OF LOW TEMPERATURE AIR** desirable for warm air heating systems are delivered by the Bryant Forced Warm Air Unit.
2. **EVENLY HEATED AIR HAVING POSITIVE CIRCULATION** is obtained by means of the blower type fan unit, similar in design and operation to the largest high-power blowers.
3. **WARM FILTERED AIR** free from dust and dirt gives greater health and comfort and a cleaner home in which to live.

BLOWER TYPE FAN ROTOR

4. **BRYANT AUTOMATIC HUMIDIFICATION,** standard equipment on all Bryant Furnaces, will give a control of relative humidity within a wide range. Note that the design of the water pans permits a variation in the exposed water surface, which makes possible this control.
5. **THE GRAVITY CAPACITY** of these units is approximately 75% of the forced feed capacity providing the warm air ducts are sized according to the standard code and the hand-operated dampers are in the open position.
6. **SLOW SPEED BLOWER TYPE FAN** is used, thus reducing to a minimum any vibration which might be caused by the air motion. No part of the blower assembly is in contact with either the unit casing or the furnace cover.
7. **HEATING SURFACES AND FILTERS** are easily accessible for cleaning.
8. **THE BRYANT FORCED WARM AIR UNIT** embodies all of the features attributed to the Bryant Furnace as given on preceding page in addition to those mentioned on this page.

Continued on next page

To Select the Appropriate Furnace

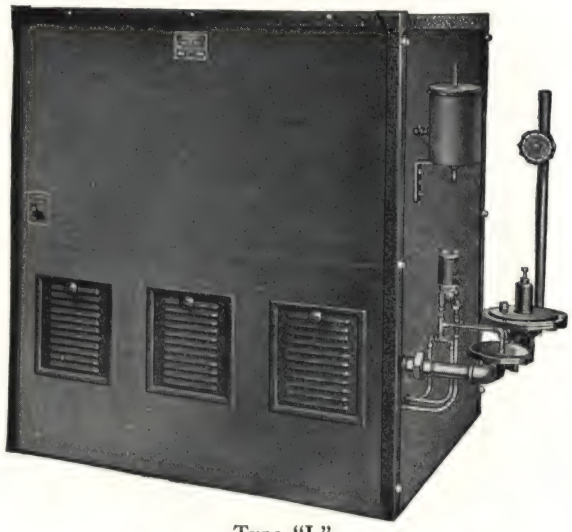
Bryant Gas Furnaces can be used with warm air heating systems of either the gravity or forced air type. They are completely automatic in their operation and are classified below according to the type of service they are adapted to.

Type "L" Furnaces

Type "L" Warm Air Furnaces operate on the gas-actuated control system; that is, the gas supply to the main burners is also utilized to operate the controls and all controls must be functioning properly before any gas can pass to the burners. They are equipped with a magnetic valve which can be operated by the thermostat of any standard room temperature control system. The following equipment is standard on Type "L" Furnaces:

- Thermostatic pilots
- Solenoid valve
- Snap valve
- Escapement burner
- Gas pressure regulator
- Labeled shut-off valve
- Draft hood
- Flue outlet tees
- Metal jacketed cover
- Tubing for controls
- Complete humidifier

Optional equipment: furnace temperature limit control.

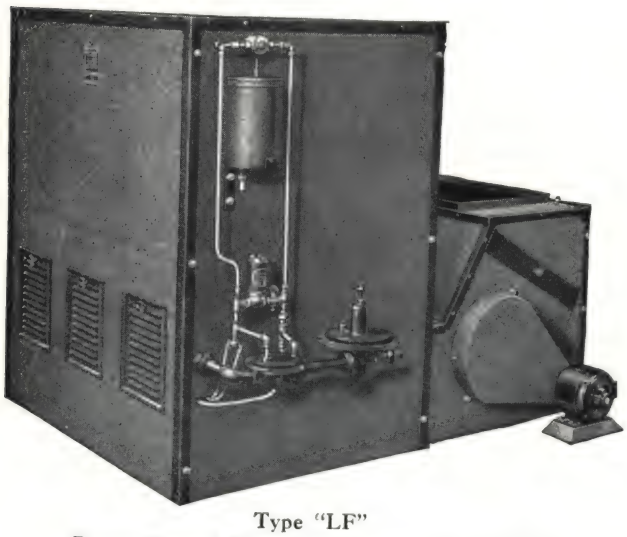


Type "L"
Bryant Warm Air Furnace No. 3-L-73

Type "Q" Furnaces

A lever operated gas control valve can be supplied on the above furnace in place of the snap valve, escapement burner and solenoid valve, as listed under standard equipment.

This furnace is designated as a Type "Q" Furnace. The limit control and thermostatic pilots cannot be used in conjunction with the Type "Q" Furnace.



Type "LF"
Bryant Forced Warm Air Furnace No. 3-LF-73

Type "LF" Furnaces

Type "LF" Forced Air Furnaces operate on exactly the same gas-actuated control system as described above in the text on Type "L" Furnaces. The magnetic valve can be operated by the thermostat of any standard room temperature control system. The following equipment is standard on Type "LF" Furnaces:

- Fan and filter unit
- Temperature limit control
- 2 pulleys and drive belt
- Thermostatic pilots
- Snap valve
- Complete humidifier
- Escapement burner
- Gas pressure regulator
- Labeled shut-off valve
- Draft hood
- Flue outlet tees
- Metal jacketed cover
- Tubing for controls

Note: The fan motor is not included in the above equipment, but can be furnished if desired.

Continued on next page

Guaranteed Ratings of Bryant Gravity or Forced Air Furnaces

Warm air furnaces are most commonly selected in accordance with the number of square inches of basement pipe area that they are capable of handling. In determining the proper size furnace, add together the square inches of basement pipe as determined from pages 5 and 6, keeping note of the separate totals for first and second floors. Refer to the table below, column headed "Total Area," and find which furnace will supply this area. Then see if it will handle this total area when it is divided between first and second floors as indicated by the separate totals. (The "basement pipe" or "leader" is the warm air duct leading from top of furnace to first floor register or to wall stack.)

Guaranteed Ratings

Furnace No.	Basement pipe area, sq. in.			Maximum B.t.u. per hour at bonnet	Furnace No.	Basement pipe area, sq. in.			Maximum B.t.u. per hour at bonnet
	First floor	Second floor	Total			First floor	Second floor	Total	
2	525	0	525	70,400	5	1310	0	1310	176,000
	445	50	495			1150	100	1250	
	365	100	465			990	200	1190	
	285	150	435			830	300	1130	
	205	200	405			670	400	1070	
	120	250	370			510	500	1010	
						350	600	950	
						190	700	890	
3	785	0	785	105,600	6	1570	0	1570	211,200
	705	50	755			1370	125	1495	
	625	100	725			1170	250	1420	
	545	150	695			970	375	1345	
	465	200	665			770	500	1270	
	385	250	635			570	625	1195	
	305	300	605			370	750	1120	
	225	350	575			170	875	1045	
	145	400	545						
4	1045	0	1045	140,800	7	1830	0	1830	246,400
	925	75	1000			1630	125	1755	
	805	150	955			1430	250	1680	
	685	225	910			1230	375	1605	
	565	300	865			1030	500	1530	
	445	375	820			830	625	1455	
	325	450	775			630	750	1380	
	205	525	730			430	875	1305	

Note: For fan capacities see page 8.

It is recommended that leaders, stacks, and registers be sized according to the method adopted by the National Warm Air Heating Association, the American Society of Heating and Ventilating Engineers, and the National Association of Sheet Metal Contractors, for both gravity and forced air systems. This method, known as "The Standard Code," is described in the next few pages. By using the Standard Code, no "factor of safety" is required in determining the furnace size, as all necessary allowances for radiation, starting and friction losses are made when the pipe sizes are calculated.

Continued on next page

To Determine Size of Warm Air Pipes for Residence Use

Basement Warm Air Pipe Sizes

	First floor rooms	Second floor rooms	Third floor rooms
Divide square feet of glass by	12	12	12
Divide square feet of net outside wall by*	60	60	60
Divide cubic contents by	800	800	800
Add together the above and multiply by	9	6	5

The result is the area of the basement pipe in square inches. (The "basement pipe" or "leader" is the warm air duct leading from the top of the furnace to the wall stack or first floor register.)

*The factor 60 is for buildings constructed as in Item No. 1, Table A. When other types of exposed walls or ceilings and floors are used, substitute the appropriate factor as given below.

Table A—Factors

Exposed Wall

No. 1—(a) Frame wall constructed of siding, paper, sheathing, studding, lath and plaster 60
(b) Same (1-a) construction substituting ½-in. fibrous board or equivalent for the lath 80
(c) (Same (1-a) construction with additional 3½-in. insulating fill between studding 140
No. 2— 9-in. brick wall plastered on one side.. 48
No. 3—(a) 9-in. brick wall air space, furred and plastered 65
(b) Same (3-a) construction substituting ½-in. fibrous board or equivalent for the lath 84
No. 4— 13-in. brick wall, plastered on one side 57
No. 5—(a) 13-in. brick wall, air space, furred and plastered 75
(b) Same (5-a) construction substituting ½-in. fibrous board or equivalent for the lath 97
No. 6— 4-in. brick, 4-in. or 8-in. hollow tile plastered 57
No. 7—(a) 4-in. brick, paper, sheathing, studding, lath and plaster (brick veneer)..... 68
(b) Same (7-a) construction substituting ½-in. fibrous board or equivalent for the lath 84
(c) Same (7-a) construction with additional 3½-in. insulating fill between studding 158
No. 8— 8-in. hollow tile, stucco and plaster... 52
No. 9—(a) 8-in. hollow tile, stucco, furred and plastered 75
(b) Same (9-a) construction substituting ½-in. fibrous board or equivalent for the lath 95

Ceilings with Attic Space Above

No. 10—(a) Lath and plaster without floor above.. 50
(b) Same (10-a) construction substituting ½-in. fibrous board or equivalent for the lath 70
(c) Same (10-a) construction with additional ½-in. fibrous board or equivalent nailed on top of joists..... 90
(d) Same (10-a) construction with additional 3½-in. insulating fill between joists 150
No. 11—(a) Lath and plaster with tight floor above. 90
(b) Same (11-a) construction substituting ½-in. fibrous board or equivalent for the lath 104
(c) Same (11-a) construction with additional 3½-in. insulating fill between joists 160
No. 12—(a) Metal without floor above..... 40
(b) Same (12-a) construction with additional ½-in. fibrous board or equivalent between metal and joists..... 65
(c) Same (12-a) construction with additional ½-in. fibrous board fastened on top of joists..... 85
(d) Same (12-a) construction with additional 3½-in. insulating fill between joists 145
No. 13—(a) Metal with tight floor above..... 75
(b) Same (13-a) construction with additional ½-in. fibrous board between metal and joists..... 95
(c) Same (13-a) construction with additional 3½-in. insulating fill.....150

Ceilings Without Attic Space Above—Part of the Roof

No. 14—(a) Lath, plaster, rafter, sheathing, any type of shingles or roofing..... 57
(b) Same (14-a) construction substituting ½-in. fibrous board or equivalent for the lath 74
(c) Same (14-a) construction with additional 3½-in. insulating fill.....130

Floors Over Exposed or Unheated Spaces

No. 15—(a) Double floor, on joists..... 42
(b) Same (15-a) construction with additional ½-in. fibrous board fastened to bottom of joists..... 88
(c) Same (15-a) construction with sheathing fastened to bottom of joists and with additional 3½-in. insulating fill between joists 140

Continued on next page

To Determine Size of Warm Air Pipes for Residence Use

Wall Stacks

First floor rooms—Same as area of basement pipes supplying them.
Second floor rooms—70% of area of basement pipes supplying them.
Third floor rooms—70% of area of basement pipes supplying them.

Transition Fittings or Boots

Area should be the same as that of stacks they supply.

Registers

The free area of each register should at least equal the calculated area of the basement pipe supplying it.

Furnace

Select furnace according to instructions and table on page 4.

Explanatory Notes

Note 1: In obtaining glass surface use full casement opening. An outside door is figured as glass.

Note 2: To obtain net outside wall, multiply height by width and deduct the glass in all windows and outside doors, as obtained in Note 1. For all rooms with attic spaces immediately above, full ceiling areas shall be taken into account, using Table A. Floors over unexcavated spaces shall be figured as 50% exposed wall, and fully exposed floors shall be figured as 100% exposed wall. For wall, floors and doors between heated and unheated spaces—use 50% of similar outside exposure.

Note 3: For rooms having unusual exposure, ordinarily north, northeast and northwest, add 15% to the calculated pipe area. For east and west exposure, add 10%.

Note 4: Use no basement warm air pipe less than 8 in. in diameter. If a basement warm air pipe figures greater area than any standard commercial size, then the nearest commercial size shall be used; provided, however, that the total pipe area shall in no case be less than the total requirements according to Sec. 1, 2 and 3.

Note 5: It is understood in using the above values for determining basement warm air pipe areas, that these pipes should be run comparatively straight and that they should not be over 12 ft. in length. Sharp turns and long pipes should have extra capacity. When warm air pipes exceed 12 ft. in length or have more than two 90° turns, the next larger commercial size pipe must be used.

Note 6: The value of 800 (used in cubic contents) is for an estimated air change of one room volume per hour. If it is desired to provide for 1½-room volumes, use the figure 600. If for 2-room volumes, use the figure 400.

Note 7: These formulæ are for 70° inside temperature with zero temperature outside. For a temperature of 10° below zero, add 10% to the capacity of each pipe.

Note 8: The factors 9, 6 and 5, are calculated for a register air temperature of 175°.

Examples

1—Basement pipe supplying first floor .....379 sq. in.
Basement pipe supplying second floor .....241 sq. in.
Total basement pipe.....620 sq. in.

The table shows that a No. 3 Furnace will handle 620 sq. in. of basement pipe that is divided between first and second floors in the assumed proportion. (See page 4.)

2—Basement pipe supplying first floor .....778 sq. in.
Basement pipe supplying second floor ..... 0 sq. in.
Total basement pipe.....778 sq. in.

The table shows that a No. 3 Furnace will handle 778 sq. in. of basement pipe that is divided between first and second floors in the assumed proportion. (See page 4.)

3—Basement pipe supplying first floor .....305 sq. in.
Basement pipe supplying second floor .....450 sq. in.
Total basement pipe.....755 sq. in.

Although the table shows that a No. 3 Furnace will handle a total of 755 sq. in. of basement pipe, it will be noted that it will handle this only when the larger part of it supplies first floor rooms. To handle 755 sq. in. of basement pipe, divided between the first and second floors in the assumed proportion, a No. 4 Furnace is required. (See page 4.)

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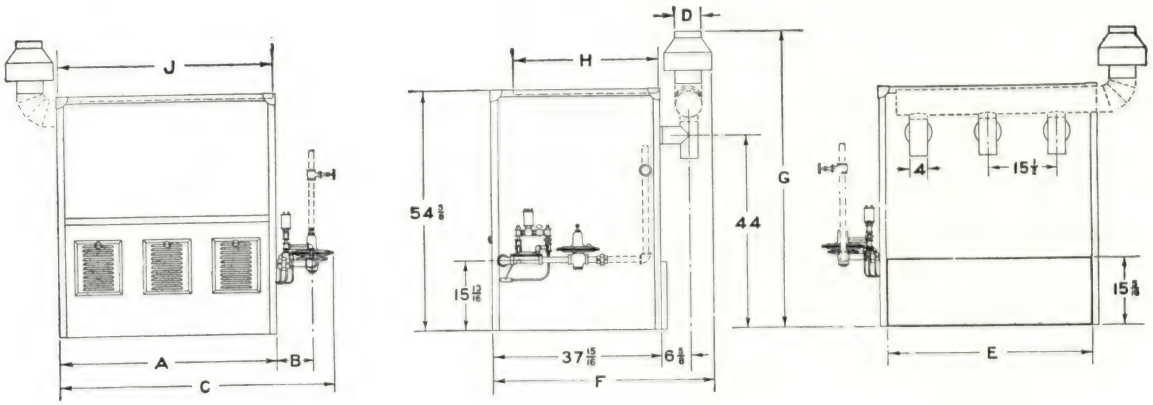
Principal Dimensions of Bryant Furnaces



Dimensions of Furnaces—Types "L" and "Q"

(Dimensions in Inches)

Furnace No.	A	B	C	D	E*	F	G	H†	J†
2	33 1/2	8 7/8	47 1/4	5	30 1/2	49 1/4	65 1/2	32 3/8	32 1/2
3	49	8 7/8	52 3/4	6	46	50 1/8	67 1/2	32 3/8	48
4	64 1/2	8 7/8	78 1/4	6	29 1/4–29 1/4	50 1/8	67 1/2	32 3/8	63 1/2
5	80	8 7/8	93 3/4	7	44 3/4–29 1/4	51	71	32 3/8	79
6	95 1/2	8 7/8	109 1/4	7	44 3/4–44 3/4	51	71	32 3/8	94 1/2
7	111	8 7/8	124 3/4	8	29 1/4–43 1/2–29 1/4	50 5/8	71 1/2	32 3/8	110

*Width of Cold Air Return ducts. Dimensions as given represent number, location, and size of return air openings, facing the furnace from the rear.

†Space for basement pipes leading to wall stacks and first floor registers.

Trimmings and Connections—Types "L," "Q" and "LF"

(For Manufactured Gas or Natural Gas)

Furnace size	Number of sections	Number of flue openings	Size of flue openings, in.	Size of flue to chimney, in.	Trim size, in.	Manifold size, in.	Capacity of meter	
							500 B.t.u.	1000 B.t.u.
2	2	2	4	5	1	1 1/4	176	88
3	3	3	4	6	1	1 1/4	264	132
4	4	4	4	6	1	1 1/4	352	176
5	5	5	4	7	1 1/4	1 1/4	440	220
6	6	6	4	7	1 1/4	1 1/4	528	264
7	7	7	4	8	1 1/4	1 1/4	616	308

Recommended Minimum Chimney Sizes

(Outside Dimensions of Standard Rectangular Tile)

Height, ft.	Gas consumption in thousands of B.t.u. per hour									
	100	200	300	400	500	750	1000	1250	1500	2000
20	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x13	8 1/2x13	13x13	13x13	13x18	13x18	18x18
40	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x8 1/2	8 1/2x13	13x13	13x13	13x18	13x18	18x18
60	7 1/2x7 1/2	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x13	13x13	13x13	13x18	13x18	18x18
80	7 1/2x7 1/2	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x13	8 1/2x13	13x13	13x18	13x18	13x18
100	7 1/2x7 1/2	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x8 1/2	8 1/2x13	13x13	13x18	13x18	13x18

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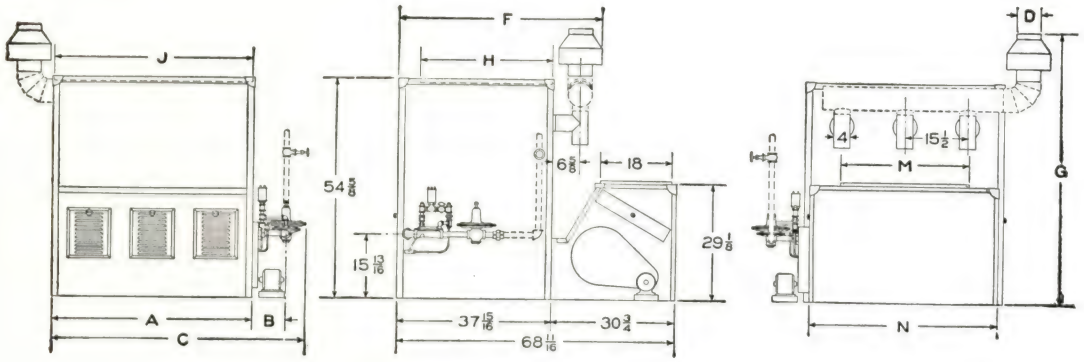
Principal Dimensions of Bryant Furnaces



Dimensions of Furnaces with Fan Unit—Type "LF"

(Dimensions in Inches)

Furnace No.	A	B	C	D	F	G	H*	J*	M†	N
2	33½	8⅞	47¼	5	49¼	65½	32⅜	32½	32	46¼
3	49	8⅞	52¾	6	50⅛	67½	32⅜	48	32	46¼
4	64½	8⅞	78¼	6	50⅛	67½	32⅜	63½	51	61¾
5	80	8⅞	93¾	7	51	71	32⅜	79	51	61¾
6	95½	8⅞	109¼	7	51	71	32⅜	94½	2–36	92¾
7	111	8⅞	124¾	8	50⅝	71½	32⅜	110	2–36	92¾

*Space for basement pipes leading to wall stacks and first floor registers.

†Width of cold air return ducts.

Specifications for Motors, Fans and Filters—Type "LF" Furnaces

Furnace size	Motor*—110 V. 60 cycle a-c. single phase						Number of filters	Fan			
	Type	Frame	Hp.	Wattage input	R.P.M.	Shaft, in.		R.P.M.	Air delivery		No. of fans
									C.F.M.	Static pressure	
2	5-KH	35-A	⅛	110	1725	½	2	480	850	⅛	1
3	5-KH	45-A	⅙	160	1725	½	2	600	1300	⅛	1
4	5-KH	45-A	⅙	170	1725	½	3	480	1700	⅛	2
5	5-KH	45-A	⅙	190	1725	½	3	540	2100	⅛	2
6	5-KX	53	¼	300	1725	⅝	4	600	2600	⅛	2
7	5-KX	53-A	⅓	350	1725	⅝	4	650	3000	⅛	2

*A motor is not included in the standard material furnished as given on page 3 unless specified on order. However a drive pulley and belt is supplied which will fit the above motors.

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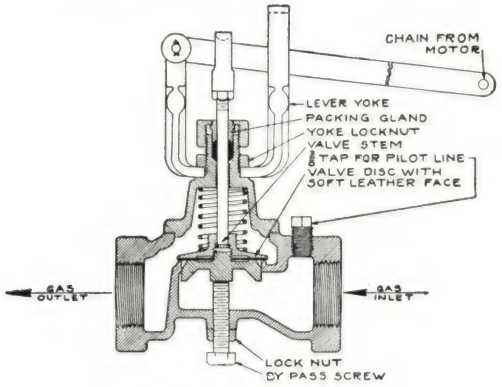
Bryant Gas Furnace Controls

Bryant Quick Action Valve



Quick Action Valve

The Bryant Quick Action Gas Valve constitutes the main gas control of Type "Q" Furnaces.

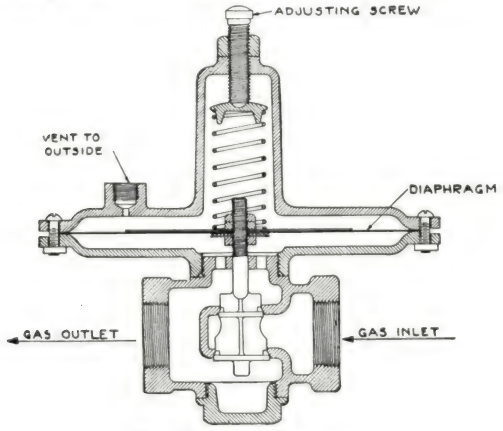
It is lever operating, actuated by regulators of the motor type. Valves open to full area on a very slight movement of the lever. The soft leather disc provides positive cut-off, and yet this disc is prevented from becoming cut by an exclusive Bryant patented feature. The valve is spring closing.

The lever is adjustable to any angle to the gas line and can be locked securely in position by means of a hexagon nut.

A ⅜-in. tapping is provided on the top of the inlet side of the valve for pilot line; or, if preferred, the valve can be by-passed by means of a throttling screw in the bottom.

The extreme simplicity and durability of the Bryant Quick Action Valve makes it a thoroughly dependable means of gas control for use where dual control is not desired.

Bryant Gas Pressure Regulator



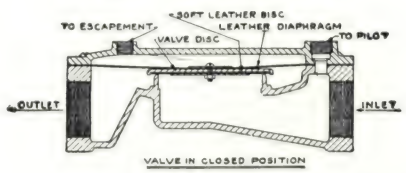
Gas Pressure Regulator

The Bryant Gas Pressure Regulator is standard equipment on all models and types of Bryant Furnaces.

This regulator maintains a constant pressure of 1½ oz. at the burners, at which the Bryant Furnace is designed to develop its rated capacity. This low pressure is maintained at all times, assuring an evenness of gas flow to the burners, regardless of outside fluctuations occasioned during peak demand periods. The large diaphragm insures a sensitiveness of operation and an instantaneous response to the slightest variations in pressure.

The durable construction of the Bryant Gas Pressure Regulator contributes to the years of care-free service of Bryant equipment.

Bryant Snap Valve



Snap Valve

The Bryant Diaphragm Snap Valve is the master control valve on Type "L" and Type "LF" Furnaces. When the furnace is in operation, the pressure of the gas supply holds the soft leather diaphragm off the valve seat (see sectional view). All the controls, such as room temperature control, furnace limit control, and pilot light control, operate this main, master valve.

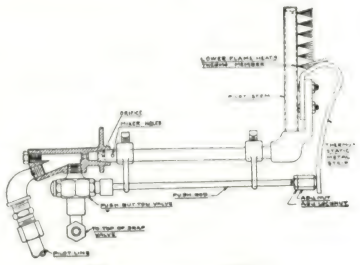
When any control is called upon to operate, it admits gas to the upper chamber of the snap valve, equalizing the gas pressure on both sides of the diaphragm, and the unfailing force of gravity shuts the gas off instantly and completely with a snap action. No springs are utilized.

A very slight movement of the leather disc opens the valve to full area.

Pilot and control line tappings are in top of the valve to prevent line trapping, and to facilitate installation.

Bryant Thermostatic Pilot

A pilot burner controlled by thermostatic element, which, when cold, opens a small valve, admitting gas to the upper chamber of the master control — the diaphragm snap valve.



Thermostatic Pilot

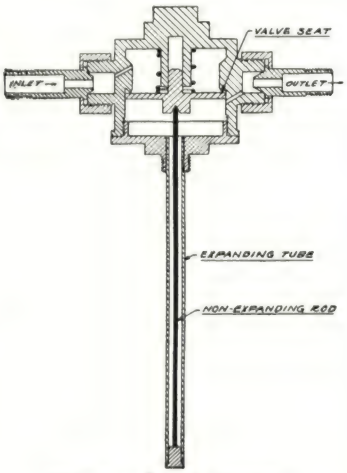
On furnaces where two or more pilots are provided, each works independently of the others, providing complete control of all burners.

Continued exposure to heat does not affect the pilot's adjustment. No flexible tubing or wires to require replacement.

All pilot burners are easily accessible for inspection.

Furnace Limit Control

The furnace temperature limit control, standard equipment on Type "LF" Forced Air Furnaces, optional on Type "L," operates to shut off the gas to the main burners if the furnace bonnet reaches a temperature of 200° F. This control is thermostatically operated, admitting gas to the upper chamber of the diaphragm valve when the maximum temperature is reached.



Furnace Limit Control

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Humidification

Complete automatic humidification is standard equipment on all Bryant Warm Air Furnaces. Any degree of relative humidity within a wide range may be obtained by the mere setting of the water level which governs the rate of evaporation of the water in the pans. Each section is equipped with its individual evaporator pan. The warm circulating air passing over the surface of the water in these pans absorbs the moisture, carrying it to the various rooms throughout the home, giving each room its proportionate amount of moisture.

This controlled weather, regardless of outside atmospheric conditions, gives a comfortable, healthful home in which to live, work or play. It also prevents cracking of plastered walls or wallpaper, and drying out of furniture and musical instruments due to lack of sufficient moisture in the atmosphere. The comfort chart, as published by the American Society of Heating and Ventilating Engineers, shows the proper relative humidity and temperature for greatest health and comfort for the average person to be 70% relative humidity and 68° F. room temperature. Under these conditions body heat is being dissipated at a normal rate to maintain temperature equilibrium. The same effective room temperature, giving equal body comfort, could be attained at lower relative humidities but would necessitate higher room temperatures. For instance, 70° F. room temperature at 50% relative humidity is considered to give the same degree of comfort, whereas 70° F. room temperature at 30% relative humidity is not considered a comfortable condition for the average person. The ideal living condition can be maintained in homes heated by Bryant Warm Air Furnaces.

Specifications for Bryant Warm Air Heating Systems

Furnace

Contractor shall furnish complete, and set up in basement in accordance with instructions furnished by the manufacturer, one No. .... Bryant Warm Air Furnace, Maximum Basement Pipe Rating .... sq. in., as manufactured by The Bryant Heater & Mfg. Company, Cleveland, Ohio. Furnace to be complete with gas pressure regulator, draft hood, triple insulated cover, labeled gas shut-off valve, humidifier, diaphragm snap valve, solenoid valve and thermostatic pilots (these controls are for a Type "L" Furnace; substitute "quick action valve and plain pilots" for last three items if a Type "Q" Furnace is specified; add "fan and filter unit and temperature limit control" if Type "LF" Forced Air Furnace is specified).

Installation of Furnace and Warm Air Piping

Contractor shall erect the Bryant Furnace in location shown on plans. He shall connect basement warm air pipes to top of furnace and shall install all warm air piping including basement pipes, wall stacks, transition fittings and registers in accordance with the Standard Code of the National Warm Air Heating Association.

Return Air Duct

The return air duct shall have a free area equal to the combined areas of the basement warm air pipes.

Metal Jacketed Cover

Contractor shall furnish and install triple insulated metal jacketed covering designed for furnace by the manufacturer.

Automatic Devices and Controls

Contractor shall install all automatic devices and controls in accordance with instructions furnished by The Bryant Heater & Mfg. Company; he shall install humidifier and make the requisite cold water connection thereto, furnishing and installing stop cock for same.

Gas Supply Line

Install .... in. gas line (one size larger than given under column headed "Trim Size" on page 7) direct from meter to labeled gas shut-off valve on furnace.

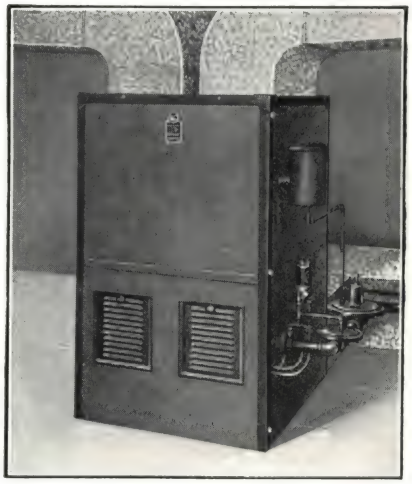
Flue Connections

Contractor shall connect flue outlets on furnace with a .... in. header, made from .... gauge (specify a corrosion resisting metal) and connect same to chimney with (size as given under column headed "Flue to Chimney" on page 7) .... in. .... gauge (specify a corrosion resisting metal) pipe, installing the draft hood in flue breeching between header and chimney.

Continued on next page

The Bryant national organization of gas heating engineers is thoroughly experienced in all phases of automatic gas heating practice.

It is a major part of this organization's business to give you whole-hearted co-operation on problems relating to the application of automatic gas heating.



THE BRYANT HEATER & MFG. COMPANY

FACTORY
17864 St. Clair Avenue
CLEVELAND, OHIO

Akron, Ohio
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Montreal, Quebec, Canada
Toronto, Ontario, Canada
Windsor, Ontario, Canada
Winnipeg, Manitoba, Canada

HOLLAND FURNACE COMPANY

HOLLAND, MICH.

The Holland Vaporaire System

Advantages

The Holland Vaporaire System is especially adapted for home heating.

(a) It burns all types of fuel—gas, oil, coal or wood—without waste. One may burn either bituminous or anthracite, including the small pea and buckwheat sizes, without changing grates; (b) low maintenance and servicing cost; (c) economical in the use of fuel; (d) efficient heat transfer from the fuel to the air; (e) provides healthful heat because it furnishes humidity, air circulation and moderately warmed air; (f) prevents cold floor drafts; (g) easy to operate; (h) it is flexible and can be operated in accordance with outdoor weather conditions; (i) it provides even temperature throughout the home; (j) it may be converted into a fan forced air system; (k) guaranteed heating service.

Construction

Holland Castings—(a) Made of the highest grade of cast iron; (b) without bolted joints; (c) minimum number of sections; (d) constructed of non-corrosive materials; (e) are of durable construction for long serviceable life; (f) no leakage of combustible gases or smoke into the air-heating chamber; (g) cup joints are deep and wide to allow for proper expansion; joints sealed with asbestos furnace cement made to our own specifications.

Furnace Base Plate—Cast in one piece with deep flange to allow proper sealing to ash pit.

Ash Pit—Deep, cast in one section, machined to fit over base.

Grate—Is of a special design. Operates on roller bearings; cast in one piece and slightly cone-shaped to keep the fuel rolling to the walls of the fire pot; thus, the burning fuels are in intimate contact with the casting surfaces providing maximum heating efficiency. The air slots are narrow, preventing fuel of the smaller sizes from dropping into the ash pit.

Fire Pot—Made in two sections to allow for expansion and contraction of the metal. The lower half is cast with funnel shaped air jets for injecting preheated air to unite with the combustibles.

Combustion Chamber—Designed to provide the maximum of space to complete combustion. Cast in one section to prevent smoke and gas leaking into the air-heating chamber.

Radiator—Cast in one piece (excepting the special and steel dome types) and is gas and smoke proof. The damper provides complete gas flow around the radiator before the hot gases enter the chimney flue, thus the maximum of heat transmitting surfaces is available.

Humidity

For healthful atmosphere the air must contain the correct amount of water vapor. Water pans do not materially increase humidity because they are lacking in evaporating area.

Humidifier—The Holland Humidifier is an integral part of every Holland Vaporaire Heating Unit. It is automatic in action. Water for evaporation flows through flexible copper pipe to the humidifier. Evaporates sufficient water to provide from 40% to 60% relative humidity. An overflow outlet allows the surplus water to saturate the ashes which eliminates dust when cleaning the furnace.

Aire-U-Well Fan

A product of the HOLLAND FURNACE COMPANY.

(a) It is placed in the air distributing chamber; (b) draws the cold air off the floor of the rooms and brings the warmer air down from the ceiling, thus the floors are always warm; (c) operates noiselessly; (d) increases circulation to provide from four to six air changes per hour in each room heated; (e) heats all rooms regardless of the direction of the wind outdoors; (f) increases over-all efficiency of the heating system; (g) reduces the heat loss through the heat conductor ducts; (h) prevents overheated furnaces; (i) lowers fuel consumption; (j) permits cooling of the home during hot weather; (k) its effect is equal to an electric fan in every room and creates a positive circulation of air throughout the home; (l) power consumption less than a cent per hour.

Holland Furnace with Sectional View of Aire-U-Well Installation

HOLLAND FURNACES, WEIGHTS AND CAPACITIES

No. of furnace	Diam. firepot, in.	Diam. casing, in.	Over-all height of casings, in.	Area of grate, sq. in.	Diam. of smoke pipe, in.	Wt. of castings and casings, lbs.	Gross rating, B.t.u.	Pipe capacity, sq. in.	Residence heating capacity cu. ft.
37	19	37	64	227	8	980	58,000	440	8,000
40	22	40	65	276	8	1085	71,000	520	13,000
45	25	45	66	355	8	1245	91,000	630	20,000
50	28	50	67	462	9	1500	122,000	810	28,000
60	32	60	69½	605	9	1990	156,000	1030	40,000

Guarantee Bond

The "Holland" Guarantee Bond is transferable from the builder to the ultimate home owner. This company assumes undivided responsibility for the performance of every Holland heating plant manufactured, sold and installed by the HOLLAND FURNACE COMPANY.

Holland Service

Every Holland Branch Office, of which there are over 550, is a permanent local institution. Holland engineers are trained to render efficient heating service to the public. They are especially well equipped to assist architects and builders in designing heating plants. If a building is so constructed that warm air heat is not practical they frankly tell you so. Architects familiar with Holland service usually select Holland Vaporaire heat for warm air installations.

Consult your telephone directory for address of nearest Holland Branch Office.

SINCE 1880

CAMPBELL HEATING CO.

Manufacturers of Campbell Fan System of Heating and Ventilating

DES MOINES, IOWA

Engineering Service

Our Engineering Department consists of trained graduate engineers backed by 50 years' practical experience. We will be glad to help solve any heating or ventilating problems or help with layouts and specifications for churches, schools, garages, or any large building.

Method of Designing Warm Air Fan System

(1) *Figure heat losses* including ventilation requirements if any, or the cubic contents for rough estimating, in buildings with average heat losses, such as churches, schools, etc.

(2) *Select heater* according to ratings given in third column of table which are conservative and have allowances included for quick heating of the building and a reasonably long firing period. If these capacities are used *we guarantee the heater for 10 years against repairs from any cause,* except the grates and according to other conditions given below. These ratings are based on coal having 12,000 B.t.u. per lb. and a 7-lb. combustion rate.

(3) *Air delivery* is based on the heat losses or the cubic feet per minute ventilation requirements, whichever is the greater. Where all recirculated air is used, the cubic feet per minute given in the table should be used or can be figured by the formulae $\text{C.f.m.} = \frac{\text{B.t.u.}}{\text{T}} \times .917$

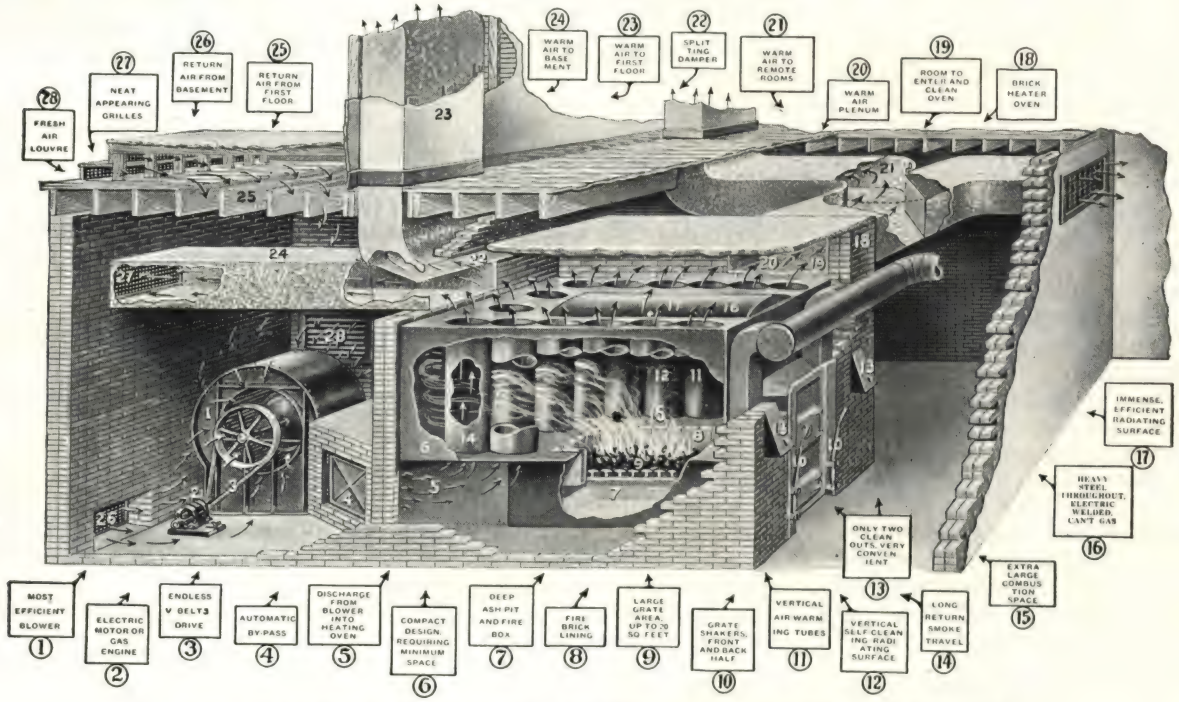
B.t.u. = Actual heat losses of the building not including ventilation requirements.

T = Temperature difference of the air entering and leaving the heater which is ordinarily 40° F. based on delivering the air to the rooms at 110° F.

(4) *Duct sizes* are based on 1 sq. ft. cross sectional area of duct carrying 30,000 B.t.u. per hour in the main ducts reducing to 20,000 for longer and smaller ducts and to as low as 10,000 in the longest and smallest ducts. The latter figures allow for cooling of the air and added friction to the flow of the air.

This duct system will make the static pressure of the entire system not to exceed ¼ in. which gives the maximum economy in operation. If the cubic contents of the building are used to get approximate duct sizes figure 1 sq. ft. of duct for every 6000 cu. ft. of space heated for the main ducts reducing to 4000 cu. ft. for the longer and smaller ducts and as low as 2000 cu. ft. for the smallest-longest ducts. Dampers should be provided for every branch or opening in the duct system so that any one room or any combination of rooms can be heated separately or so an even distribution of the heat can be obtained.

Our Engineering Department will be glad to check any layout or co-operate in working them out.



SIZES, CAPACITIES AND PRINCIPAL DIMENSIONS OF CAMPBELL FAN SYSTEMS

No.	Max. capacity B.t.u. per hr.	Capacity to use B.t.u. per hr.	Capacity cu. ft. space average building	Grate area, sq. ft.	Fire heating surface, sq. ft.	C.f.m. recirculation	Inside measurements of heating oven and fan room				Size smoke pipe, in.	Size chimney, in.	Min. height chimney, ft.
							Length, ft. in.	Width, ft. in.	Min. height, ft. in.	Feeding space, ft. in.			
805	612,000	306,000	69,000	5	170	7,000	8— 3	6—7	7—0	4—0	12	12x12	35
806	716,000	370,000	83,000	6	200	8,500	9— 0	6—7	7—0	4—0	12	12x16	35
807½	866,000	433,000	97,000	7.5	225	10,000	9— 9	6—7	7—0	5—0	12	12x16	35
808	1,200,000	510,000	115,000	8.1	289	11,700	10— 7	7—9	8—0	5—0	14	16x16	35
810	1,190,000	595,000	134,000	10.	320	13,600	11—11	7—9	8—0	6—0	14	16x16	35
812½	1,440,000	720,000	162,000	12.5	375	16,500	13— 0	7—9	8—0	6—0	16	16x20	40
815	1,730,000	865,000	1^4,000	15	450	20,000	15— 0	7—9	8—0	6—0	16	16x20	40
817½	2,000,000	1,000,000	225,000	17.5	525	23,000	16— 8	7—9	8—6	6—0	20	20x20	40
820	2,230,000	1,115,000	250,000	20	600	25,500	18— 0	7—9	9—6	6—0	20	20x20	40

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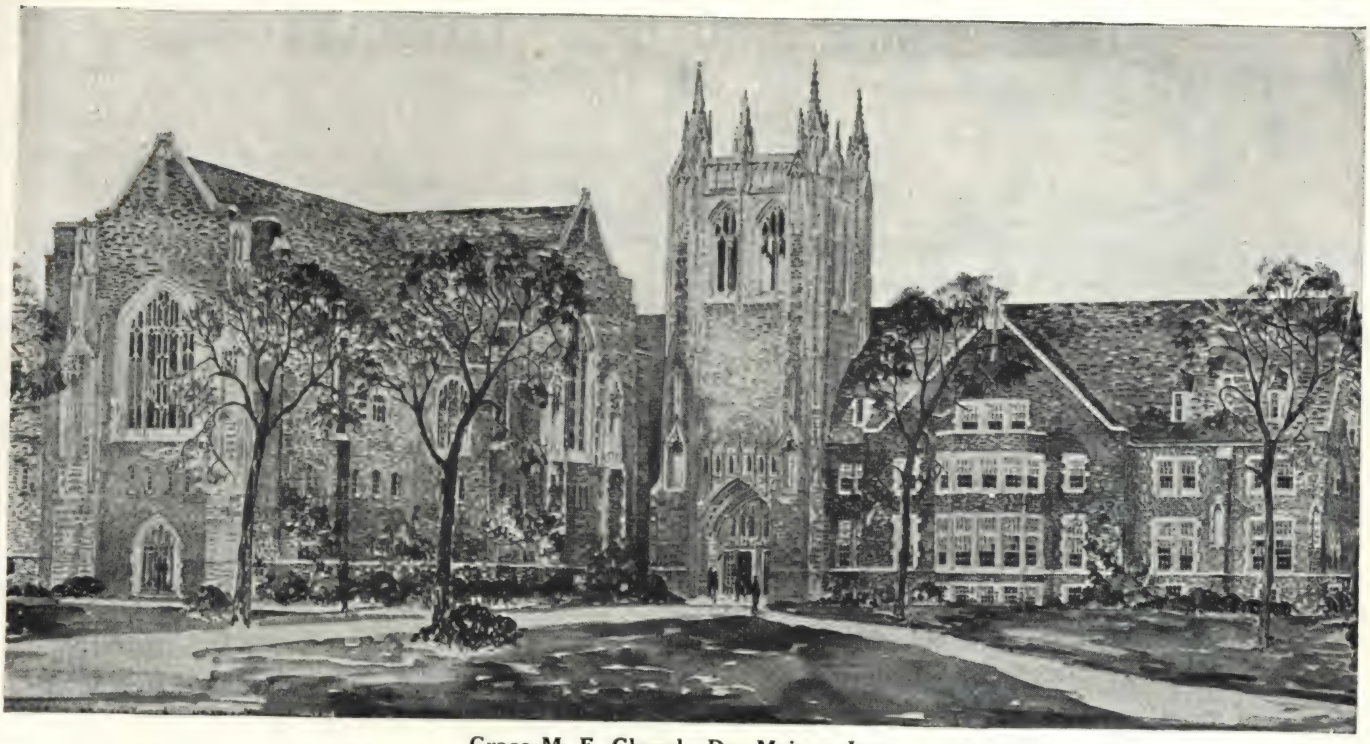


Grace M. E. Church, Des Moines, Iowa

VORSE-KRAETSCH & KRAETSCH, Architects, Des Moines

The many rooms of this large church have been evenly and comfortably heated since 1927 by a Campbell Fan System. In sub zero weather the entire building was heated in two hours having been unheated for several days previous. The large auditorium was heated in less than one hour. Tests by disinterested engineers show the over-all efficiency of this heating plant to be 70.6%.
The fan is used for ventilation in the summer making the building very comfortable

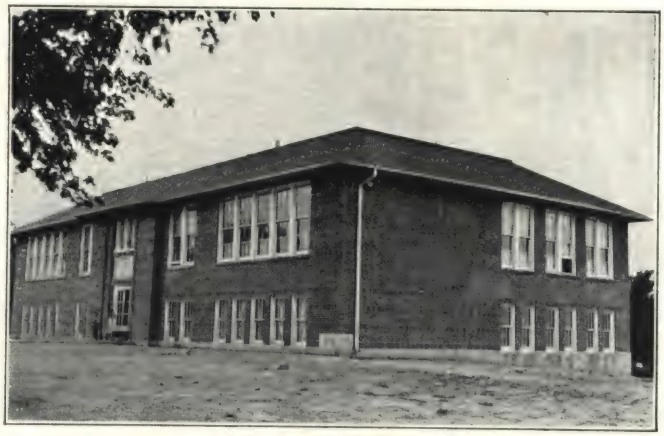
Heater

The heater is constructed of heavy boiler plate steel, riveted and electric welded so as to be permanently gastight. It has plenty of heating surface for maximum efficiency and very fine for burning oil. These surfaces are vertical and self-cleaning.

The heater includes brickset fixtures such as steel entrance door, warm air plenum thermometer, automatic humidifier pan, permanent sheet iron form for the concrete top of the heating oven, etc. The heater is ordinarily shipped welded and riveted as a unit but can be shipped in sections to go through a 26-in. door and assembled in the basement.

Guarantee

If the duct system is designed as described above or approved by our Engineering Department and the heater blower motor and drive are furnished by us and are according to our ratings we will guarantee the heater for 10 years against repairs from any cause with the exception of the grates, and will guarantee the heating of all rooms to which warm air is delivered at 70° in the coldest and windiest weather and will furnish the owner with a surety bond for one year to back up this guarantee.



Public School, Swan, Iowa

DOUGHER, RICH & WOODBORN, Architects, Des Moines, Iowa

This building heated for $216.81 worth of coal last winter. The school board is enthusiastic about the heating plant. The superintendent says it is fine. This is only one of more than 1000 buildings heated with the Campbell Fan System

Congregational Church, Vermillion, S. D.

BEUTTLER & ARNOLD, Architects, Sioux City, Iowa

It was at first thought that a Campbell Fan System could not be used in this building because of structural reasons. Our Engineering Department, however, co-operating with the architects, designed a satisfactory duct system that did not mar the appearance of the building

FOLLANSBEE BROTHERS COMPANY

Follansbee Fresh Air Heating System

GENERAL OFFICES
PITTSBURGH, PA.
MILLS: FOLLANSBEE, W. VA., and TORONTO, OHIO
OFFICES AND WAREHOUSES
DETROIT, MICH. INDIANAPOLIS, IND. ROCHESTER, N. Y. MEMPHIS, TENN. MILWAUKEE, WIS. CINCINNATI, OHIO
NEW YORK, N. Y. BUFFALO, N. Y. NASHVILLE, TENN. CHICAGO, ILL. CLEVELAND, OHIO PHILADELPHIA, PA.

For Follansbee Forge Roofing, see Manufacturers' Index

Follansbee Service to Architects

The service of experienced Heating Engineers is available to architects in solving problems involving heating layouts. Consult with our representatives in any district office.

The Follansbee Fresh Air Heating System

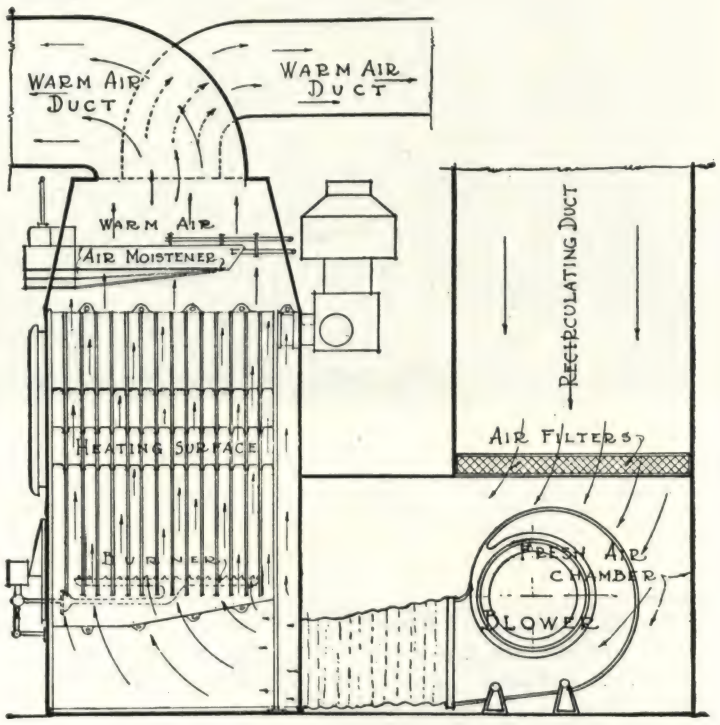
The Follansbee Fresh Air Heating System is adapted to small and large residences, small churches, schools and many other types of buildings.

The heaters, burners, controls and automatic equipment have met the requirements of the American Gas Association Testing Laboratories and the gas heaters bear their star of approval.

The equipment in the system is composed of standardized parts which can be assembled by the heating contractor on the job.

What the System Provides

(1) Heat to maintain proper temperature.
(2) Positive air circulation.
(3) Air cleaning.
(4) Correct degree of relative humidity.
(5) Automatic control.



TYPICAL CONSTRUCTION SECTION B-B

Details of Installation

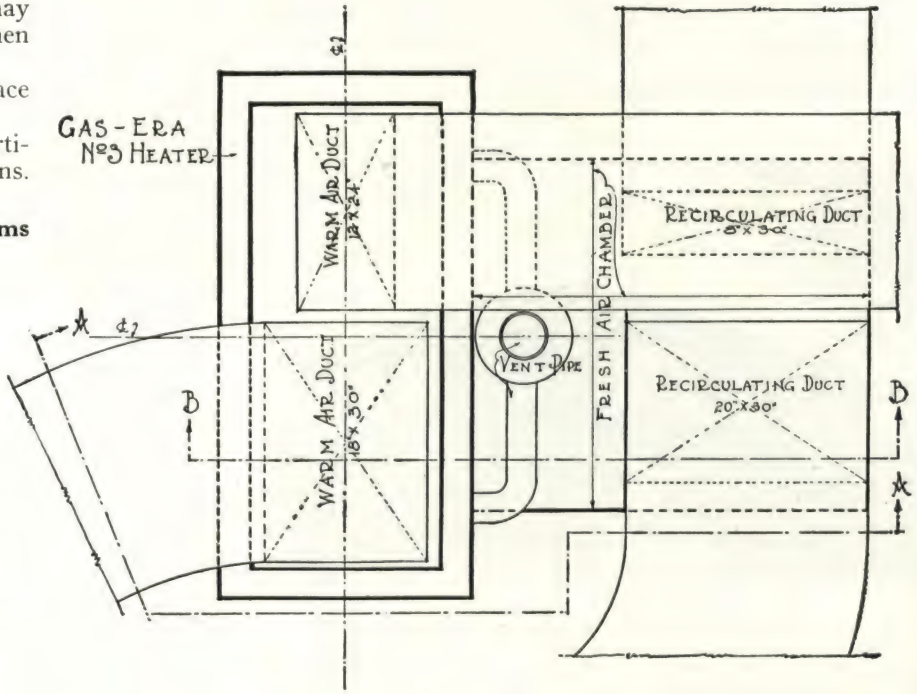
If desired, automatic louvers may be used for gravity operation when blower is not operating.

Round piping may be used in place of square ducts.

Air filters may be placed in vertical, semivertical or horizontal positions.

Follansbee Fresh Air Heating Systems Function as Follows

When the air in the house has cooled to several degrees below the required temperature, the room thermostat calls for heat. The electric circuit to the diaphragm gas valve closes and the valve opens. Gas flows to the main burner of the heater and the pilots ignite the gas in the burners. The diaphragm gas valve is automatically held open so long as the electric circuit from the room thermostat remains closed. This assures a continuous supply of gas to the burners. The air in the bonnet of the heater becomes warmed until it reaches the predetermined temperature. The fan

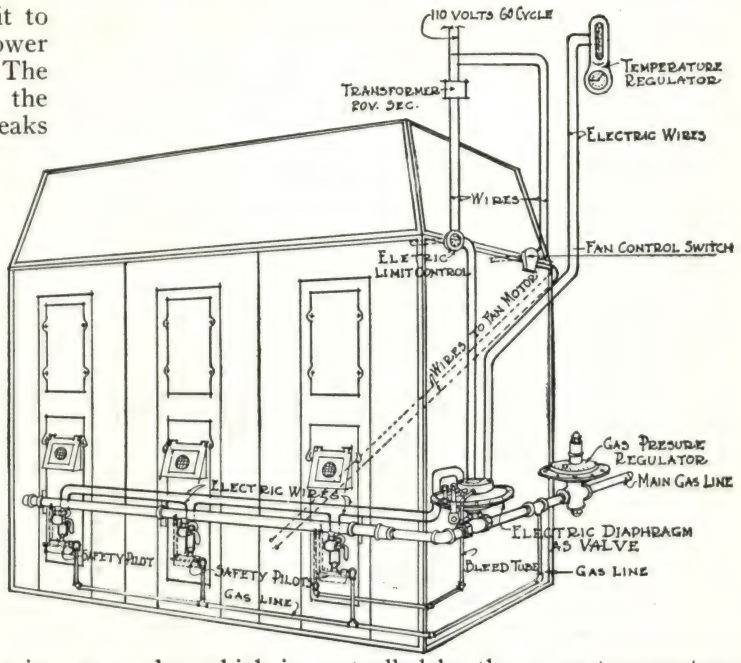


TYPICAL DETAIL PLAN C-C

Continued on next page

switch in the bonnet now closes the electric circuit to the blower which then begins to operate. The blower assures air circulation after the air is warmed. The room temperature now begins to rise and when the proper degree is reached, the room thermostat breaks the circuit and the flow of gas to the burner is stopped by the diaphragm gas valve.

The limit control acts as a safety switch. It automatically stops the flow of gas to the main burners when the temperature of the air in the bonnet of the heater has reached the predetermined high point. If cold air should strike the room thermostat for any reason, the limit control will prevent overheating the system by shutting off the gas supply. The thermostatic safety pilot is important. If, for any reason, the pilot flame should become extinguished, the circuit is broken and all gas to the safety pilots and to the main burners is shut off and all valves are closed.



Piping and Wiring Details

Electric power enters at 110 volts, 60 cycles—other specifications on special order—and continues unchanged through fan control switch to fan motor. Fan does not operate until temperature in bonnet has reached approximately 120° F. Fan continues to operate while temperature of bonnet is above that degree.

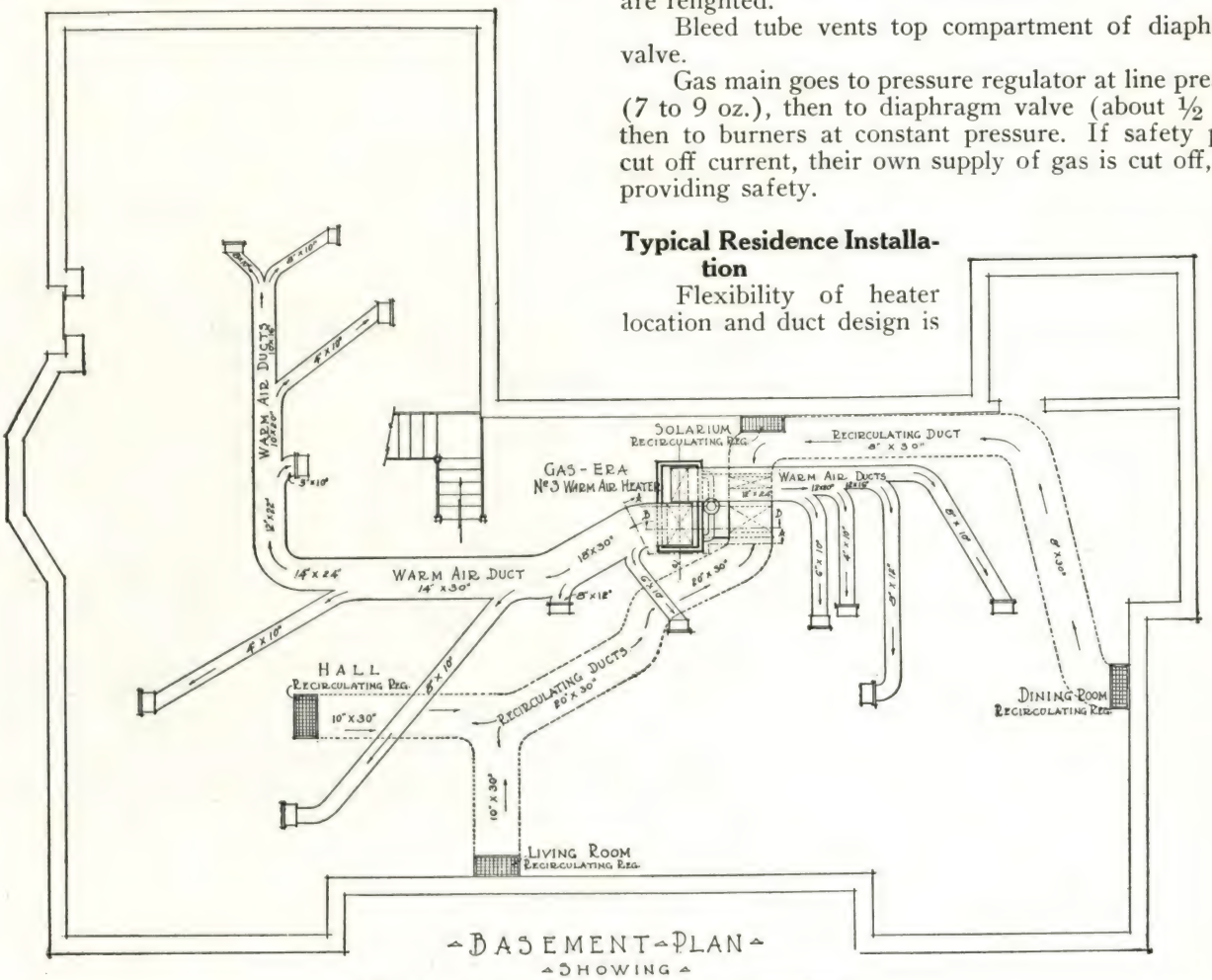
110 V. goes to transformer, then 20 V. Sec. to limit control (contact is broken if heat in bonnet goes over a predetermined temperature; thus preventing overheating unit); then 20 V. to electric diaphragm gas valve which is controlled by the room temperature regulator or thermostat. The temperature regulator opens or closes the circuit to the gas valve according to the heat desired in the rooms. (Room temperatures usually run from 68° to 72° F.) The safety pilots are wired into the system so that their sensitive bimetal tubes open the circuit if their flame is blown out. This stops the gas supply to the burners and pilots until they are relighted.

Bleed tube vents top compartment of diaphragm valve.

Gas main goes to pressure regulator at line pressure (7 to 9 oz.), then to diaphragm valve (about ½ oz.), then to burners at constant pressure. If safety pilots cut off current, their own supply of gas is cut off, thus providing safety.

Typical Residence Installation

Flexibility of heater location and duct design is



BASEMENT PLAN
SHOWING
FOLLANSBEE FRESH AIR HEATING SYSTEM

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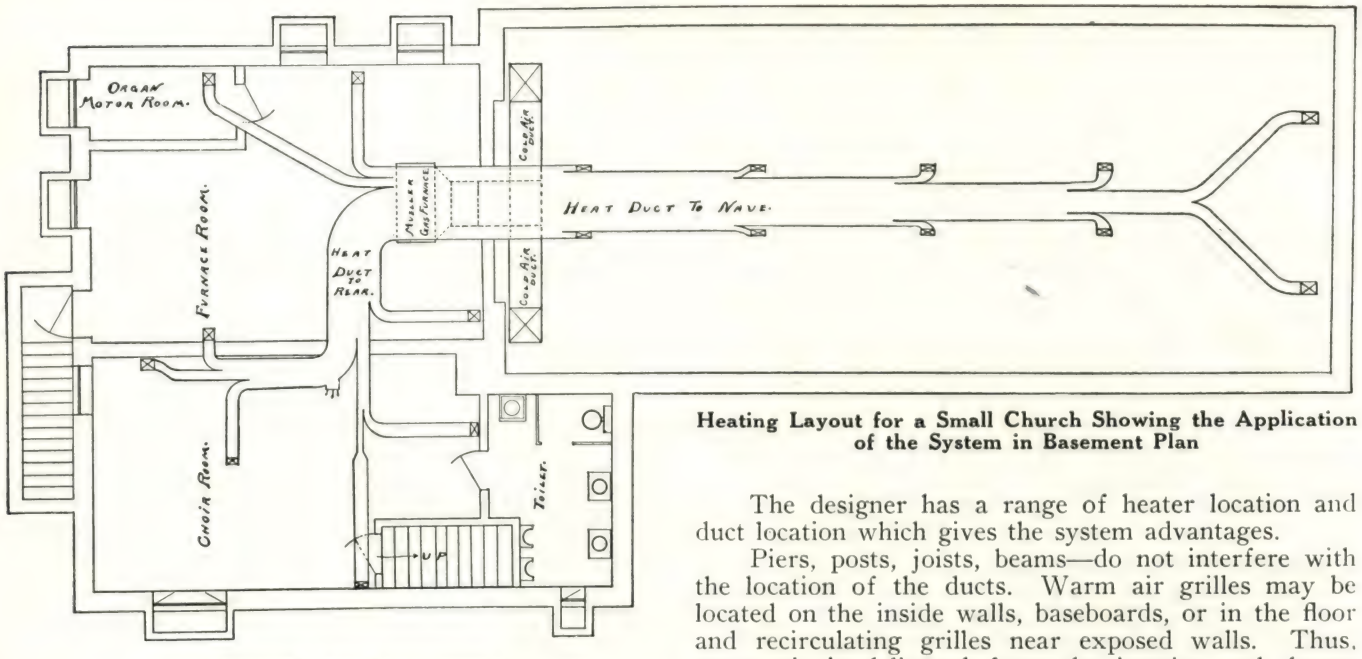


Heating Layout for a Small Church Showing the Application of the System in Basement Plan

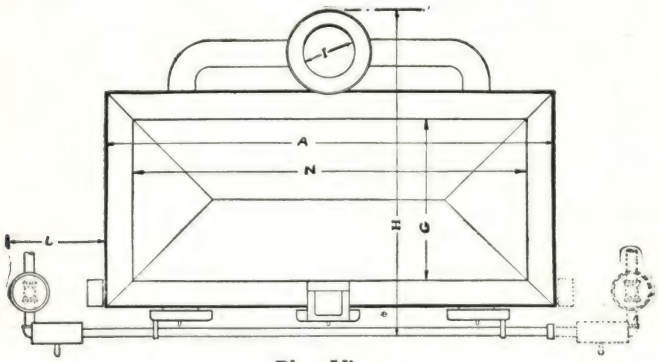
The designer has a range of heater location and duct location which gives the system advantages.

Piers, posts, joists, beams—do not interfere with the location of the ducts. Warm air grilles may be located on the inside walls, baseboards, or in the floor and recirculating grilles near exposed walls. Thus, warm air is delivered from the interior and drawn across the rooms to be heated in through the recirculating ducts, assuring higher temperatures near the floor and lower temperatures near the ceiling.

DIMENSIONS AND CAPACITIES

Heater No.	A. G. A. input rating B.t.u. per hour	Total load B.t.u. per hour	Capacity warm air pipes, sq. in.	Size gas supply tapping, in.
1 (10)	65,000	47,500	430	¾
2 (20)	130,000	95,000	860	1
3 (30)	195,000	142,500	1,290	1¼
4 (40)	260,000	190,000	1,720	1¼
5 (50)	325,000	237,500	2,150	1½
6 (60)	390,000	285,000	2,580	1½

accomplished by the blower which builds up positive pressures against the static pressures within the warm air ducts (⅛, ¼, ⅜, ½ in. or higher).

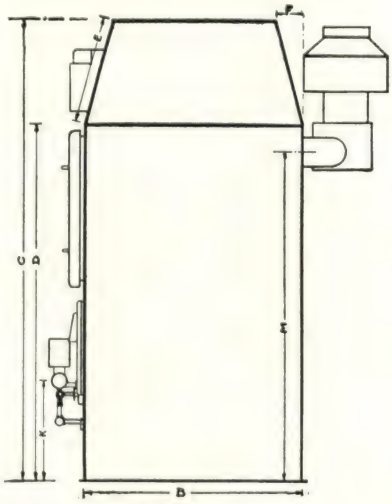


Plan View

Determining Size of Heaters

The proper method of determining the size heater necessary to heat a given building is on the basis of B.t.u. loss per hour. This should be calculated in accordance with the heat transmission formulas from the American Association of Heating and Ventilating Engineers' Guide.

When the Standard Code of the National Warm Air Heating Association is used to secure pipe areas, heater size should be selected on the basis of B.t.u. requirements. For gravity operation each square inch of first floor leader pipe area to be equivalent to 111 B.t.u.; second floor 167 B.t.u. and third floor 200 B.t.u.



Side Elevation

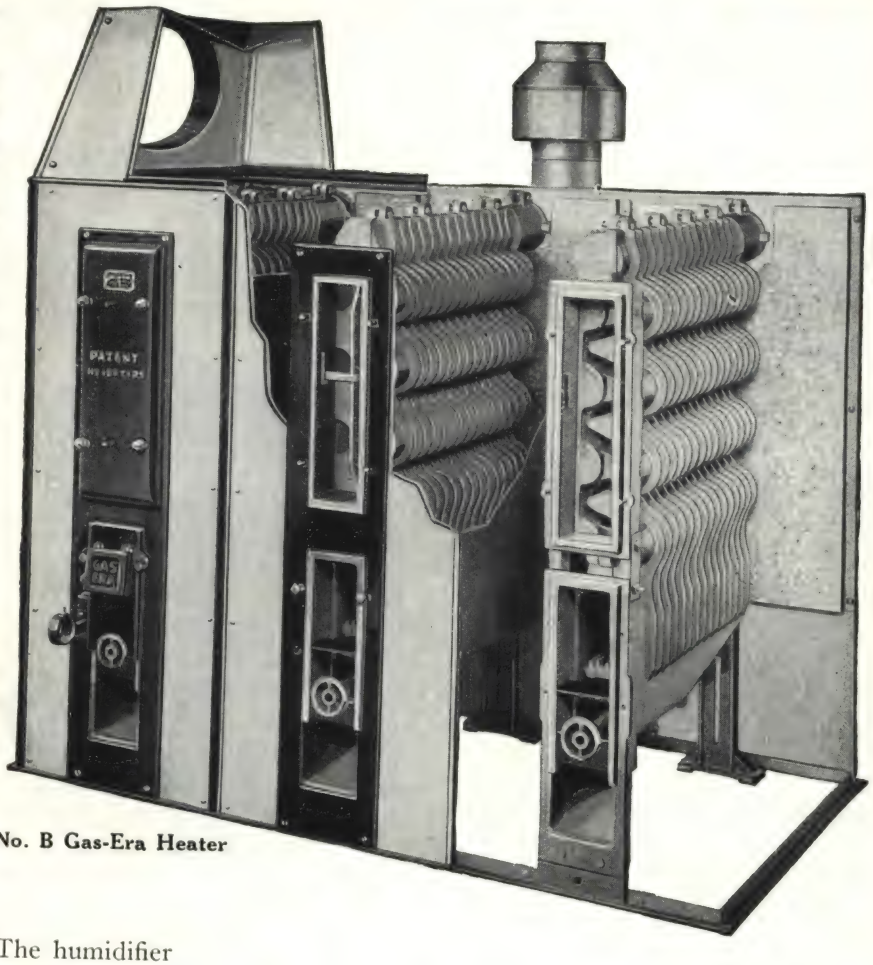
DIMENSIONS AND CAPACITIES

Heater No.	Number burners	Number sections	Gravity casing width per section, in.	Fan casing width per section, in.	Size, in inches										Gravity casing, in.	Fan casing, in.	Number and size of vents, in.
			A	A	B	C	D	E	F	G	H	K	L	M	N	N	I
1 (10)	1	1	21⅝	14 7/16	31½	66½	51½	15½	4	23½	44	14½	15	47¾	13⅝	6 7/16	1–4
2 (20)	2	2	43¼	28⅞	31½	66½	51½	15½	4	23½	47	14½	16	47¾	35¼	20⅞	1–6
3 (30)	3	3	64⅞	43 5/16	31½	66½	51½	15½	4	23½	48	14½	16	47¾	56⅞	35 5/16	1–7
4 (40)	4	4	86½	57¾	31½	66½	51½	15½	4	23½	47	14½	16½	47¾	78½	49¾	2–6
5 (50)	5	5	108⅛	72 3/16	31½	66½	51½	15½	4	23½	48	14½	16½	47 3/16	100⅛	64 3/16	1–6—1–7
6 (60)	6	6	129¾	86⅝	31½	66½	51½	15½	4	23½	48	14½	16½	47¾	121¾	78⅝	2–7

Continued on next page

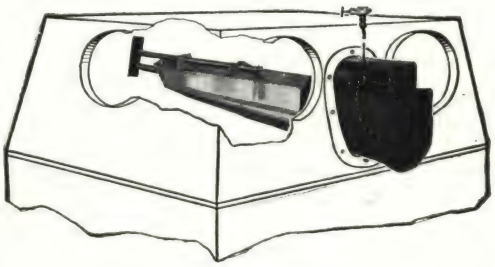
Design and Construction of Follansbee Gas-Era Heaters

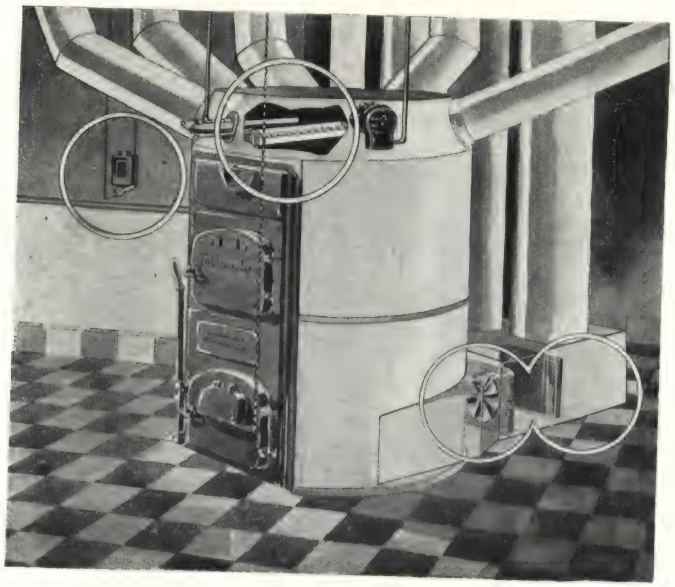
Follansbee Gas-Era Heaters are designed for gas only. The features of the design are economy in the use of fuel and dependable operation. The heating units are formed of two cast iron half-sections. The edges of the sections are surface ground and drawn together iron to iron, forming permanently tight connections. The exterior heating surfaces are heavily ribbed in order to present a greater heating surface and to strengthen the entire assembly. The gas travel is exceptionally long, passing through the sections of alternating concave and convex portions. The gases are confined to numerous small passages giving intimate contact with effective heating surface. Small combustion chamber and large heating surface are combined for high efficiency. Soot will not accumulate due to this design.



No. B Gas-Era Heater

The capacity of air to hold moisture increases as its temperature rises, therefore the automatic humidifier is a necessary part of the system so that the proper percentage of relative humidity may be constantly maintained. The humidifier is connected to the water supply and the flood valve maintains a constant water level in the evaporation pan. The amount of evaporation from the pan depends upon the temperature of air in the heater bonnet which is controlled from the room thermostat.





Automatic Controls—These controls consist of electric diaphragm gas valve and temperature limit control, thermostatic pilots, gas pressure regulator and temperature regulator or room thermostat. These controls are an essential part of the automatic system.

Coal Fired Furnace

The heating unit of the Follansbee Fresh Air Heating System may be cast iron or steel heaters designed for solid fuel. The Follansbee cast iron heaters are designed for coal or coke. If oil is desired for fuel, the Follansbee Steelclad heater is built especially for oil burners.

ESTABLISHED 1857

L. J. MUELLER FURNACE CO.

Gas-Fired Warm Air Furnaces

GENERAL OFFICES

337 So. Second Street, MILWAUKEE, WIS.

BRANCH OFFICES

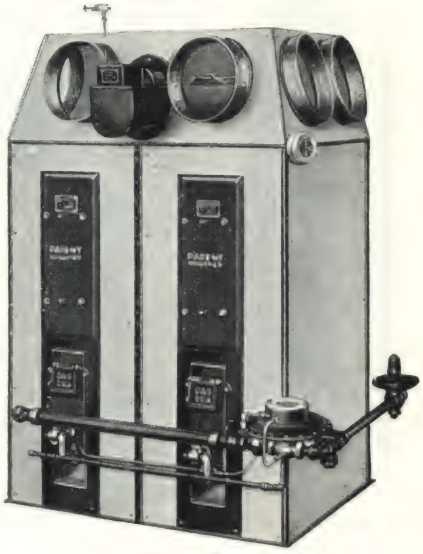
ST. LOUIS, MO., 4246 Forest Park Boulevard
MINNEAPOLIS, MINN., 631 Third Avenue, So.
MEMPHIS, TENN., Medical Arts Building
CHICAGO, ILL., 211 W. Wacker Drive
DETROIT, MICH., 2280 Fourteenth Avenue
SEATTLE, WASH., 2401-2405 Utah Street
BALTIMORE, MD., 909 Cathedral Street
SALT LAKE CITY, UTAH, 601 McIntyre Bldg.
LOS ANGELES, CAL., 5450 West Boulevard

Products

GAS-ERA GAS-FIRED WARM AIR FURNACES, all-cast; also pressed steel.

Also all-cast Warm Air Furnaces for any kind of fuel; Horizontal Tubular Furnaces for large schools and churches; Steam and Hot Water Boilers; Residence Garbage Burners; Hot Water Supply Boilers; Hot Water Coils. Complete catalogues on request.

For Mueller pages on Gas-Fired Steam and Hot Water Boilers, Air Conditioning Systems, and Registers, Grilles and Ventilators, see Manufacturers' Index.



No. 2 Gas-Era Furnace

Mueller Gas-Era Gas-Fired Furnaces

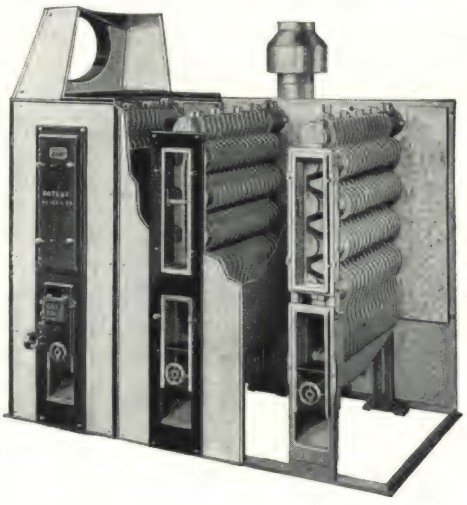
Uses—For heating every type of residence, school, church and store, either by gravity or with fan circulation.

The Mueller Gas-Era Furnace secures a maximum heat utilization from the gas burned. The correctly proportioned free area and ample space beneath sections, with provision for adequate return air connections at ends as well as rear, insure quick, uniform and positive heat delivery. The pitched hood aids proper heat distribution.

Construction—Gas-Era Furnaces are of multiple construction. Sections are all cast iron, without packed or puttied joints.

The heat retaining qualities of cast iron insure uniform temperature.

Sections are formed by two half-sections, accurately surface ground and drawn iron-to-iron, forming permanently tight connections. Their exterior surface is heavily ribbed, affording twice the surface presented by a smooth casting of similar design, and strengthening the entire assembly. Triangular baffles, filled with plastic material, are inserted horizontally, holding products of combustion in contact with the surface of the casting and securing maximum heat transfer. They also reduce the volumetric content of the flues, eliminating explosion hazards. The front cleanout extension renders the flue readily accessible.



Operation—All control equipment necessary to make the Gas-Era Furnace completely automatic in operation is provided. Automatic humidifier is regularly supplied. Limit control eliminates possibility of overheating. Electric diaphragm gas valve operated from room control turns gas on or off as required. Can also be furnished without automatic equipment for manual control.

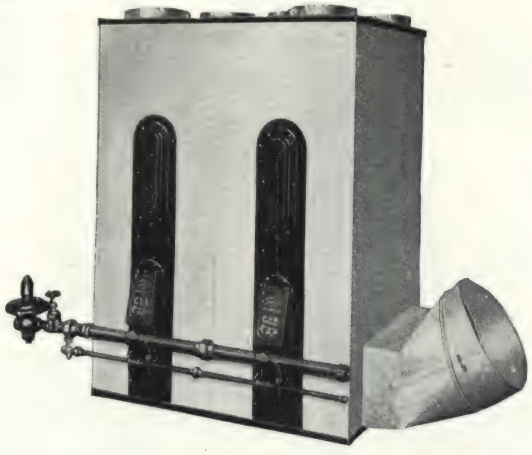
Forced Air Heating—Special casings and controls are supplied for forced circulation. Electric valves, with relays operating in conjunction with reverse-acting limit controls, which start fans when temperature rises and stops them when gas valve is closed, will be supplied where required.

DIMENSIONS AND RATINGS GAS-ERA CAST FURNACES PER SECTION

Width, in.	Depth, in.	Height, in.	A.G.A. input, B.t.u. per hr.	Net load, B.t.u. per hr.
21⅝	31½	66¾	65,000	47,500

Stock sizes up to and including ten sections. Larger units on special order.

Pressed Steel Gas-Era Furnace



DIMENSIONS AND RATINGS GAS-ERA STEEL FURNACES PER SECTION

Width, in.	Depth, in.	Height, in.	A.G.A. input B.t.u. per hr.	Net load, b.t.u. per hr.
20	31½	53	45,000	33,000

Note: Write for literature and complete data on this new, high-quality unit.

AMERICAN CHIMNEY CORPORATION

Perforated Radial Brick and Common Brick Chimneys

147 Fourth Avenue, NEW YORK, N. Y.

BRANCHES

PHILADELPHIA, PA., Stephen Girard Building
BOSTON, MASS., 141 Milk Street
CLEVELAND, OHIO, Penton Building
DETROIT, MICH., General Motors Building

Construction Data on Perforated Radial Brick Chimneys

In the rules and formula quoted below:
H = height in feet of chimney above foundation.
D = clear diameter in feet of the chimney at the top.

Foundation—The foundation should be round or octagonal for best distribution of the load.

The depth should be approximately $\frac{H}{25}$ but not less than 4 ft.

The width of the bottom slab should be approximately:

$$\frac{H}{10}+D$$

The resultant maximum compressive stresses will be found to be approximately 3 tons per sq. ft., suitable for sand or gravel bottoms.

Where the foundation meets the stack it should be approximately 9 in. larger than the diameter of the stack at its base.

Wall Thickness—Using a radial brick of medium strength the thickness of the brick wall in inches at any cross section should not be less than:

$$\frac{H}{9}+4 \text{ in.}$$

If a radial brick of superior quality is used, the bottom wall thickness may be reduced by 4 in.

The thickness of the wall at the top of the chimney should be at least 7 in. for chimneys of less than 7 ft. in diameter; 8 in. for chimneys 7 to 10 ft. in diameter; 9¼ in. for chimneys of larger diameter.

Batter—The batter of the chimney depends on the ratio of height to diameter.

The following will serve as a guidance:

H/D = 15; increase outside diameter of chimney by 2 ft. 3 in. for 100 ft. in height.

H/D = 20; increase outside diameter of chimney by 4 ft. for 100 ft. in height.

H/D = 30; increase outside diameter of chimney by 4 ft. 6 in. for 100 ft. in height.

Lining—A refractory lining should be provided in every instance. It should be equal to at least one-fifth of the height of the chimney in case of boiler plants; one-half height of the chimney for stacks carrying temperatures of 800° to 1200°, and a high grade fire brick lining for the entire height is necessary in case temperature exceeds 1500°.

The lining should start 2 ft. below bottom of flue opening, resting on a corbel. If there is danger that combustible materials may be carried over into the chimney and be ignited there the lining should start at top of foundation and the concrete should be protected by brick paving of at least 4½-in. thickness.

Base—If a common brick base is desired, it is generally built octagonal or square. The height should be approximately one-fifth of the total height of the chimney.

Wall thickness should be not less than

$$\frac{H}{9}+7 \text{ in.}$$

Flue Opening—The area of the flue opening should be approximately 10% larger than the clear area of the chimney at the top.

Satisfactory results in regard to draft hindrances as well as stability are obtained by making:

Width of flue = .60 D
Height of flue = 1.45 D

The I-beams over the top of the flue opening should be carefully protected by a masonry arch with ample clearance between I-beams and arch to take care of expansion.

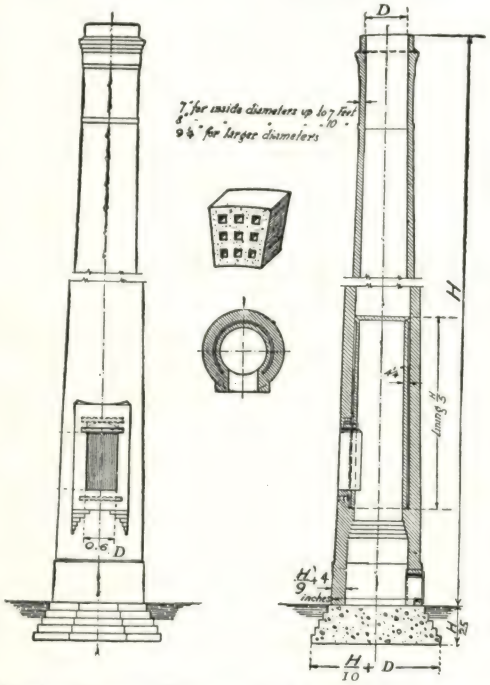
Lightning Rod—The lightning rod should have a point for every 3 ft. of circumference at top of the chimney. The points should be made of copper and should not extend more than 4 or 5 in. above top of the chimney as a protection against the effects of acids contained in the gases and to avoid swaying in the wind, resulting in a quick loosening of the brickwork. The cable should be at least $\frac{7}{16}$ in. thick and the earth terminal should consist of a copper cylinder of at least 4-sq. ft. contact surface.

Radial Bricks—The radial bricks should weigh approximately 120 lb. per cu. ft. when laid in the wall and their perforations should not exceed 25% of the area of the brick. No perforations should exceed 1 sq. in. in area, as otherwise in laying the bricks the perforations will be entirely filled up with mortar, defeating the purpose for which they are arranged. The water absorption of the bricks should be between 8% and 12%.

Steel Bands—Should be provided at least at the top and above and below the flue opening.

Step Irons—Step rungs should be of ¾-in. round iron with hooks at the end to secure them in the wall. They should be placed approximately 16 in. apart. An inside ladder is preferable to an outside one.

Cast Iron Cap—Chimneys should be provided with a sectional cast iron cap, especially in cases when they are operated periodically (as in heating plants).



Design Data—Chimney for Boiler Operation

Estimates

When asking for information or estimates on new construction, or repair or extension of existing chimneys, kindly advise on the following points:

(1) Intended use of chimney (boiler furnace, smelter, chemical plant, incinerator).

(2) Height above foundation and diameter or boiler horsepower or number and dimensions of boilers.

(3) If a bid is desired on foundation, give character of soil.

(4) Does chimney stand independent of building? If it is a part of the building, state for what height.

(5) Give hauling distance from purchaser's railroad siding or nearest railroad freight yard.

(6) If possible, give approximate prices of building materials and wage scale of local common labor.

Estimates furnished on inspection and repair of lightning rods, refractory linings for Steel Stacks, boiler brickwork and construction and repair of industrial furnaces.

CONTINENTAL CHIMNEY CO., INC.

Radial, Common Brick and Reinforced Concrete Chimneys

TELEPHONE
DEARBORN 6607

127 North Dearborn Street
CHICAGO, ILL.

BRANCH OFFICES
CLEVELAND, OHIO, Hunkin-Conkey Building
KANSAS CITY, MO., 2517 Jefferson Street
LOUISVILLE, KY., 420 Baxter Avenue
ST. PAUL, MINN., 204 Endicott Building

Products and Services

PERFORATED RADIAL and COMMON BRICK CHIMNEYS, Designed and Constructed for all purposes, and of all sizes.

OLD CHIMNEYS EXTENDED, REPAIRED, STRAIGHTENED, and POINTED while in operation; REPORTS and RECOMMENDATIONS on condition of old chimneys; STEEL STACKS LINED.

Chimney 250 ft. High by 12-ft. Top Inside Diameter, for Ford Motor Co., St. Paul, Minn.

Engineering Service and Facilities

Reliable information and recommendations will be given by our engineers regarding the proper dimensions of chimneys with full consideration of the purpose for which they are designed. Advice will be given as to boiler arrangements and other conditions.

Twenty-nine years' experience in building chimneys in all parts of the world enables us to render the most efficient and economical service in all the details involved.

Perforated Radial Brick Chimneys

The purest materials only are used in making the radial blocks and are chosen for their great refractory qualities and high crushing strength. These materials are so combined in the proper proportions as to insure a chimney with the maximum resistance to strains of every nature to which it may be subjected.

Radial bricks can be furnished in red or light buff color as desired.

Common Brick Chimneys

The CONTINENTAL CHIMNEY CO., INC., also builds round common brick chimneys of inside top diameter from 3 ft. 6 in. and larger.

These chimneys are just as good looking and durable as the radial brick chimneys; they have been in use for many years and have given universally good results and satisfaction.

Data Required for Chimney Designs and Estimates

Give all possible information regarding place, transportation, dimensions of chimney required, boiler horsepower, probable temperatures, etc.

State nature of soil where chimney will be erected.

Give local prices for necessary building material.

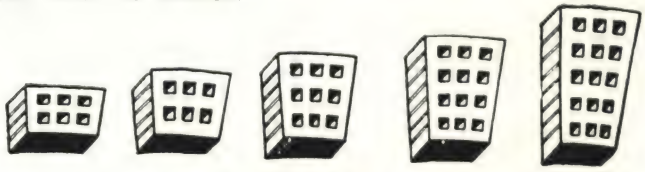
In accordance with the above information, designs and lowest estimates of the chimney needed will be submitted.

Chimney Repairing

Chimneys are extended with no interference to operation of plant. Old chimneys repaired, straightened, pointed and banded while in operation.

Dimensions or plan of chimney should always be given when requesting information or estimates on repair work or alterations.

We also make inspection of old chimneys and furnish reports on their condition.



Perforated Radial Blocks

Chimney 175 ft. High by 8-ft. Top Inside Diameter, for Atwater Kent Mfg. Co., Philadelphia, Pa.

ALPHONS CUSTODIS CHIMNEY CONSTRUCTION CO.

TELEPHONE
CORTLANDT 8428

95 Nassau Street, NEW YORK, N. Y.
CHICAGO, ILL., Marquette Building

CABLE ADDRESS
"CUSTOS, NEW YORK"

AMERICAN BRANCH OFFICES

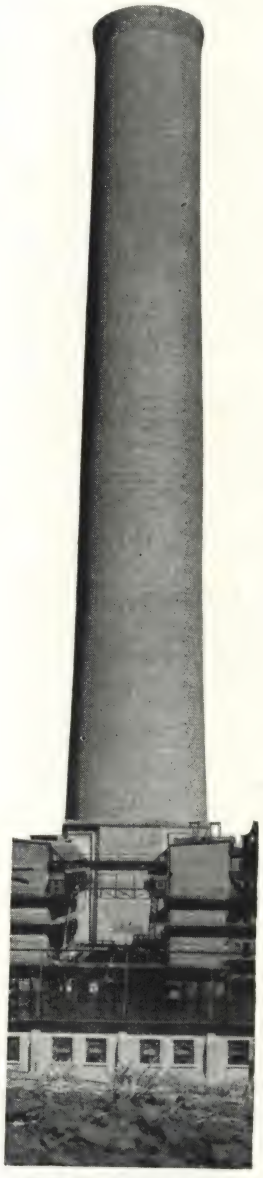
ATLANTA, GA., Forsyth Building
BOSTON, MASS., 51 Ellery Street
CLEVELAND, OHIO, 405 Caxton Building
CINCINNATI, OHIO, Union Trust Building
DALLAS, TEX., 720 Mercantile Bank Building
DETROIT, MICH., 725 Ford Building
INDIANAPOLIS, IND., 909 Roosevelt Building
LOS ANGELES, CAL., 804 Central Building
MILWAUKEE, WIS., 311 Knapp Street
MINNEAPOLIS, MINN., 459 N. W. National Life Insurance Building
PHILADELPHIA, PA., Land Title Building
PITTSBURGH, PA., 524 Bessemer Building
PORTLAND, ORE., 1119 Failing Building
RICHMOND, VA., 301 American National Bank Building
ST. LOUIS, MO., Syndicate Trust Building
SAN FRANCISCO, CAL., Sheldon Building
SEATTLE, WASH., L. C. Smith Building

CUSTODIS CANADIAN CHIMNEY COMPANY, LTD.

HALIFAX, N. S., 172-74 Lower Water Street
QUEBEC, QUE., 140 St. John Street
TORONTO 2, ONT., 250 Confederation Life Building
MONTREAL, QUE., 215 New Birks Building
BRITISH COLUMBIA: C. C. MOORE & Co., Standard Bank Building, VANCOUVER, B. C.

Products

Designers and Builders of PERFORATED RADIAL BRICK CHIMNEYS and REINFORCED CONCRETE CHIMNEYS of all sizes with FOUNDATIONS; ACIDPROOF CHIMNEYS; HIGH TEMPERATURE CHIMNEYS; BOILER SETTINGS and REFRACTORY BRICKWORK; REPAIRING and HEIGHTENING OLD CHIMNEYS; LIGHTNING RODS INSTALLED and REPAIRED.



Tallest and Largest Radial Brick Chimney in the World, Anaconda Copper Mining Company, Anaconda, Mont.

Height above grade, 585 ft. Inside diameter at top, 60 ft. Built in 1918

Engineering Service

Specifications, plans, designs and data furnished free on request.

This company with nearly 70 years of experience, is equipped to give expert advice as to the size of any kind of a chimney, for any purpose.

State conditions and results desired and our engineers will furnish the correct, efficient and economical size and design for that particular purpose.

The fact that there are over 12,000 Custodis radial brick chimneys in successful operation today is conclusive proof of their permanency, economy and efficiency.

Perforated Radial Brick Chimneys

The perforated radial blocks are made only from the purest clays, selected for high refractory powers and high crushing strength. All the radial blocks are formed to suit the circular and radial lines of each part of the chimney, so that they can be laid with thin, even joints and produce a regular smooth surface.

Moulded with vertical perforations, the radial blocks are most thoroughly and uniformly burned, materially increasing their density and strength.

Reinforced Concrete Chimneys

A monolithic tapering structure built of concrete reinforced vertically and horizontally with deformed steel rods and electrically welded rectangular wire mesh. This reinforcing is accurately determined and distributed in the walls to properly take all the stresses due to weight, wind and temperature. Forms both inside and out are made of steel. They can be adjusted to insure an accurate taper and any desired wall thickness.

Boiler Settings and Refractory Brickwork

We maintain a department for the setting of new boilers; overhauling of old boiler settings; the construction of oil stills, industrial furnaces and similar installations.

Repairing and Heightening

We repair brick chimneys, concrete chimneys and steel chimneys. Work done while in operation, if necessary.

We heighten old chimneys without interruption to the plant.

We demolish old brick, concrete and steel chimneys without danger.

We inspect all kinds of chimneys and make reports and recommendations on their condition.

Lightning Rods

Lightning rods installed and repaired.

Information Required for Estimates

Name of place where chimney is to be erected.
On what railroad siding is same located.
Distance from siding delivery to chimney site.
Is chimney to be used for boiler drafts or other purposes.
Give probable temperatures of the flue gases.
If for boiler draft, what is total horsepower.
Kind of fuel or coal to be used.
Dimensions of chimney required—diameter; height.
What is nature of soil where chimney will stand.
What is estimated safe load per square foot.
What depth of excavation is necessary to reach good soil.
Local prices—common brick, lime, cement, sand and concrete stone.

Text Book

Send for the free set of Custodis Text Books, S. A. 9, a technical treatise on the design and static calculations of chimneys and the determination of their proper sizes for particular installations. It is replete with valuable and heretofore unpublished information.

Reinforced Concrete Chimney, Northern Pacific Railway, St. Paul, Minn.

Height, 208 ft. Inside diameter at top, 8 ft.

H. R. HEINICKE, INC.

Builders of Radial Brick Chimneys

221 South New Jersey Street
INDIANAPOLIS, IND.

342 Madison Avenue
NEW YORK, N. Y.

FACTORY: NEWCOMERSTOWN, OHIO

SALES OFFICES
BOSTON, MASS. CHARLOTTE, N. C. PHILADELPHIA, PA.

Products and Services

Specialists for over 20 years in the design and construction of PERFORATED RADIAL BRICK CHIMNEYS and accessory structural members, including Foundations, Boiler Setting and Brick Furnaces.

Manufacturers of PERFORATED RADIAL BRICK.

Our Engineering Department will gladly advise as to your chimney requirements, and is prepared to furnish special drawings and specifications for architects and engineers.

Rush work a specialty. Material always ready for immediate shipment from the factory.

Inspection and Repair

We maintain a special Inspection and Repair Department for convenience of our customers. If you have trouble, wire us. Work done while chimneys are in operation if necessary. Lightning rods installed and repaired.

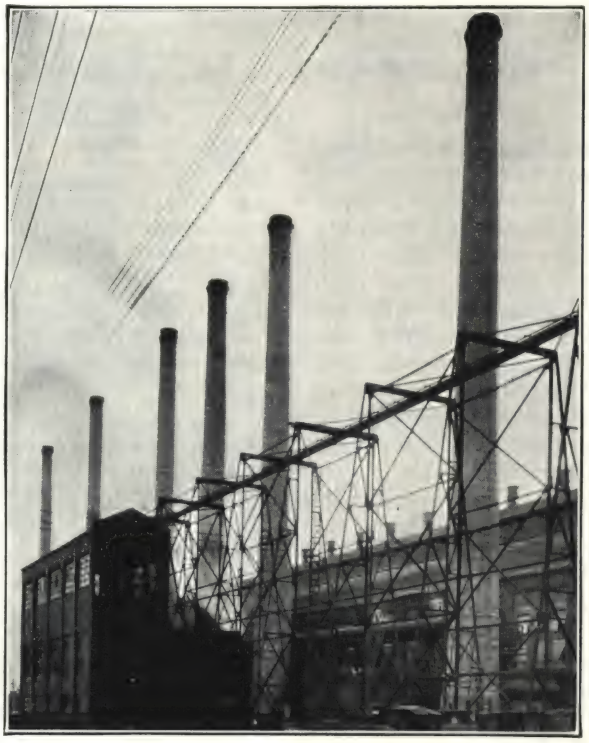
Advantages of Heinicke Construction

Heinicke Chimneys are constructed of specially moulded perforated bricks manufactured by the company itself. These bricks conform to the circular and radial lines of the chimney, producing, when in place, smooth and true inner and outer surfaces.

They are hard burned, regular in shape, sound ringing, weatherproof and acidproof, produced from selected, chemically tested and carefully proportioned refractory fire clay and shale.

The perforations permit of thorough burning of the bricks, assuring a product which is highly resistant to acids, heat, weather and other deteriorating influences.

Our brick plant is run as a part of the business and not as a separate enterprise. It is the only brick plant in the United States which makes a specialty of radial bricks. Radial bricks are produced by other brick makers simply as a side line in connection with their regular business and, of course, the same care and attention are not always given. Heinicke bricks are superior to the brick ordinarily used and are made by this company to maintain a high standard of excellence. Since we manufacture the brick and erect the chimneys with our own organization, full responsibility is assumed for results without question or argument.



Heinicke chimneys are bonded in each direction. This, with the concealed reinforcement employed, enables us to absolutely guarantee chimneys against cracking, except from unusual cause or abuse.

Heinicke designed chimneys have been erected in Europe and America and thousands are in operation today as examples of their success. As specialists in the engineering and designing of chimneys, this company's experience is available to engineers, architects, contractors and owners.

Features of Design and Workmanship

(A) Perforations in radial bricks form insulating dead air spaces in wall of chimney, which reduce radiation and prevent sudden temperature changes within chimney, resulting in a considerable saving in fuel. Mortar slightly extends into perforations, forming an anchorage that adds greatly to stability of chimney.

(B) Concealed steel bands are used in reinforcing chimney; these add materially to strength in resisting stresses due to expansion, and insure safety against cracking.

(C) The Heinicke system of bonding provides for breaking of joints between courses. Every course is thoroughly bonded through use of bricks varying in length from 4 to 10 in. This method of bonding gives greater strength and resistance to lateral stresses than other systems; the increase in strength over the common bond amounts to about 300%.

(D) Erection of chimney is done from inside, doing away with outside scaffolding and eliminating accompanying dangers to workmen as well as unnecessary cost.

Estimates

Please advise us on the following points:

(1) Distance from nearest railroad siding or team track.

(2) Intended use of chimney (boilers, furnaces, incinerators, smelters).

(3) Height and diameter, or boiler horsepower, or type, number and dimensions of boilers.

(4) Kind of fuel to be used.

(5) Character of soil for foundation.

(6) Approximate price of cement, lime, sand, gravel, crushed stone and common hard brick, delivered at chimney site.

THE RUST ENGINEERING COMPANY

Engineers and Constructors

Koppers Building, PITTSBURGH, PA. | Martin Building, BIRMINGHAM, ALA. | 30 Church Street, NEW YORK, N. Y. | District Bank Building, WASHINGTON, D. C.

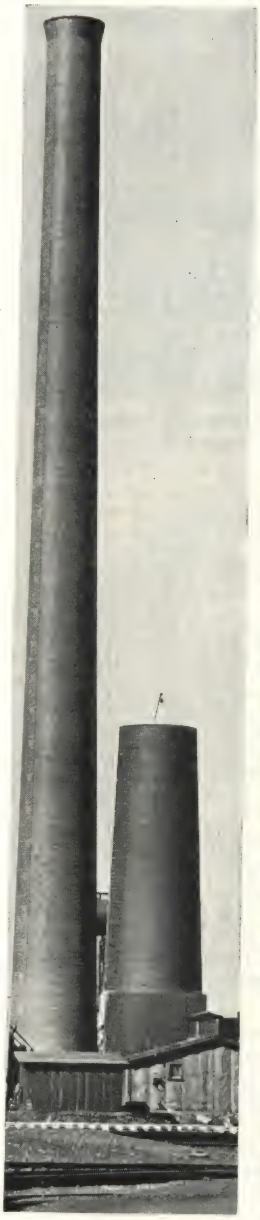
SALES OFFICES

CHICAGO, ILL., LOS ANGELES, CAL. PHILADELPHIA, PA. DETROIT, MICH. MONTREAL, QUE. SEATTLE, WASH.

Service

COMPLETE DESIGN and CONSTRUCTION of: Power Plants, Boiler Settings, Cement Gun Work, Radial Brick Chimneys, Reinforced Concrete Chimneys, Factories, Industrial and Material Handling Plants, Silos and Storage Bins, Warehouses, Bridges.

Estimates and Reports.



Radial Brick Chimneys, Inland Steel Co., Indiana Harbor, Indiana
1—250 ft. x 11 ft. 6 in.
1—70 ft. x 16 ft.

Representative Installations

American Sheet & Tin Plate Co.
American Tar Products Co.
Atlantic Refining Co.
Alabama Power Co.
American Smelting & Refining Co.
American Can Co.
American Metal Co.
Armstrong Cork Co.
American Writing Paper Co.
American Gas & Electric Co.
American Rolling Mills
Aluminum Company of America
Bethlehem Steel Corporation
Baltimore & Ohio R.R.
Brooklyn Edison Co.
British American Nickel Co.
Babcock & Wilcox Co.
Consolidated Gas Co.
Canadian Steel Corporation
Cleveland Electric & Illuminating Co.
Carnegie Steel Co.
Consolidated Mining & Smelting Co.
Celanese Corporation of America
Commercial Solvents Corporation
Chesapeake Corporation
DuPont Co.
Duquesne Light Co.
Diamond Alkali Co.
Delaware & Hudson Co.
Davison Coke & Iron Co.
Erie Railroad
Electric Bond & Share Co.
Firestone Rubber Co.
Ford Motor Co.
General Motors Corporation
Goodrich Rubber Co., B. F.
Grand Trunk Railway
Gulf Refining Co.
General Electric Co.
H. J. Heinz Co.
Hercules Powder Co.
Hudson Motor Co.
Harbison-Walker Co.
Hubbard & Co.
Heppenstall Knife & Forge Co.
International Cement Corporation
International Paper Co.
Jones & Laughlin Steel Corporation
Koppers Co.
Keystone Portland Cement Co.
Long-Bell Lumber Co.
Lehigh Portland Cement Co.
Metropolitan Edison Co.
Morris & Co.
Morton Salt Co.
National Tube Co.
Norfolk & Western Ry. Co.
New York Central R.R. Co.
Owens Bottle Co.
Pennsylvania R.R. Co.
Peoples Drug Stores
Packard Motor Co.
Procter & Gamble Co.
Phoenix Utilities Co.
Pennzoil Co.
Pressed Steel Car Co.
Pittsburgh & Lake Erie R. R. Co.
Pittsburgh Plate Glass Co.
Raritan Copper Co.
Republic Iron & Steel Co.
Southern Ry. Co.
Standard Oil Co.
Standard Sanitary Manufacturing Co.
Shell Petroleum Co.
Swift & Co.
Steel Company of Canada
Tennessee Iron & Railroad Co.
Timken Roller Bearing Co.
Tennessee-Eastman Corporation
Universal Atlas Portland Cement Co.
Union Gas & Electric Co.
Viscose Co.
Virginia Power Co.
Ward Baking Co.
Wheeling Steel Co.
Westinghouse Electric & Mfg. Co.
Weirton Steel Co.
Youngstown Sheet & Tube Co.

Reinforced Concrete Chimney, National Paper Products Co., Port Townsend, Washington
250 ft. 6 in. x 16 ft.

THE M. W. KELLOGG COMPANY

Manufacturers of Perforated Radial Brick Chimneys

225 Broadway
NEW YORK, N. Y.

BRANCH OFFICES

BIRMINGHAM, ALA. BOSTON, MASS. CHICAGO, ILL. PITTSBURGH, PA.
LOS ANGELES, CAL.

CANADIAN KELLOGG CO., LTD., MONTREAL, TORONTO, WINNIPEG, CAN.

Products

PERFORATED RADIAL BRICK CHIMNEYS.

Also Common Brick and Reinforced Concrete Chimneys; Chimney Repairing and Remodeling; Ignisite Refractory Cement.

Service

THE M. W. KELLOGG COMPANY has erected some of the finest chimneys in the United States during the last twenty-six years, and is ready to share the results of that experience with engineers and architects who are engaged in problems where chimney construction is required.

This company's engineers will be glad to advise on types, sizes, shapes, etc., of chimneys for any conditions that may arise.

Kellogg Perforated Radial Brick Chimneys

No artificially produced material for the construction of the modern factory chimney compares with refractory clay. This raw material is put through a variety of scientific treatments by skilled hands and especially designed machines before it comes from the kilns in the form of perforated radial brick ready for shipment, and for use in chimney construction.

Each brick is formed to occupy a certain position in the circular and radial lines of the chimney, as shown by the drawing on this page, and is sound ringing, hard, well burned and free from checks.

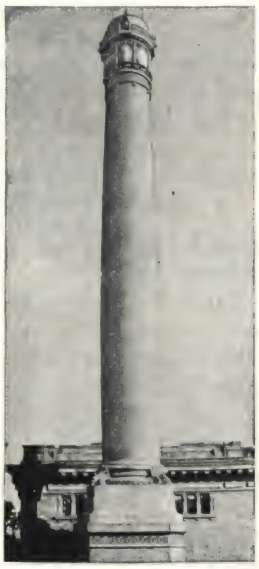
Bricks are made to conform closely with the circular and radial lines of the shaft and are weatherproof and acidproof.

The total amount of perforations does not exceed one-fourth of the cross area of the brick, which are tested to a crushing strength of not less than 6000 lbs. per sq. in.

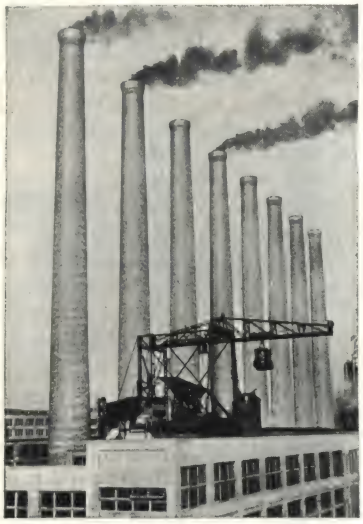
The perforations in the radial bricks form a dead air space about the core of the chimney. This has a marked effect in reducing amount of fuel used, in preventing sudden changes of temperature within the chimney, and in reducing radiation. Thus a uniformly maximum draft is maintained in any kind of weather.

A trained superintendent of construction, familiar with all the details of the plans and specifications of the chimney, accompanies each shipment of radial brick, to supervise unloading and stacking in the order of their use. Throughout the entire construction the bricks of each tier reach their final place under his direction.

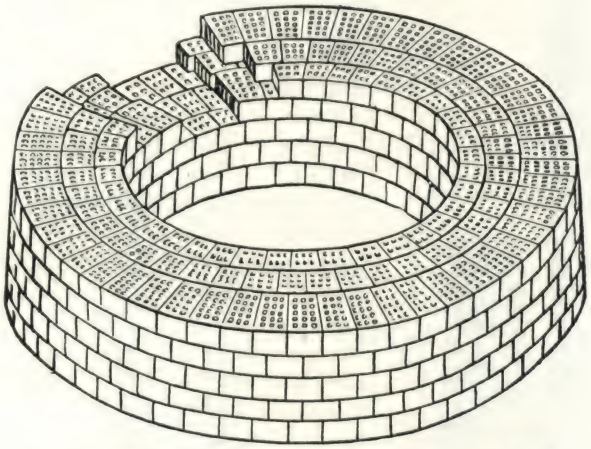
An expert mortar man supervises the preparation and use of all of the mortar. The tensile strength of the chimney, its ability to withstand heat and cold and to defy all sorts of weather from without and all sorts of gases from within, depend largely upon this mortar. Each brick is laid in so full a bed of mortar that the latter enters the perforations of the brick from 1 to 1½ in. The joints are struck both inside and out.



Queen Lane Filter Plant, Philadelphia, Pa.



Corn Products Refining Co., Argo, Ill.



Method of Using M. W. Kellogg's Perforated Radial Brick in Chimney Construction

A crew of trained men in scientific chimney construction carry forward the erection of the chimney from start to finish, insuring careful construction and the proper grading and matching of brick throughout.

Standard Specifications for Perforated Radial Brick Chimneys

Scope—The work included under this contract is to consist of all labor and material necessary for the erection complete of one radial brick chimney in accordance with this specification, which shall become a part of the contract. The proposal shall include all scaffolding, cartage, unloading of material and removal of rubbish necessary to leave the chimney in a first class condition ready for operation.

Continued on next page

Delivery—The chimney will be built at.....located on the.....railroad.

Material may be unloaded on owner's siding, which is within.....of the chimney site.

Space—Sufficient storage room for chimney contractor's materials will be provided adjacent to chimney as well as unobstructed access from transportation delivery to the site of chimney for delivery and removal of materials and tools. At least one side of chimney will be left free and open by the owners for hoisting and working space until the chimney is completed.

Water—The owners will provide the chimney contractor with necessary water within 50 ft. of the site of the chimney free of expense to the chimney contractor. From this point the chimney contractor will make his own hose connections, if required.

Workmanship and Materials—All workmanship and materials shall be first class.

The chimney contractor shall furnish a competent foreman under whose supervision the chimney will be built. Chimney must be built in a thorough, complete and workmanlike manner.

Time of Completion—The chimney contractor shall state in bid the guaranteed number of working days in which he will finish the chimney after receipt of signed contract and approved drawings.

Foundation—Proper foundation will be built by the owner from plans and specifications to be furnished by the chimney contractor, who will, on completion, give in writing his approval of the foundation as being sufficient to sustain the chimney and fulfill the guarantee.

Note: In case, however, it is desired to have chimney contractor build the foundation, the following may be used:

The chimney contractor shall furnish a concrete foundation of proper depth and spread to safely sustain the chimney. The foundation shall not be loaded to more than.....tons per sq. ft., which is the safe bearing value as determined for this work.

Excavating shall be done by contractor for foundation.

The concrete shall be composed of cement, sand, stone or gravel in the proportion of 1 part cement to 2½ parts sand and 5 parts of stone or gravel. It shall be deposited in the forms in layers not to exceed 6 in. in thickness and thoroughly rammed into place. Concrete shall be a wet mixture.

Design—The design of the chimney shall conform to the following dimensions as shown on drawing attached:

Height above top of foundation.....ft.....in.

Minimum internal diameter.....ft.....in.

The wall of the column shall have one straight and true batter from top to bottom. The wall thickness and section lengths to be as shown on drawing. In case the contractor's standard wall thickness should not be exactly as shown, a variation of 3% will be allowed in either direction.

The chimney shall be built of perforated radial brick for the entire height, as hereinafter specified.

Base—If chimney is to be built with base and column construction, use the following:

The base of the chimney shall be built [here fill in shape of base] in shape.....ft. high, of the dimensions shown on drawing, of straight, hard, well burned, well shaped common building brick laid in full bed of cement lime mortar as herein specified.

Radial Brick—All radial brick shall be best quality, moulded from refractory clay, sound ringing, hard, well burned, well shaped, of reasonably even color and free from checks; made to closely conform with the circular and radial lines of the shaft, and shall be weatherproof and acidproof. They shall have a water absorption of not less than 5% nor more than 12% of their dry weight after immersion for a period of 24 hr.; and shall have a crushing strength of not less than 6000 lb. per sq. in. The total amount of perforations shall not exceed one-fourth of the cross area of the brick. One cu. ft. of radial brickwork shall weigh not less than 120 lb.

The outside faces of the brick shall be of regular size, so that the general appearance of the brickwork will be neat and uniform.

Lining—The chimney shall have an expansion lining built of perforated radial fire brick 4¼ in. thick,.....ft. high from a point 2 ft. below the bottom of the flue opening. The lining prevents flue gases from coming in contact with the solid masonry of which the shell is built, and shall be separated from same by an air space of not less than 2 in.

The lining shall be built after the chimney is finished, and exceptional care must be taken to keep the air space clear and free of loose mortar and other dirt.

Rack out the shell of the chimney approximately 2 in. above lining, to form a ledge for the purpose of diverting the falling soot when the chimney is in operation.

Mortar—All brickwork shall be laid in cement lime mortar, as hereinafter specified, with courses level and with regular joints throughout. Face brickwork and backing to be laid up at the same time with joints of reasonably even thickness, not exceeding ½ in. The mortar to be used in the chimney shall consist of 1 part portland cement, 2 parts fresh burnt lump lime mortar and 5 parts clean, sharp sand. The cement to be added to the sand and lime mortar as the mortar is required, and no mortar having taken an initial set is to be used. The cement must not be added until the lime is cool. The sand shall be clean and sharp, free from loam, vegetable matter and large pebbles. If necessary, it must be both screened and washed.

Bond—All common brickwork shall have every fourth course a header course.

Radial brickwork shall be bonded every three courses.

Breeching Opening—One opening shall be provided in chimney. The opening to be lined on the reveals with refractory material. The masonry above the opening to be supported by heavy I-beams set on steel plates, with air spaces at each end for expansion. Under these I-beams a flat masonry arch shall be built to properly protect the beams from the effect of the gases. The flue opening shall be reinforced laterally by heavy tie rods and plates over the top and at the bottom.

Steel bands, ⅜x3 in., to be placed in the masonry above and below opening.

The opening shall be.....wide by.....high, the bottom of which shall be approximately.....above foundation.

Reinforcing Rings—The chimney contractor shall place in the brickwork at every change in wall thickness steel bands ⅜ in. thick by 3 in. wide.

If the contractor should furnish perforated radial brick having corrugated sides, these bands may be omitted.

Head—The head of the chimney shall be neatly corbeled out and fitted with a heavy annular retaining ring set in full bed of cement mortar.

Clean-out Door—Provide and place in base of chimney where directed by owner a cast iron clean-out door and frame properly hinged and fitted with latch. Said door to be approximately 24 in. wide by 36 in. high.

Ladder—Build on the interior of the chimney a ladder to consist of ¾-in. galvanized iron rungs, spaced approximately 15 in. center to center and securely anchored to the masonry from top to bottom. These ladder irons to be in the shape of a "U" with hooked ends.

Lightning Conductor—The lightning conductor is to consist of.....copper points, ¾ in. in diameter by 8 ft. long, with 1½-in. platinum tips. The points to be anchored to the top of the column and extend from the bottom of the corbeling upward. The lower ends of the points to be connected by a loop of copper cable encircling the chimney. From this loop there is to be 1½-in. 7-strand No. 10 Stubbs' wire gauge copper cable, carried down the side of the chimney and connected to copper ground plate of the 3-winged type as best for the proper distribution of charge. The points to be securely fastened to the top of the chimney and the cable to be anchored every 7 ft. in height with brass anchors, so designed that they will support the weight of the cable. The ground plate shall be buried by the contractor for the foundation when it is built.

Lettering (When Desired)—Work into the column on [one or two] sides as directed the letters [here insert the desired legend] to be made in permanently colored kiln burnt brick. Letters to be true to size and shape and to be in a true vertical line.

Trimmings (If Any)—All necessary stone or terra cotta shown on drawing will be furnished without charge by the building contractor to the chimney contractor, who will set same. No one piece should weigh over 200 lb.

Insurance—The chimney contractor shall carry at his own expense, during the entire period of construction, liability insurance, insuring the men in his employ and the public in general, in case of damage due to accidents.

Guarantee—The chimney contractor shall guarantee the chimney for a period of 5 years from date of completion. The guarantee shall cover any defects that may arise within this period due to faulty design, construction, material, weather, and the products of combustion up to 800° F.; and shall further guarantee to make good at his own expense all defects that may arise from any of the above conditions within the specified period.

The chimney shall be designed for a wind velocity of not less than 100 miles per hour.

Note: The chimney shall be built according to THE M. W KELLOGG COMPANY [or equal] system of construction.

WM. SUMMERHAYS SONS CORPORATION

Designers and Builders of Radial Brick Chimneys and Brick Boiler Settings

620 Clinton Avenue South
ROCHESTER, N. Y.

BUFFALO, N. Y., Ellicott Square

Products

BRICK BOILER SETTINGS.

Design and construction of RADIAL BRICK CHIMNEYS and COMMON BRICK STACKS.

Chimney Repairing, Steel Stack Linings and Flue Linings. Installation and repair of Lightning Arrestors.

Also Special Furnaces and Ovens.

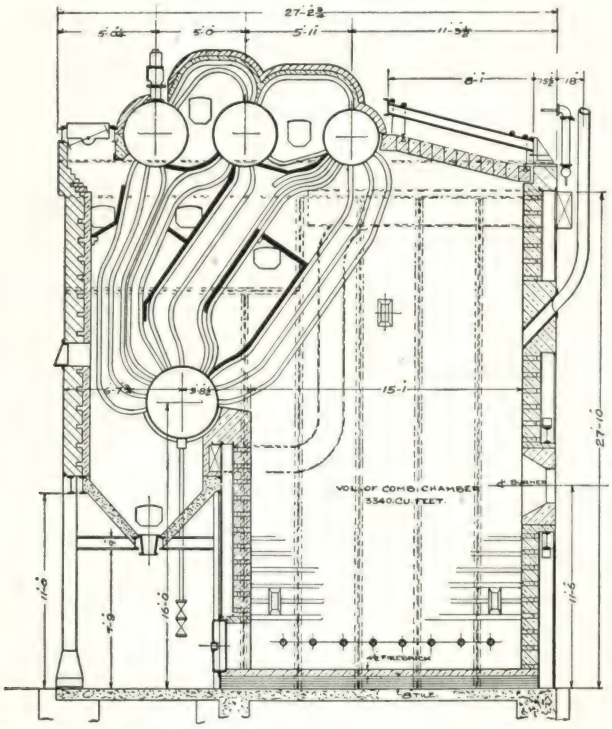
Service

The services of a competent engineering staff are at the disposal of engineers and architects without obligation.

Boiler Settings

Recent advances made in the methods of burning coal under boilers have brought into existence various types of furnace construction and equipment which necessarily require expert knowledge in both design and construction.

Boiler setting designs or engineering assistance for the solution of coal burning problems, preliminary layouts, and estimates are available upon request.



Powdered Coal Furnace Adapted to Firing Wood Refuse at Rudolph Wurlitzer Co., North Tonawanda, N. Y.

Estimates for Chimneys

The following information will assist in the preparation of a chimney estimate:

Nearest railroad delivery and the distance to the chimney site.

Purpose for which chimney is to be used.

Maximum temperature likely to be encountered.

Dimensions of chimney required or total horsepower of boilers.

Type of fuel to be used.

General arrangement of chimney and boiler layout together with data as to location of flue opening.

Local prices of sand, cement and red (common) brick.

Chimney for C. F. Baker & Son, Utica, N. Y.

HENRY MAURER & SON

Manufacturers of Refractory Clay Products

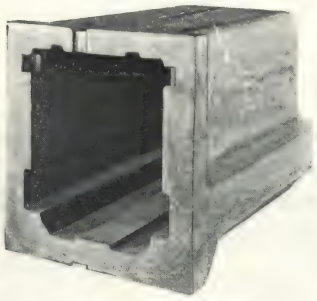
420 East 23rd Street
NEW YORK, N. Y.

PLANT, MAURER, NEW JERSEY

Products

FIRE BRICK for high pressure boiler settings to meet the modern engineering demand for intensive power plant operation, and for the various general types of industrial furnaces, including both a complete line of 9-in. standard shapes and sizes and special shapes and intricate designs to order.

A Special Department is maintained for the production of all items of an intricate nature. One splendid example is the "Furnace Muffle" illustrated herewith, a one-piece lining for an Electric Furnace of the General Electric Co.



"Furnace Muffle"

Also Fire Clay for laying up brick and for foundry use.

For our page on Terra Cotta Hollow Tile Block, see Manufacturers' Index.

Experience and Facilities

Over Seventy Years' Experience—HENRY MAURER & SON have been manufacturing refractory and other clay products for more than seventy years. Substantial and superior workmanship is typical of all Henry Maurer products.

Plant—Our plant is located at Maurer, New Jersey, on tidewater in New York Harbor and on two railroads (Central Railroad of New Jersey and Lehigh Valley R. R.) with all facilities for shipment by boat and rail.

Motor truck deliveries direct from factory to destination can be made when expedient.

Clay Resources—All Maurer Fire Brick are manufactured from the highest refractory New Jersey fire clay obtained from our own extensive clay mines. Mines located in the famed Woodbridge district, nearby the plant.

Maurer Fire Brick

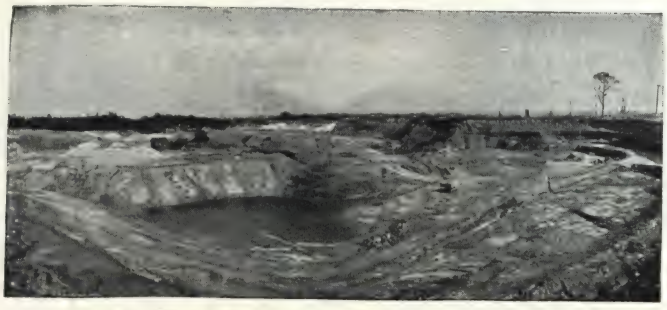
All brands of Henry Maurer Fire Brick are made with the same exacting care, to insure uniform brick, true to size and shape, with sharp edges, so that they can be laid with minimum thickness of joints.

The following principal brands have been developed:

Maurer-1A—For furnaces fired by fuel oil. Contains our most suitable clays prepared and combined to meet the conditions incidental to the use of liquid fuels.

Maurer-1—For high pressure boiler settings operated by stokers or powdered coal systems. Has great strength to resist compression and load stress in carrying the weight of the higher furnace walls. The rugged texture retards the abrasive action of fuel and slag.

Maurer—The original brand of Maurer Fire Brick. Recommended for use in hand fired boilers and for various types of industrial furnaces. This brand has been used in mechanically stoked furnaces with complete satisfaction.



A Clay Mine of Henry Maurer & Son

ESTABLISHED 1853

BASS FOUNDRY & MACHINE COMPANY

Manufacturers of Electrically Welded Steel Water Tube Boilers and Horizontal Return Tubular and Water Tube Boilers

FORT WAYNE, IND.

Bass Steel Heating Boilers

Provide heat, incineration, hot water, greater efficiency at less cost.

The Bass Steel Heating Boiler operates at the highest efficiency obtainable for the following reasons:

(1) It is a steel water tube design with long gas travel from grates to stack.

(2) It has large firebox volume and is smokeless in operation.

(3) It has an ample secondary combustion chamber with provision for admittance of secondary air.

(4) It has maximum direct or radiant heat absorbing surfaces.

(5) Positive and rapid water circulation is assured.

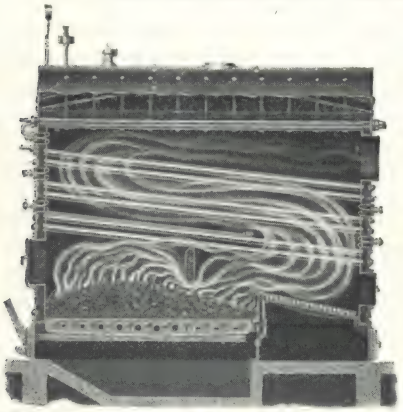
(6) It has minimum surface for collection of soot.

(7) It is easily accessible for cleaning of heating surfaces so that maximum efficiency can be maintained throughout the long life of the boiler.

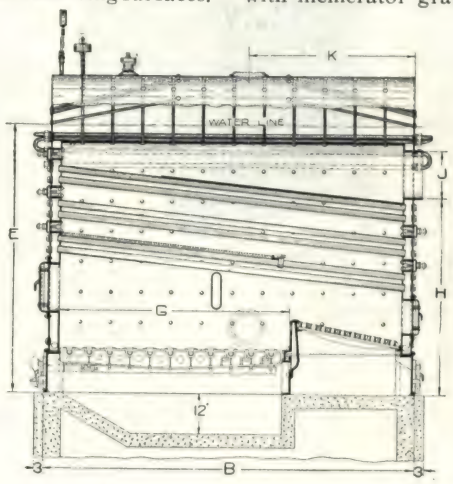
(8) Double firebox construction and adjustable baffles permits the use of all fuels, singly or in combination—coal, oil or gas—without change in construction.

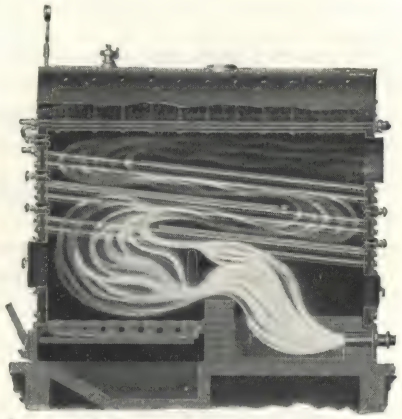
(9) Domestic hot water supply system of the submerged coil type built in boiler.

(10) Incineration without cost. Secondary firebox is fitted with incinerator grates.



Sectional View of Bass Steel Heating Boiler Showing Arrangement for Coal Firing





Sectional View of Bass Steel Heating Boiler Showing Arrangement for Oil Firing

Exceptional Boiler Efficiency

The superiority of the Bass Triple Duty Type Steel Heating Boiler is based on sound engineering, modern construction and advanced mechanical devices. The long gas travel from grates to stack over and around the ample heat absorbing surfaces assures the full benefit of radiant heat from the fuel and positive, rapid circulation of water. The Bass Boiler, in fact, possesses all the features of the modern high pressure water tube boiler (which shows such astounding efficiencies in the modern super power stations) except price. The cost of this type of boiler is well within the range of low pressure heating.

Domestic Hot Water—Incineration

Domestic hot water is supplied by copper coils submerged in the boiler—at temperatures of 140° to 160° in quantities ranging from 40 to 4600 gal. per hour, depending upon the boiler size. Plenty of hot water in summer as well as winter may be economically supplied, where oil or gas burner is used, by arranging an aquastat control. The entire cost of installing and operating a separate hot water supply system is eliminated.

Incineration is accomplished by means of a secondary combustion chamber equipped with special grates on which garbage and refuse may be burned. This saves the entire installation and operating cost of a separate incinerator and conserves basement space.

Steam boiler No.	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10	S-11	S-12	S-13
Hand fired rating, sq. ft. rad.	700	960	1160	1340	1540	1820	2100	2880	3610	4340	4910	5550	6240
Hot water boiler No.	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	W-11	W-12	W-13
Hand fired rating, sq. ft. rad.	1120	1530	1850	2140	2460	2910	3360	4440	5770	6940	7860	8890	9990
Steam boiler No.	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8	S-9	S-10	S-11	S-12	S-13
Oil, gas, stoker rating, sq. ft. rad.	860	1170	1410	1630	1870	2210	2550	3500	4380	5270	5960	6740	7580
Hot water boiler No.	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10	W-11	W-12	W-13
Oil, gas, stoker rating, sq. ft. rad.	1370	1870	2250	2600	2990	3530	4080	5600	7010	8430	9540	10790	12130
Weight complete, lb.	2100	2400	2650	3100	3875	4475	5400	5850	6800	7700	7550	8275	8950
Heating surface, sq. ft.	52	70	83	96	110	130	150	206	258	310	351	397	446
Grate area, sq. ft.	5.4	6.1	6.9	7.6	8.0	9.0	10.0	10.7	12.0	13.3	14.4	15.9	17.5
Main steam opening, in.	4	4	4	5	5	5	5	6	6	6	8	8	8
Number and size return opening, in.	2-4	2-4	2-4	2-5	2-5	2-5	2-5	2-6	2-6	2-6	2-8	2-8	2-8
Size safety valve, in.	1¼	1¼	1½	1½	1½	1½	2	2	2	2	2½	2½	2½
Area smoke outlet, sq. in.	108	108	108	108	187	187	187	220	220	220	310	310	310
Min. diam. stack, in.	10	12	12	14	18	18	18	20	20	20	22	22	22
Min. height stack, ft.	30	35	40	45	50	55	55	60	60	60	65	65	65
Boiler insulation, sq. ft.	34	38	45	52	58	69	74	77	96	115	110	125	140
A—Width over-all, in.	27	27	27	27	33	33	33	39	39	39	45	45	45
B—Length over-all, ft. in.	4-0	4-6	5-3	6-0	5-9	6-9	7-9	6-3	7-9	9-3	7-9	8-9	9-9
C—Height over-all, ft. in.	4-10½	4-10½	4-10½	4-10½	5-7	5-7	5-7	6-6	6-6	6-6	7-4	7-4	7-4
D—Height of base, in.	12	12	12	12	12	12	12	12	12	12	12	12	12
E—Height of water line, ft. in.	4-5	4-5	4-5	4-5	5-0	5-0	5-0	5-10	5-10	5-10	6-6	6-6	6-6
F—Width firebox and ashpit, in.	20	20	20	20	26	26	26	31	31	31	37	37	37
G—Length firebox and ashpit, in.	39	44¼	49½	54¾	44¼	49½	54¾	50	56	62	56	62	68
H—Height from floor to smoke outlet	42½	42½	42½	42½	46½	46½	46½	55	55	55	59	59	59
J—Height smoke outlet on boiler	6	6	6	6	8½	8½	8½	10	10	10	12	12	12
K—Location of steam outlet	18¾	26¼	33	32¼	33	39	41¼	32½	41¼	54	48	54	60

Steam boiler No.	S-14	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-25	
Hand fired rating, sq. ft. rad.	6770	7530	8300	9260	10240	11240	12220	15370	17680	19990	22280	24590	
Hot water boiler No.	W-14	W-15	W-16	W-17	W-18	W-19	W-20	W-21	W-22	W-23	W-24	W-25	
Hand fired rating, sq. ft. rad.	10840	12050	13280	14820	16390	17980	19550	24590	28290	31980	35660	39350	
Steam boiler No.	S-14	S-15	S-16	S-17	S-18	S-19	S-20	S-21	S-22	S-23	S-24	S-25	
Oil, gas, stoker rating, sq. ft. rad.	8220	9140	10080	11250	12440	13650	14840	18660	21470	24270	27060	29860	
Hot water boiler No.	W-14	W-15	W-16	W-17	W-18	W-19	W-20	W-21	W-22	W-23	W-24	W-25	
Oil, gas, stoker rating, sq. ft. rad.	13160	14630	16120	18000	19910	21840	23740	29860	34350	38840	43300	47790	
Weight complete, lb.	10350	11250	12100	14000	15100	16100	17200	20800	22600	24400	26400	28200	
Heating surface, sq. ft.	484	538	593	662	732	803	873	1098	1263	1427	1592	1757	
Grate area, sq. ft.	20.0	21.9	21.9	24.0	25.5	26.7	27.8	33.9	33.9	36.6	36.6	38.7	
Main steam opening, in.	8	8	8	8	8	8	8	10	10	10	10	10	
No. and size return opening, in.	2-8	2-8	2-8	2-8	2-8	2-8	2-8	2-10	2-10	2-10	2-10	2-10	
Size safety valve, in.	3	3	3	3	3½	3½	3½	4	4	4½	4½	4½	
Area smoke outlet, sq. in.	420	420	420	520	520	520	520	700	700	700	840	840	
Min. diam. stack, in.	24	24	24	26	26	26	28	30	32	36	36	40	
Min. height stack, ft.	70	70	70	75	75	75	80	80	85	90	95	100	
Boiler insulation, sq. ft.	144	160	175	171	189	207	225	238	270	310	350	380	
A—Width over-all, in.	51	51	51	63	63	63	63	75	75	75	75	75	
B—Length over-all, ft. in.	9-3	10-3	11-3	9-9	10-9	11-9	12-9	10-3	11-9	13-3	14-9	16-3	
C—Height over-all, ft. in.	7-10	7-10	7-10	8-10	8-10	8-10	8-10	11-3	11-3	11-3	11-3	11-3	
D—Height of base, in.	12	12	12	15	15	15	15	15	15	15	15	15	
E—Height of water line, ft. in.	6-8	6-8	6-8	7-6	7-6	7-6	7-6	9-9	9-9	9-9	9-9	9-9	
F—Width firebox and ashpit, in.	42½	42½	42½	54	54	54	54	66	66	66	66	66	
G—Length firebox and ashpit, in.	68	74	74	65	68	71¼	74	74	74	80	80	86	
H—Height from floor to smoke outlet	58	58	58	64½	64½	64½	64½	87	87	87	87	87	
J—Height smoke outlet on boiler	14	14	14	16	16	16	16	20	20	20	20	20	
K—Location of steam outlet	49½	60	61¼	57	58½	69½	79½	60	69½	68¼	90	101½	

ESTABLISHED 1855

THE BROWNELL COMPANY

DAYTON, OHIO

Sales and Service Agencies in All Principal Cities Throughout the U. S. A.

Products

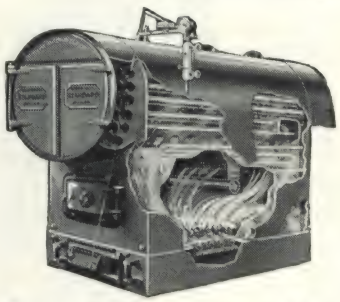
BOILERS—Large Capacity Steel Heating Boilers; Residence Steel Heating Boilers; H.R.T. Boilers for Power and Process; R.F.P. Riveted High Pressure Boilers; Scotch Boilers; Vertical Tubular Boilers; Feed Water Heaters; Stacks, Breeching, etc.

TRADE-MARK

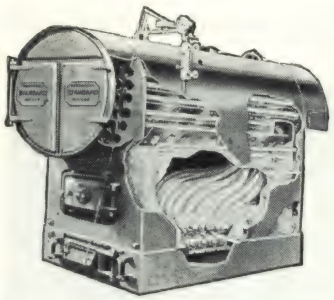
STOKERS—Heavy Duty, Single Retort, Ram Type Underfeed Stokers; Industrial, Worm Feed Type Side Dump Stokers; Commercial, Worm Feed Type Stokers; Residence and Small Buildings Underfeed Stokers.

BROWNELL "STANDARD" WELDED STEEL BOILER —SMOKELESS TYPE

Boiler No.	Capacity, sq. ft.	
	Steam	Water
S-1	900	1440
S-2	1260	2010
S-3	1490	2380
S-4	1730	2760
S-5	2040	3260
S-6	2400	3840
S-7	2890	4620
S-8	3240	5180
S-9	3520	5630
S-10	4500	7200
S-11	5050	8080
S-12	5550	8880
S-13	5990	9580
S-14	6560	10490
S-15	7540	12060
S-16	8280	13240
S-17	9040	14460
S-18	10440	16700
S-19	11600	18560
S-20	13000	20800
S-21	13880	22200
S-22	14750	23600
S-23	16420	26270
S-24	17430	27880
S-25	18710	29930
S-26	20440	32700
S-27	22560	36090
S-28	25000	40000
S-29	28290	45260
S-30	31150	49840
S-31	34030	54440



Brownell "Standard" Welded Steel Boiler—Smokeless Type



Brownell "Standard" Welded Steel Boiler—Direct Draft Type

BROWNELL "STANDARD" WELDED STEEL BOILER —DIRECT DRAFT TYPE

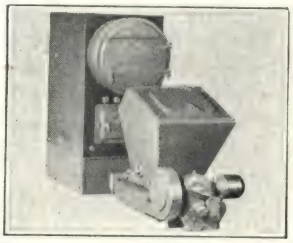
Boiler No.	Capacity, sq. ft.	
	Steam	Water
S-100R	525	840
S-101R	650	1040
S-101	900	1440
S-102	1260	2010
S-103	1490	2380
S-104	1730	2760
S-105	2040	3260
S-106	2400	3840
S-107	2890	4620
S-108	3240	5180
S-109	3520	5630
S-110	4500	7200
S-111	5050	8080
S-112	5550	8880
S-113	5990	9580
S-114	6560	10490
S-115	7540	12060
S-116	8280	13240
S-117	9040	14460
S-118	10440	16700
S-119	11600	18560
S-120	13000	20800
S-121	13880	22200
S-122	14750	23600
S-123	16420	26270
S-124	17430	27880
S-125	18710	29930
S-126	20440	32700
S-127	22560	36090
S-128	25000	40000
S-129	28290	45260
S-130	31150	49840
S-131	34030	54440

Brownell Boilers

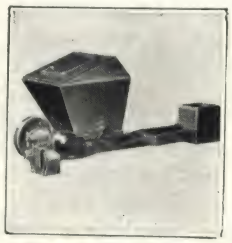
Above boilers in direct draft type, available in six smallest sizes with red baked enamel steel jacket and insulation.

Brownell Boilers equipped with self-contained refractory arch and air admitting dampers (when requested) for use in cities having ordinances requiring provision for operation of heating boilers smokelessly.

Direct draft type also made especially for stoker, oil or gas firing in full range of sizes up to and including 41,330 sq. ft. of steam capacity.



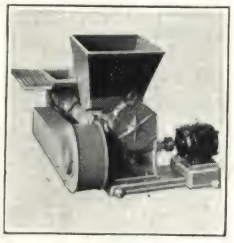
Brownell "Ideal Home" Stoker and Brownell Steel Enameled Jacketed Steel Heating Boiler



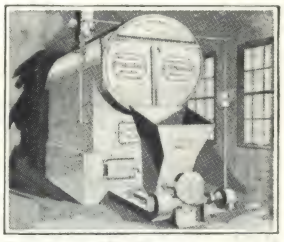
Brownell "Ideal Home" Stoker
Detached unit, for boilers already in use

Construction

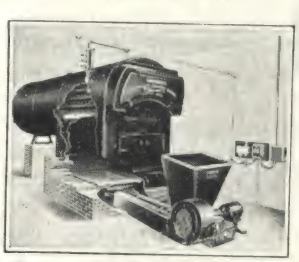
THE BROWNELL COMPANY, with 75 years' experience in the combustion field, is the first and only manufacturer of both boilers and stokers. Brownell Steel Heating Boilers are of one-piece electrically welded construction. They are particularly designed for long gas travel, spacious combustion, large steam liberating area, rapid steaming, and low maintenance costs. Brownell Stokers are made in a wide range of both types and sizes, designed to meet individual boiler room needs and are of unusually rugged construction.



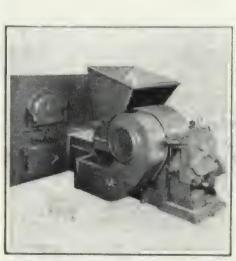
Brownell Commercial Worm Feed Type Stoker
Detached unit for boilers already in use



Brownell Commercial Worm Feed Type Stoker and Brownell Standard Steel Heating Boiler



Brownell Worm Type Underfeed Stoker and Brownell Riveted Firebox Boiler



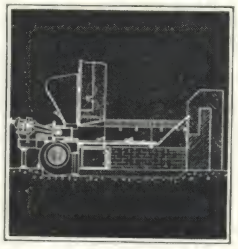
Brownell Industrial Worm Feed Side Dump Stoker
For boilers already in use

Information and Literature

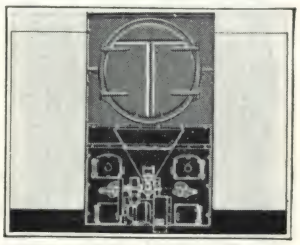
THE BROWNELL COMPANY will be pleased to furnish descriptive bulletins giving detailed information covering their products.

A Data Folio, giving complete engineering data and information on both boilers and stokers, is available for architects and consulting engineers. A.I.A. File No. 30-c-1.

Write for complimentary copy.



Brownell Heavy Duty Ram Type Stoker
For boilers already in use



Brownell Ram Type Heavy Duty Stoker and Brownell H.R.T. High Pressure Boiler

BURNHAM BOILER CORPORATION

Manufacturers of Steam and Hot Water Boilers

IRVINGTON-ON-HUDSON, N. Y.

BRANCHES

TORONTO, ONT., Harbor Commission Building
SPRINGFIELD, MASS., 153 Plainfield Street
SAN FRANCISCO, CAL., 413-15 10th Street
QUEENS VILLAGE, L. I., N. Y., 222nd Street and L. I. R. R.
BOSTON (CAMBRIDGE), MASS., 195 Albany Street
CHICAGO, ILL., 1038 So. Kolmar Avenue
MONTREAL, QUE., 1410 Stanley Street
PHILADELPHIA, PA., 108 Walnut Street
BALTIMORE, MD., 12 West Madison Street
LANCASTER, PA., 701 Griest Building
SHANGHAI, CHINA, 151 Avenue Foch

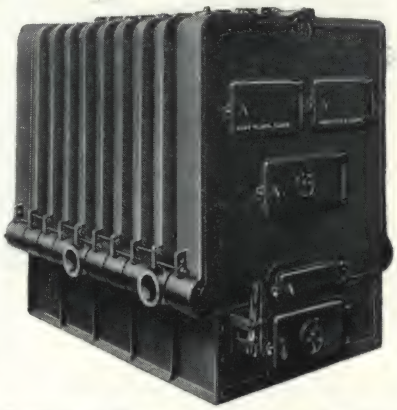
PLANTS: IRVINGTON, N. Y.; ELIZABETH, N. J.; LANCASTER, PA.; ZANESVILLE, OHIO

Products

SECTIONAL STEAM and HOT WATER BOILERS.
SMOKELESS BOILERS.
HOT WATER SUPPLY BOILERS.
WELDED STEEL BOILERS.
Also Burnham Fero Radiators.

Water Tube Type Boilers for Steam and Hot Water Heating

Made in four series, 17, 21, 27 and 36 in. Within this range are found all the capacities required for the largest and smallest domestic and commercial uses. These boilers have the typical Burnham balanced long fire travel, direct flue cleaning doors, and double shaking grates. Control parts are all in front. The waterways are tube shaped, for faster steaming and circulation. Burnham Tube Type boilers are all sectional.



Burnham Water Tube Type Boiler 36-in. Series

Working Pressure Tests—Tested to two and one-half times working pressure of 30 lbs. for water and five times working pressure of 15 lbs. for steam.

RATINGS WATER TUBE TYPE BOILERS FOR STEAM AND WATER

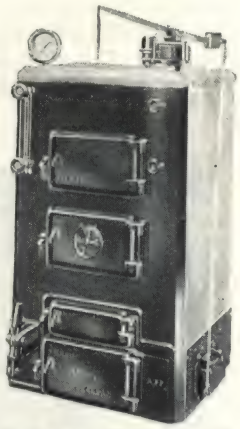
Steam			Steam and Water			Water		
Boiler number	Rating, sq. ft.	Sup. and ret. tappings, in.	Number of sections	Grate area, sq. ft.	Chimney size, in.—ft.	Sup. and ret. tappings, in.	Rating, sq. ft.	Boiler number
17-in. Series								
5-S-17	500	2-3	4	1.7	8x 8x30	2-3	850	5-W-17
6-S-17	650	2-3	5	2.2	8x 8x30	2-3	1100	6-W-17
7-S-17	800	2-3	6	2.7	8x12x35	2-3	1350	7-W-17
8-S-17	950	2-3	7	3.2	8x12x35	2-3	1500	8-W-17
9-S-17	1100	2-3	8	3.7	8x12x35	2-3	1850	9-W-17
21-in. Series								
2104-S	600	1-3	4	2.55	8x12x35	1-3	1000	2104-W
2105-S	800	2-3	5	3.28	8x12x35	2-3	1300	2105-W
2106-S	1000	2-3	6	4.01	12x12x35	2-3	1600	2106-W
2107-S	1200	3-3	7	4.74	12x12x35	3-3	1900	2107-W
2108-S	1400	3-3	8	5.47	12x12x40	3-3	2200	2108-W
2109-S	1600	4-3	9	6.20	12x12x40	3-3	2500	2109-W
27-in. Series								
2706-S	1600	2-4	6	5.86	12x12x40	2-4	2600	2706-W
2707-S	1975	2-4	7	6.98	12x16x40	2-4	3200	2707-W
2708-S	2350	3-4	8	8.11	16x16x45	2-4	3800	2708-W
2709-S	2725	3-4	9	9.23	16x16x50	3-4	4400	2709-W
2710-S	3100	3-4	10	10.34	16x20x50	3-4	5000	2710-W
2711-S	3475	3-4	11	11.48	16x20x55	3-4	5620	2711-W
2712-S	3850	4-4	12	12.61	20x20x60	4-4	6200	2712-W
36-in. Series								
3606-S	3200	2-4	6	8.13	16x20x45	3-4	5185	3606-W
3607-S	3850	3-4	7	9.63	16x20x50	3-4	6285	3607-W
3608-S	4500	3-4	8	11.13	20x20x50	4-4	7385	3608-W
3609-S	5150	4-4	9	12.63	20x20x50	4-4	8485	3609-W
3610-S	5800	4-4	10	14.13	20x20x55	4-4	9585	3610-W
3611-S	6450	5-4	11	15.63	20x20x55	5-4	10685	3611-W
3612-S	7100	5-4	12	17.13	20x24x60	5-4	11785	3612-W
3613-S	7750	5-4	13	18.63	24x24x60	5-4	12885	3613-W
3614-S	8400	5-4	14	20.13	24x24x60	5-4	13985	3614-W

Burnham Boilers Jacketed in Color

This is a water tube type boiler with all the fuel saving features of our other water tube boilers.

The jacket of heavy steel is lined with four-ply air cell asbestos, is enameled a rich red, and goes on after the boiler is installed and ready for firing.

Unusually efficient when oil is the fuel used, because of its extra long fire travel, completely surrounded with water, requiring no fire brick for protection.



Burnham Boiler with Colored Jacket

RATINGS—BURNHAM JACKETED BOILER

Boiler number	Number of sections	Rating, sq. ft.	Grate area, sq. ft.	Supply and ret. tappings, in.	"L" length of base, in.	Over-all length, in.
Steam						
1-S-5	4	500	1.7	2-3	22	40½
1-S-6	5	650	2.2	2-3	26	44½
1-S-7	6	800	2.7	2-3	30	48½
1-S-8	7	950	3.2	2-3	34	52½
1-S-9	8	1100	3.7	2-3	38	56½
Water						
1-W-5	4	850	1.7	2-3	22	40½
1-W-6	5	1100	2.2	2-3	26	44½
1-W-7	6	1350	2.7	2-3	30	48½
1-W-8	7	1600	3.2	2-3	34	52½
1-W-9	8	1850	3.7	2-3	38	56½

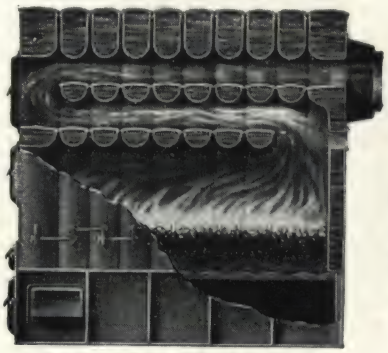
Burnham Big Twin Sectional

For the largest heating installations. Has a 50-in. grate, divided for easy shaking. The sections are twins, dividing down the middle of the boiler for convenience in handling. Has three-way fire travel that makes a short fuel bill. Every part will go through any opening through which a man can go sidewise. Ratings to 16,550 sq. ft. for steam; 27,000 sq. ft. for water.

Tube Type Smokeless Series

For burning soft coal efficiently and smokelessly. They get all possible heat units from the volatile gases that rise from the fuel bed. The gases are fed with air in such a way that they are quickly ignited and the heat transferred to the tubes. A three-way fire travel aids combustion of all fuel particles.

Meet the smoke ordinances of all municipalities.



Burnham Smokeless Boiler
Note long fire travel

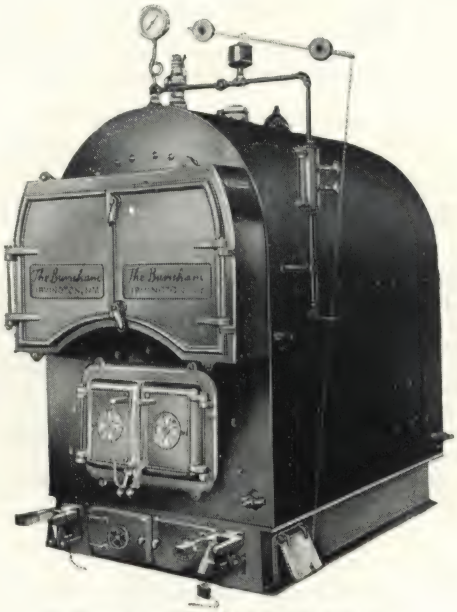
Continued on next page

Burnham Three Purpose Welded Steel Boilers

For heat, hot water—health.

Heating, hot water supply, and incineration are provided for in designing this steel boiler.

Completely Welded—It is a completely welded boiler made to conform with A.S.M.E. Code, for a maximum steam working pressure of 15 lbs. It is compact in form, easy to handle in installation work and requires no masonry other than a solid foundation.



Burnham Welded Steel Boiler

Multiple Shaking Grates—Each with its own shaking mechanism. A partial fire may be maintained on part of the grates in mild weather, or any section can be cleaned without affecting the whole fire.

Hot Water Supply for Domestic Use—Obtained by the insertion of copper coils above the flues, entirely submerged in the water.

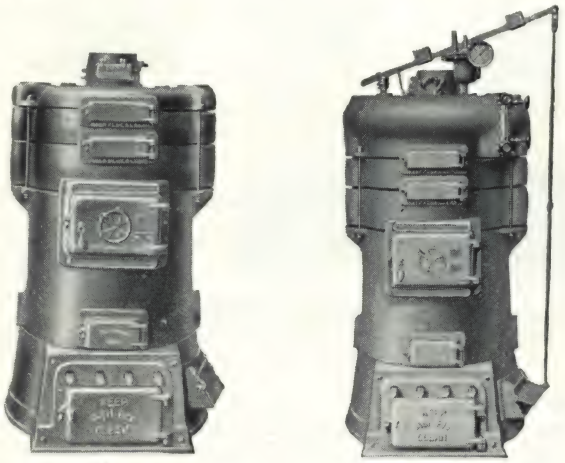
Oil Burning Apparatus—May be introduced from the rear, the flames being thrown forward against a baffle wall near the front of the firebox. The flames are thus retained longer in the firebox, before they begin their long fire travel journey to the chimney.

Incinerator Grate for Garbage Disposal—When oil fuel is used, a short grate is placed at the front of the boiler, the oil burning apparatus being entirely behind the baffle wall against which this grate rests. Not only does the grate act as an incinerator, but should the mechanical equipment ever fail and oil, gas or electricity be shut off during cold weather, this grate can be used for coal burning, without change or readjustment.

Size Range—This provides for both domestic and commercial uses. A special A.I.A. Folder giving pictures, full descriptions and ratings gladly sent on request.

Burnham Round Sectional Boilers

This is the boiler that made the long fire travel famous. The crown sheet is corrugated, more than doubling the surface directly over the fire. The nipple connections are outside, where they do not take up fire surface. Intermediate sections have flue clean-out openings both front and rear. No matter how many sections are added, the back and forth fire travel is maintained, and smoke outlet is always at the rear. Fire pot and crown sheet are in separate sections, making handling easier. In case of breakage only one part need be repaired.



Water Steam

Burnham Round Sectional Boilers

On steam boilers, the top of dome section, is half again as large as on the water boiler, and considerably larger, probably, than on any boiler made. There is plenty of room for rapid, frictionless expansion

RATINGS IMPROVED ROUND SECTIONAL STEAM AND WATER BOILERS

Steam			Steam and Water				Water	
Boiler number	Direct radiation, sq. ft.	Water line, in.	Grate diam., in.	Grate area, sq. ft.	Supply and return tappings, in.	Smoke box diam., in.	Direct radiation, sq. ft.	Boiler number
S-1804	330	42	18	1.77	2–2½	7	550	W-1804
S-1805	360	47	18	1.77	2–2½	7	600	W-1805
S-1806	390	52	18	1.77	2–2½	7	650	W-1806
S-2004	440	43	20	2.18	2–3	7	725	W-2004
S-2005	490	48	20	2.18	2–3	7	810	W-2005
S-2006	530	53	20	2.18	2–3	7	875	W-2006
S-2304	600	45	23	2.88	2–3	8	990	W-2304
S-2305	675	50	23	2.88	2–3	8	1115	W-2305
S-2306	725	55	23	2.88	2–3	8	1200	W-2306
S-2604	775	46	26	3.69	2–3½	9	1280	W-2604
S-2605	875	51	26	3.69	2–3½	9	1445	W-2605
S-2606	950	56	26	3.69	2–3½	9	1570	W-2606
S-2904	1125	48	29	4.58	2–4	10	1860	W-2904
S-2905	1250	53	29	4.58	2–4	10	2075	W-2905
S-2906	1350	58	29	4.58	2–4	10	2230	W-2906
S-31-4	1350	49	31	5.25	2–4	11	2230	W-31-4
S-31-5	1475	55	31	5.25	2–4	11	2450	W-31-5
S-31-6	1550	61	31	5.25	2–4	11	2560	W-31-6

For Hot Water Supply

High Pressure Boiler—For use in apartment houses, hotels, laundries and other quantity users of hot water.

Sectional construction. Guaranteed to 80 lbs. pressure; tested to two and one-half times its ratio working pressure. Supplies up to 3800 gal. requirements.

Burnham Junior Boiler—Will keep 175 to 700-gal. tank always full of hot water.

Burnham Laundry Stove—Tank capacities up to 80 gals.

High Pressure Boiler for Hot Water Supply

Catalogues

Covering any or all our boilers gladly sent on request.

COMBINATION BOILER COMPANY

Manufacturers of Combination Triple Service Boilers

BENTON HARBOR, MICH.

NEW YORK, N. Y., 33 West 60th Street
BOSTON, MASS., 544 Commonwealth Avenue
CHICAGO, ILL., 339 Engineering Building
ST. LOUIS, MO., 2234 Olive Street
MILWAUKEE, WIS., 422 Jefferson Street

Products

COMBINATION TRIPLE SERVICE BOILER for Oil Burner or Stoker operation, (No. 100 series).

COMBINATION TRIPLE SERVICE GAS BURNING BOILER, (No. 300 series).

Combination Triple Service Boiler

A welded steel, water-tube boiler, designed and built especially for automatic heat with oil burner, gas burner or stoker.

Triple Service

Three complete and practical services in one simple, compact unit. Eliminates separate water heater, separate incinerator, and, for usual hot water supply requirements, it also eliminates the hot water storage tank. As a result, it saves the cost of installation, cost of operation and cost of maintenance of these three separate pieces of equipment. It also saves the space they occupy, and at the same time, does each job well and economically.

The year 'round hot water and incineration services make the oil burner, gas burner or stoker a year 'round utility. With proper controls, hot water supply is heated in the summer time more economically than with a separate heater, and all garbage and waste is incinerated besides. Heat may be sent to the radiators automatically at any time of season heat is required.

Heat

Economical unfailing heat with either steam, vapor or hot water.

Domestic Hot Water Supply

Copper water heating coil submerged in water of boiler furnishes an abundant supply of hot water the year 'round at negligible cost.

Incineration

Complete, sanitary, odorless incineration of garbage and waste, with same flame that heats the radiators and hot water supply. Resulting heat is absorbed by boiler and utilized in heating the home or building.

Emergency Firing

In case of emergency arising from interruption of electric current or failure of the oil or gas supply, or in case of accident to the mechanical equipment, a fire of wood, coal or coke may be immediately started on the rocking grates of the incinerator chamber and the desired temperature maintained until the automatic heat equipment resumes operation.

Application

The Combination Triple Service Boiler is especially adapted to any job wherein automatic heat is employed or where, in addition to heat for the building, an abundant and dependable supply of hot water is wanted. Also, where means for the incineration of garbage and waste materials is desired.

Adaptability

The Combination Triple Service Boiler is specially adapted to automatic heat produced by any kind of mechanical equipment using oil, gas, coal or coke. Unusually long fire travel is obtained by means of baffle plates which conduct the hot gases back and forth, four times or more, practically the full length of boiler. These baffle plates are adjustable to meet the needs of chimney draft conditions of the individual job.

All doors and door frames are massively built and all surfaces are ground to fit. Air infiltration is reduced to the minimum.

All boilers are fitted with special openings properly placed for immersion type electric switches—a great convenience in installing controls.

For Stoker Operation

When properly installed in the Combination Triple Service Boiler, any good stoker realizes its fullest possibilities in economical operation and year 'round utility.

Unusually long fire travel, with pass areas carefully proportioned to meet the flue gas conditions prevailing under stoker operation, together with the superior heat absorbing and rapid circulating qualities of the water tube principle, insure greater efficiency and operating economy.

Bases, specially adapted to the installation and operating requirements of automatic stokers, are available.

Send for bulletin on stoker fired boilers.

Durability

The rugged welded steel construction of the Combination Triple Service Boiler insures a long life of useful service. Heavy steel plates are electrically welded into a solid homogeneous body—indestructible and practically everlasting.

A.S.M.E. Standard

Combination Triple Service Boilers are manufactured, inspected and tested in strict compliance with the A.S.M.E. Code for low pressure heating boilers. Each boiler is thoroughly inspected during fabrication by a licensed inspector of the Hartford Steam Boiler Inspection & Insurance Company.

All boilers on completion are tested and stamped as A.S.M.E. rules require. Certificate of such inspection and test is furnished with each Combination Triple Service Boiler.

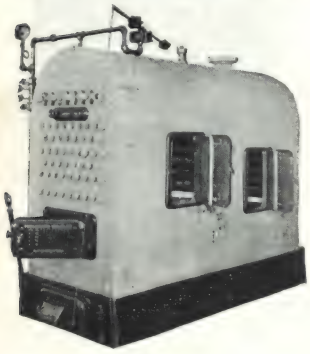
Guarantee

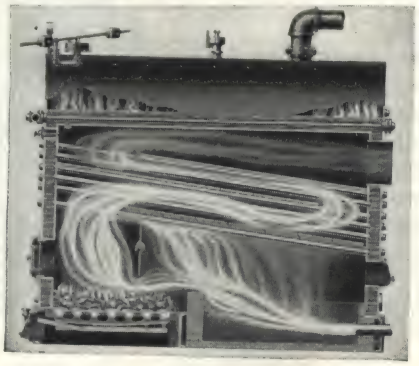
Combination Triple Service Boilers are warranted both as to materials and workmanship used and are guaranteed to develop their full rated capacities, based on 2 lb. pressure for steam or 180° F. for hot water, at boiler outlets.

Lasting Satisfaction

Remember this: During the lifetime of any boiler, its cost of operation and maintenance amounts to many times its original cost. Consequently, the boiler that affords greater efficiency and lower cost of operation and maintenance is the most economical boiler to use.

The correct design and rugged construction of the Combination Triple Service Boiler insures a long life of useful, economical service.





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Oil Burner Application

Rear views of Combination Triple Service Boiler showing provisions for installing different types of oil burners. Note the oil burner service door with pyrex glass observation window.

Fig. 1 shows provision for gun type oil burners.

Fig. 2 shows provision for vertical rotary and spinner type oil burners.

Fig. 3 shows provision for horizontal rotary type oil burners.

Write for bulletin covering oil fired boilers.

Fig. 1

Fig. 2

Fig. 3

COMBINATION TRIPLE SERVICE BOILERS FOR OIL OR STOKER OPERATION

Size No.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121
Capacity, Steam.....sq. ft.	780	900	1200	1500	1800	2100	2400	3000	3600	4200	4800	5400	6000	6600	7200	8400	9600	10800	12000	13200	14400
Hot water.....sq. ft.	1248	1440	1920	2400	2880	3360	3840	4800	5560	6720	7620	8640	9600	10560	11520	13440	15360	17280	19200	21120	23040
Heating surface.....sq. ft.	65	77	92	114	130	146	166	208	254	284	334	360	375	435	476	523	593	674	740	817	888
Area of auxiliary grate..sq. ft.	1.75	2.65	3.5	4	4	4.5	5.6	6.25	6.25	8.25	9	9	9	10.5	12.25	13.7	15.6	18	18	21.3	24
Height of Water Line.....in.	54	54	58	60	60	63	63	66	70	70	73	73	73	80	80	84	84	87	87	93	93
Height over all.....in.	64	64	68	71	71	75	75	79	85½	85½	89½	89½	89½	99½	99½	105½	105½	110½	110½	120½	120½
Width of Boiler.....in.	29	29	29	32	32	35	35	38	41	41	44	44	44	50	50	56	56	62	62	74	74
Length of boiler.....in.	52	61	67	70	76	76	85	85	85	94	97	103	109	109	118	123	138	138	150	138	150
Width of furnace.....in.	17	17	17	19	19	22	22	25	28	28	31	31	31	37	37	42	42	48	48	59½	59½
Length of furnace.....in.	21	24	24	27	33	33	36	36	38	41	44	50	56	56	59	62	71	71	83	70½	76½
Volume furnace above base.....cu. ft.	4.1	5	5.4	6.8	8.4	9.3	10.6	12.2	12.5	14.4	18	21.6	25.2	29.5	31.9	39.7	47.3	54.2	66	69.3	78.5
Including base.....cu. ft.	6.4	7.8	8.2	9.3	11.5	12.1	14.8	15.9	18.3	20.4	25.5	30.1	34.7	39.3	44	60.1	70.7	80.3	96	102	113.5
Steam opening.....in.	4	4	4	5	5	5	5	5	6	6	6	6	6	8	8	8	8	8	8	8	8
Return openings.....in.	3	3	3	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	6	6	6
Safety valve.....in.	1	1	1¼	1¼	1½	1½	1½	2	2	2	2	2½	2½	2½	2½	2½	2½	2½	2½	2½	3
Number of safety valves.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2
Size of smoke outlet.....in.	8x16	8x16	8x16	9x18	9x18	11x22	11x22	12x24	13x26	13x26	14x28	14x28	14x28	16x32	16x32	17x34	17x34	18x36	18x36	20x40	20x40
Area of smoke outlet...sq. in.	114	114	114	158	158	216	216	257	300	300	350	350	350	457	457	516	516	578	578	714	714
Diam. of stack (1 boiler....in.	12	14	14	16	16	18	18	20	20	20	22	22	24	24	26	26	26	28	28	30	30
(2 boilers).....in.	16	18	18	22	22	24	24	26	28	28	30	30	32	32	34	34	34	38	38	40	40
Min. height stack (1 boiler) ft.	35	40	40	45	45	50	50	50	50	50	55	55	60	60	60	65	65	65	70	70	75
(2 boilers).....ft.	40	45	45	50	50	55	55	55	60	60	65	65	70	70	70	75	75	75	80	80	85
Surface to cover (total)..sq. ft.	57	65	72	77	81	90	99	110	129	139	152	160	167	191	204	222	242	268	285	316	338
Approximate shipping weight.....lbs.	2200	2375	2800	3200	3600	3950	4400	5000	5800	6000	6800	7400	8000	8800	9500	10300	11000	12000	12900	13800	14700

For computing heating load of hot water supply when storage tank is used, figure each gallon of tank capacity as equivalent to 1 sq. ft. of steam radiation, or 1½ sq. ft. of hot water radiation.

For tankless jobs, figure each gallon of water required to be heated 100° per hour as equivalent to 4 sq. ft. of steam radiation.

Combination Triple Service Boiler Specially Equipped for Gas Burning

This series of boilers offers the same advantages of design and construction that are found in the Series 100 for oil burner or stoker operation.

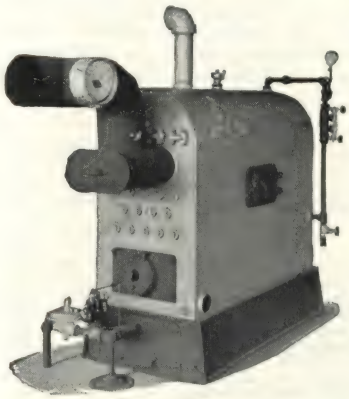
Furnishes heat for the building, year 'round hot water and incinerates all garbage and waste besides.

Eliminates the investment in a separate hot water heater and incinerator, and also greatly reduces fuel cost.

Adapted to any type of gas burner using artificial or natural gas.

Furnished either with or without gas burner as specified. The gas burning equipment includes all necessary controls for maintaining Triple Service, complete and ready to install.

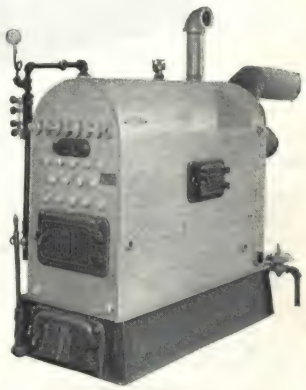
Ask for bulletin covering gas fired boilers.



Front View
Showing incinerator door and water heating coil connections

Size No.	301	302	303	304	305	306	307	308	309	310
Capacity, steam.sq. ft.	780	900	1200	1500	1800	2100	2400	3000	3600	4200
Capacity, water.sq. ft.	1248	1440	1920	2400	2880	3360	3840	4800	5560	6720

Combination Triple Service Boilers are specially adapted to the better grade of residences, apartment buildings, hotels, dormitories, hospitals, schools, service stations—any improvement wherein automatic heat is to be used or where the three services, heat, hot water and incineration are necessary or desirable.



Rear View
Showing gas regulator, automatic electric gas valve, and controlled air damper door

CENTRAL RADIATOR COMPANY

SUBSIDIARY OF THE UNIVERSAL PIPE AND RADIATOR COMPANY
Graybar Building, 420 Lexington Avenue, at 43rd Street
NEW YORK, N. Y.

BRANCH OFFICES
PHILADELPHIA, PA., 2401 Chestnut Street
LANSDALE, PA., 50 Central Avenue
CHICAGO, ILL., 332 So. Michigan Avenue

Products

THE GRAY SENTRY BOILER — the Lansdale-Craig Water Tube Boiler with the insulated gray jacket.

Also Lansdale-Craig Water Tube Boilers and Lansdale Round Boilers for coal or oil burning, Lansdale Tank Heaters and Lansdale Radiators.

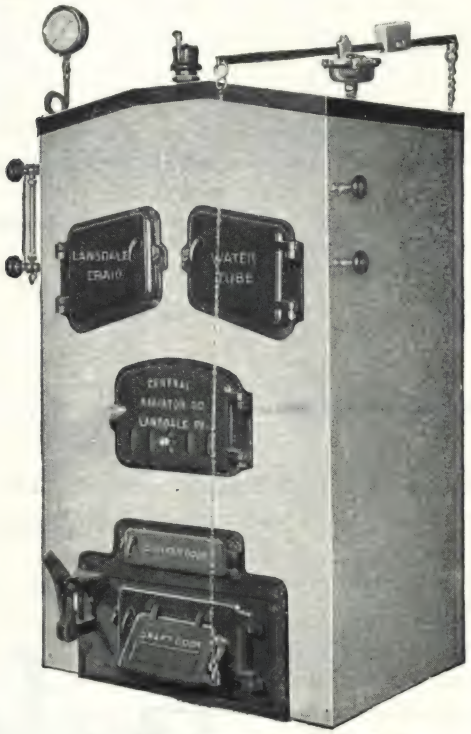
The Gray Sentry

The Gray Sentry is the new Lansdale-Craig Water Tube Boiler with the gray jacket, for homes and other buildings.

(1) Lasting Beauty and Cleanliness—What color could be more appropriate, more conducive to cleanliness than gray? Its exquisite French gray, smooth-as-glass enamel finish shows no dust and always looks clean.

(2) Distinctive Design—The gentle gable slope on each side of the top of the jacket does away with that severe, flat, boxlike appearance.

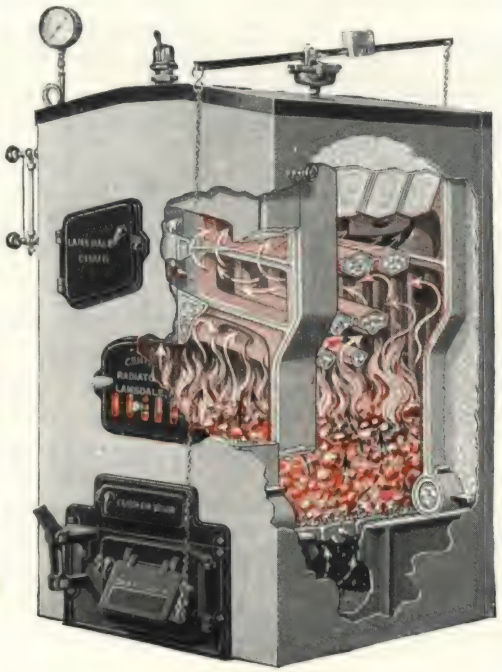
(3) Insulated—The thick layer of rock wool which fills the space between the jacket and the boiler prevents heat loss and saves fuel.



The Gray Sentry Jacketed Boiler

(4) Superior Heating Efficiency—The Gray Sentry guards against hot smoke and gases escaping up chimney. Its flues provide a long forward and back travel, assuring greatest heating efficiency.

(5) Heating Surface Doubled—No Dead Corners—The corrugated front, back and sides—all corners rounded—and the large drop tubes directly over the fire assure double the direct heating surface.



Cutaway View

(6) Fuel—Burns hard coal (large sizes or small No. 1 buckwheat), soft coal, coke, or oil).

(7) Cast Iron—The gray jacket is of enduring steel. The boiler itself is of rugged all-cast iron sectional construction. Easy to install.

(8) 24 Sizes—The complete line of Lansdale-Craig Water Tube Boilers is featured in our special bulletin. Steam up to 6950 lb. Water up to 11,100 lb.

(9) Laboratory Tested—All Lansdale-Craig boilers are certified by unbiased engineers of national reputation. Ask nearest office for charts of performances, efficiencies and ratings prepared for the architect by the Robinson Frost Research Laboratory.

SIZES, RATINGS, DIMENSIONS, ETC., OF THE GRAY SENTRY

Boiler No.	Commercial ratings, sq. ft. Steam	Commercial ratings, sq. ft. Water	Grate area, sq. ft.	Depth, in., including smoke box	Smoke pipe diameter, in.	Tappings, outlets—inlets, in.	Water line height, in.	Shipping weight approx., lb.	Dimension, in. (Common to all boilers in a given series)
No. 1 Series—Steam and Water									
14	400	650	1.15	32	8	1-2½	42	1056	Height from floor to outlet....51
15	600	1000	1.67	37	8	1-2½	42	1228	Height, including steam trimmings....57
16	800	1300	2.19	42	8	2-2½	42	1390	Height from floor to center return inlet....13½
17	1000	1650	2.71	47	8	2-2½	42	1568	Width, including steam trimmings....34
18	1250	2050	3.23	52	8	2-2½	42	1740	Width, less steam trimmings....27
No. 2 Series—Steam and Water									
26	1300	2100	3.97	49	10	2-3	47	1993	Height from floor to outlet....57
27	1650	2650	4.89	55	10	2-3	47	2311	Height, including steam fittings....61
28	2050	3300	5.80	61	10	2-3	47	2623	Width, including steam trimmings....42
29	2400	3900	6.72	67	12	2-3	47	2936	Width, less steam trimmings....35¼

ESTABLISHED 1864

E. KEELER COMPANY

Manufacturers of Water Tube and Return Tubular Steel Boilers

WILLIAMSPORT, PA.

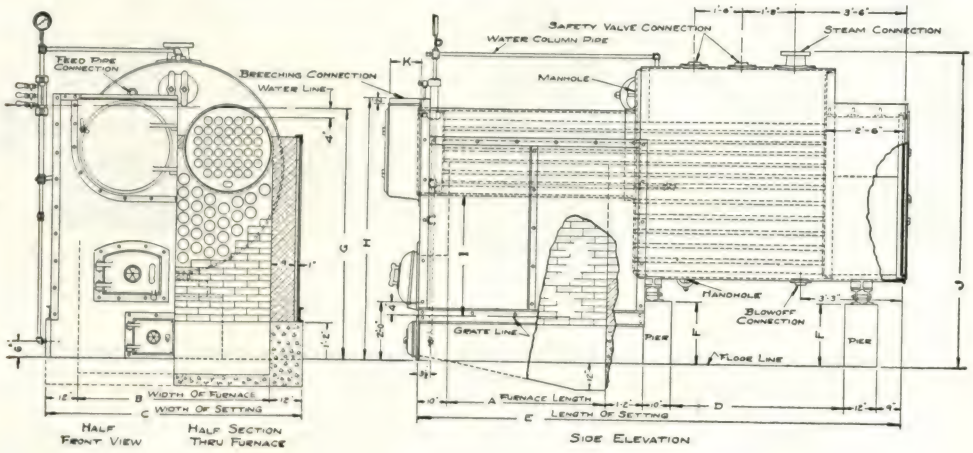
Experience and Responsibility of the Company

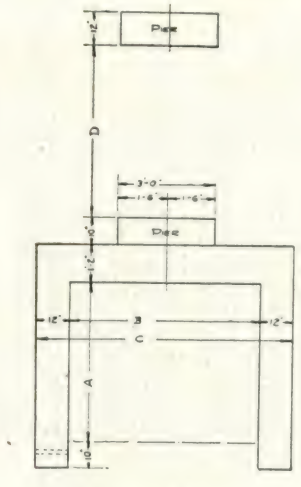
Continuous building of boilers for the past 67 years has earned for Keeler products a reputation for safety, durability and efficiency.

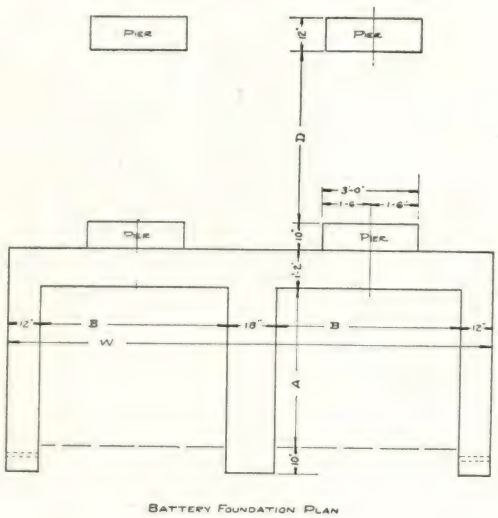
Keeler Double Duty Boilers for Heating or Power

This boiler is made with standard furnace, or with down-draft type. It is suitable for either steam or hot water heating or as a power boiler. It is a dependable, safe boiler for apartment houses, hotels, office buildings, factories, laundries, etc., where service does not warrant the expensive masonry setting.

The Double Duty is an all-steel horizontal return tube boiler of improved design, built for pressures up to 150 lb. The shell and drums are circular and have no flat sides to require troublesome cross ties running from side to side through the tube bank. There are no crown sheets to stay or waterbacks or other pockets to retard circulation and accumulate scale or sediment.







KEELER DOUBLE DUTY UP-DRAFT BOILER

Boiler No.	Heating surface, sq. ft.	Grate area, sq. ft.	Dimensions, inches											Openings, in.					Smoke outlet, in.		Breech. diam., in.	Stack diam., in.	Stack height, ft.	Space required, in.	
			A	B	C	D	E	F	G	H	I	J	W	Steam	Safety	Feed	Blow-off	Water column tap	K	Width				Front	Rear
35	360	13.5	36	54	78	41½	132½	26⅜	79⅜	84¾	36	97⅝	150	3	2	¾	1	1	9⅜	56⅝	22	20	55	93	24
40	400	15.7	42	54	78	41½	138½	26⅜	79⅜	84¾	36	97⅝	150	3	2	¾	1	1	9⅜	56⅝	24	22	55	99	24
50	533	17.5	42	60	84	53½	150½	21⅞	79⅞	87¾	36	99⅛	162	3	2	1¼	1½	1	9⅜	62⅝	24	22	60	111	30
60	620	20	48	60	84	53½	156½	27⅞	89⅝	93¾	42	109¼	162	4	2–2	1¼	1½	1	9⅜	62⅝	26	24	60	117	30
70	735	20	48	60	84	65½	168½	33⅞	89⅝	93¾	42	109¼	162	4	2–2	1¼	1½	1	9⅜	62⅝	28	26	65	129	42
85	884	24	48	72	96	59½	162½	23⅝	90⅛	98⅛	42	116⅞	186	5	2–2	1½	2	1	12⅜	72⅝	30	28	65	123	36
105	1065	30	60	72	96	65½	180½	23⅝	93⅞	98⅛	42	116⅞	186	5	2–2½	1½	2	1	12⅜	72⅝	32	30	70	141	42
130	1300	36	72	72	96	77½	204½	23⅝	93⅞	98⅛	42	116⅞	186	5	2–3	1½	2	1	12⅜	72⅝	34	32	70	165	54
150	1520	36	72	72	96	101½	228½	23⅝	93⅞	98⅛	42	116⅞	186	6	2–3	1½	2½	1	12⅜	72⅝	36	34	75	189	78

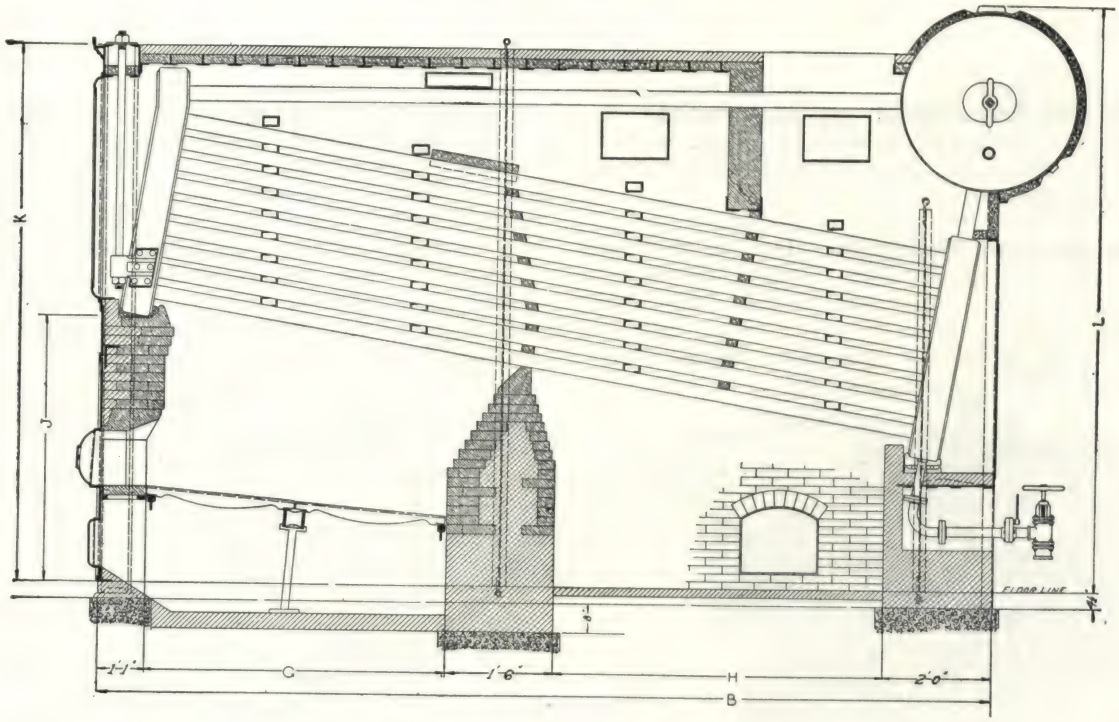
Continued on next page

Keeler Cross Drum Water Tube Boilers

Keeler cross drum water tube boilers are often favored by architects because they are built for higher pressures and can be readily installed in buildings where entrance and headroom are limited. 31,000 hp. are installed in Philadelphia schools alone.

Catalogue

The Keeler standard (long drum) water tube boilers, cross drum water tube boilers and horizontal return tubular boilers for heavy duty are described in our catalogue which may be had on request.



CROSS DRUM WATER TUBE BOILERS—4" DIAM. TUBES—PRESSURE 160 LBS. AND OVER

Boiler No.	Size Vertical	Size Horizontal	Drum Diameter	Drum Length Single Setting	Drum Length Double Setting	No. Tubes in Bank	No. Cir. Tubes	Diameter Feed	Diameter Steam	LENGTH OF TUBES — Total Heating Surface of Tubes and Headers 12½′	13′	13½′	14′	14½′	15′	15½′	16′	16½′	17′	17½′	18′	A Width Battery Setting	A Width Single Setting	I Width of Grates	I Height Floor to Front Hdr.	K Height Floor to Top of Frame	L Height Floor to Ste. Flange
1	2′	3½′	36″	7′	5½′	38	8	1½″	5″	626	650	674	698	722	746	770	794	818	847	871	895	12′-10″	7′-0″	4′-0″	6′-0″	10′-3″	11′- 3½″
2	2′	4′	36″	7½′	6½′	43	9	1½″	5″	710	737	764	791	818	845	872	899	926	958	985	1012	13′-10″	7′-6″	4′-6″	6′-0″	10′-3″	11′- 3½″
3	2′	4½′	36″	8″	6½′	48	10	1½″	5″	791	821	851	881	911	941	971	1001	1031	1067	1097	1127	14′-10″	8′-0″	5′-0″	6′-0″	10′-3″	11′- 3½″
4	2′	5′	36″	8½′	7½′	53	11	2″	5″	971	904	937	970	1003	1038	1071	1104	1137	1178	1211	1244	15′-10″	8′-6″	5′-6″	6′-0″	10′-3″	11′- 3½″
5	2½′	4′	36″	7½′	6½′	51	8	2″	6″	815	846	877	908	939	970	1001	1032	1063	1102	1133	1164	13′-10″	7′-6″	4′-6″	6′-0″	10′-9″	11′-10½″
6	2½′	4½′	36″	8″	6½′	57	9	2″	6″	901	937	973	1009	1045	1081	1117	1153	1189	1222	1258	1294	14′-10″	8′-0″	5′-0″	6′-0″	10′-9″	11′-10½″
7	2½′	5′	36″	8½′	7½′	63	10	2″	6″	1001	1040	1079	1118	1157	1196	1235	1274	1313	1356	1395	1434	15′-10″	8′-6″	5′-6″	6′-0″	10′-9″	11′-10½″
8	2½′	5½′	36″	9″	7½′	69	11	2″	6″	1099	1141	1183	1225	1267	1309	1351	1393	1435	1486	1528	1570	16′-10″	9′-0″	6′-0″	6′-0″	10′-9″	11′-10½″
9	2½′	6′	36″	9½′	8½′	75	12	2″	6″	1194	1240	1286	1332	1378	1424	1470	1516	1562	1614	1660	1706	17′-10″	9′-6″	6′-6″	6′-0″	10′-9″	11′-10½″
10	3′	4½′	42″	8″	6½′	67	10	2″	6″	1044	1084	1124	1164	1204	1244	1284	1324	1364	1412	1452	1492	14′-10″	8′-8″	5′-0″	6′-0″	11′-3″	12′- 7½″
11	3′	5′	42″	8½′	7½′	74	11	2″	6″	1145	1190	1235	1280	1325	1370	1415	1460	1505	1555	1600	1645	15′-10″	8′-6″	5′-6″	6′-0″	11′-3″	12′- 7½″
12	3′	5½′	42″	9″	7½′	81	12	2″	6″	1255	1304	1353	1402	1451	1500	1549	1598	1647	1702	1751	1800	16′-10″	9′-0″	6′-0″	6′-0″	11′-3″	12′- 7½″
13	3′	6′	42″	9½′	8½′	88	13	2″	6″	1365	1418	1471	1524	1577	1630	1683	1736	1789	1849	1902	1955	17′-10″	9′-6″	6′-6″	6′-0″	11′-3″	12′- 7½″
14	3′	6½′	42″	10″	8½′	95	14	2″	6″	1473	1530	1587	1644	1701	1758	1815	1872	1929	1995	2052	2109	18′-10″	10′-0″	7′-0″	6′-0″	11′-3″	12′- 7½″
15	3′	7′	42″	10½′	9½′	102	15	2″	6″	1584	1645	1706	1767	1828	1889	1950	2011	2072	2143	2204	2265	19′-10″	10′-6″	7′-6″	6′-0″	11′-3″	12′- 7½″
16	3′	7½′	42″	11″	9½′	109	16	2″	6″	1691	1756	1821	1886	1951	2016	2081	2146	2211	2288	2353	2418	20′-10″	11′-0″	8′-0″	6′-0″	11′-3″	12′- 7½″
17	3′	8′	42″	11½′	10½′	116	17	2″	6″	1792	1862	1932	2002	2072	2142	2212	2282	2352	2431	2501	2571	21′-10″	11′-6″	8′-6″	6′-0″	11′-3″	12′- 7½″
18	3½′	7½′	42″	11″	9½′	124	15	2″	6″	1890	1963	2036	2109	2182	2255	2328	2401	2474	2559	2632	2705	20′-10″	11′-0″	8′-0″	6′-0″	11′-9″	13′- 1½″
19	3½′	8′	48″	11½′	10½′	132	16	2″	6″	.....	.....	.....	.....	.....	2398	2475	2552	2629	2719	2796	2873	21′-10″	11′-6″	8′-6″	6′-0″	11′-9″	13′- 4½″
20	3½′	8½′	48″	12″	10½′	140	17	2″	6″	.....	.....	.....	.....	.....	2589	2622	2705	2788	2878	2961	3044	22′-10″	12′-0″	9′-0″	6′-0″	11′-9″	13′- 4½″
21	4′	8′	48″	11½′	10½′	149	17	2½″	8″	.....	.....	.....	.....	.....	.....	.....	2839	2926	3021	3108	3195	21′-10″	11′-6″	8′-6″	6′-0″	12′-3″	13′-10½″
22	4′	8½′	48″	12″	10½′	158	18	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3011	3103	3203	3295	3387	22′-10″	12′-0″	9′-0″	6′-0″	12′-3″	13′-10½″
23	4′	9′	48″	12½′	11½′	167	19	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3181	3277	3385	3482	3579	23′-10″	12′-6″	9′-6″	6′-0″	12′-3″	13′-10½″
24	4½′	8½′	48″	12″	10½′	175	17	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3299	3400	3506	3607	3708	22′-10″	12′-0″	9′-0″	6′-0″	12′-9″	14′- 4½″
25	4½′	9′	48″	12½′	11½′	185	18	2½″	8″	.....	.....	.....	.....	.....	.....	.....	3487	3594	3709	3816	3923	23′-10″	12′-6″	9′-6″	6′-0″	12′-9″	14′- 4½″
26	4½′	9½′	48″	13″	11½′	195	19	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	3909	4022	4135	24′-10″	13′-0″	10′-0″	6′-0″	12′-9″	14′- 4½″
27	5′	9′	48″	12½′	11½′	204	19	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4050	4167	4284	23′-10″	12′-6″	9′-6″	6′-0″	13′-3″	14′-10½″
28	5′	9½′	48″	13″	11½′	215	20	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4269	4392	4515	24′-10″	13′-0″	10′-0″	6′-0″	13′-3″	14′-10½″
29	5′	10′	48″	13½′	12½′	226	21	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4479	4609	4739	25′-10″	13′-6″	10′-6″	6′-0″	13′-3″	14′-10½″
30	5′	10½′	48″	14″	12½′	237	22	2½″	8″	.....	.....	.....	.....	.....	.....	.....	.....	.....	4697	4833	4969	26′-10″	14′-0″	11′-0″	6′-0″	13′-3″	14′-10½″
G—Length of Grates										5′-3″	5′-3″	5′-6″	5′-6″	5′-6″	5′-9″	5′-9″	6′-0″	6′-6″	6′-9″	7′-0″	7′-0″	.....	.....	.....	.....	.....	.....
H—Length of Combustion Chamber										4′-5″	4′-11″	5′-2″	5′-8″	6′-2″	6′-5″	6′-11″	7′-2″	7′-2″	7′-5″	7′-8″	8′-2″	.....	.....	.....	.....	.....	.....
B—Length Over All-Brick Setting										15′-3″	15′-9″	16′-3″	16′-9″	17′-3″	17′-9″	18′-3″	18′-9″	19′-3″	19′-9″	20′-3″	20′-9″	.....	.....	.....	.....	.....	.....

CROSS DRUM JUNIOR WATER TUBE BOILERS—3½" DIAM. TUBES—PRESSURE 125 LBS.

										12′	12½′	13′	13½′	14′	14½′	15′	15½′	16′	16½′	17′	17½′	18′						
1	15″	35″	36″	76″	61″	30	8	1½″	5″	436	453	470	487	504	521	538	555	571	589	607	625	643	11′- 6″	6′-4″	3′-4″	5′-2″	8′-7″	9′-7½″
2	20″	35″	36″	76″	61″	38	8	1½″	5″	527	547	567	587	607	627	648	668	688	710	731	753	775	11′- 6″	6′-4″	3′-4″	5′-2″	8′-11″	10′-0½″
3	20″	40″	36″	81″	66″	43	9	1½″	5″	594	617	640	663	686	709	732	755	778	803	827	852	877	12′- 4″	6′-9″	3′-9″	5′-2″	8′-11″	10′-0½″
4	20″	45″	36″	86″	71″	48	10	1½″	5″	666	691	716	741	766	791	817	842	868	896	923	951	979	13′- 2″	7′-2″	4′-2″	5′-2″	8′-11″	10′-0½″
5	20″	50″	36″	91″	76″	53	11	2″	6″	731	759	787	815	843	871	900	928	956	986	1017	1047	1077	14′- 0″	7′-7″	4′-7″	5′-2″	8′-11″	10′-1½″
6	25″	45″	36″	86″	71″	57	10	2″	6″	766	795	824	853	882	911	941	970	999	1031	1063	1095	1127	13′- 2″	7′-2″	4′-2″	5′-2″	9′- 5″	10′-6½″
7	25″	50″	36″	91″	76″	63	11	2″	6″	818	854	890	926	962	998	1034	1070	1105	1140	1176	1211	1246	14′- 0″	7′-7″	4′-7″	5′-2″	9′- 5″	10′-6½″
8	25″	55″	36″	96″	81″	69	12	2″	6″	926	961	996	1031	1066	1101	1137	1172	1208	1247	1285	1324	1363	14′-10″	8′-0″	5′-0″	5′-2″	9′- 5″	10′-6½″
9	25″	60″	42″	101″	86″	75	13	2″	6″	1008	1046	1084	1122	1160	1198	1237	1275	1314	1354	1395	1435	1475	15′- 8″	8′-5″	5′-5″	5′-2″	9′- 5″	10′-9½″
10	30″	55″	42″	96″	81″	81	12	2″	6″	1059	1100	1141	1182	1223	1264	1305	1346	1386	1429	1471	1514	1557	16′- 6″	8′-0″	5′-0″	5′-2″	9′-11″	11′-2½″
11	30″	60″	42″	101″	86″	88	13	2″	6″	1152	1196	1240	1284	1328	1372	1417	1461	1505	1552	1597	1644	1691	15′- 8″	8′-5″	5′-5″	5′-2″	9′-11″	11′-2½″
12	30″	65″	42″	106″	91″	95	14	2″	6″	1240	1288	1336	1384	1432	1480	1528	1576	1624	1674	1724	1774	1824	16′- 6″	8′-10″	5′-10″	5′-2″	9′-11″	11′-2½″
13	30″	70″	42″	111″	96″	102	15	2″	6″	1333	1384	1435	1486	1537	1588	1640	1691	1743	1797	1850	1904	1958	17′- 4″	9′-3″	6′-3″	5′-2″	9′-11″	11′-2½″
G—Length of Grate										5′-6″	5′-6″	6′-0″	6′-0″	6′-0″	6′-0″	6′-0″	6′-0″	6′-3″	6′-3″	6′-6″	6′-6″	7′-0″	.....	.....	.....	.....	.....	.....
H—Length of Combustion Chamber										4′-5″	4′-11″	4′-11″	5′-5″	5′-11″	6′-5″	6′-11″	7′-5″	7′-8″	8′-2″	8′ 5″	8′-11″	8′-11″	.....	.....	.....	.....	.....	.....
B—Length of Setting Over All										14′-6″	15′-0″	15′-6″	16′-0″	16′-6″	17′-0″	17′-6″	18′-0″	18′-6″	19′-0″	19′-6″	20′-0″	20′-6″	.....	.....	.....	.....	.....	.....

Continued on next page

Keeler Bent Tube Water Tube Boilers

Keeler bent tube water tube boilers, the culmination of 67 years' experience in building and designing.

Careful study and experimentation to design the best balanced curved tube boiler has been the aim of Keeler Engineers and tests have proven the attainment of the following features:

Adaptibility for installation under a variety of building conditions.

Durability and low maintenance cost.

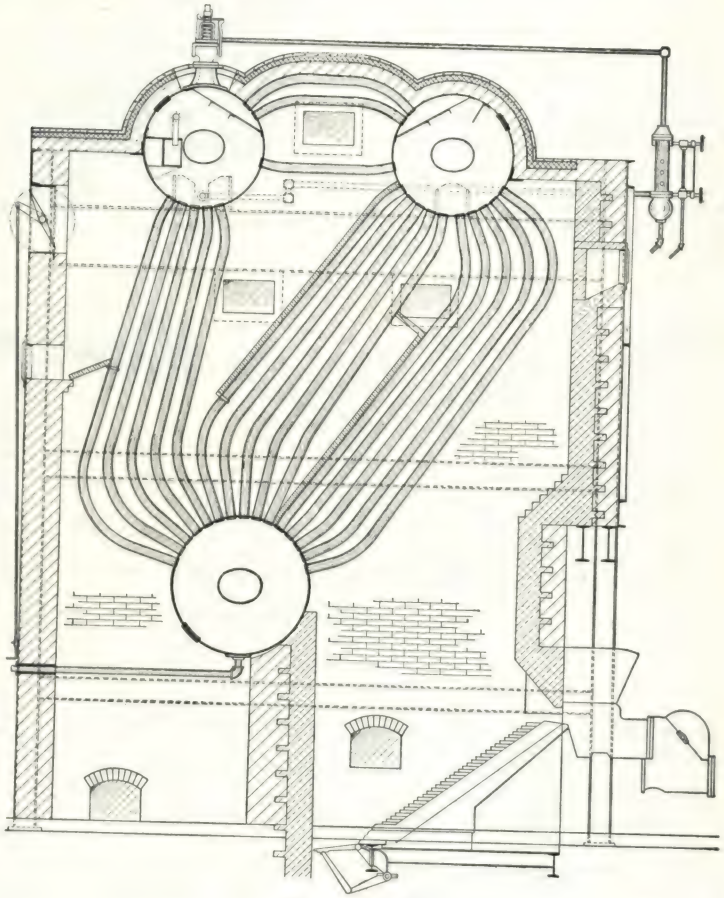
Ample cleaning facilities.

Steady water line assuring true gauge readings.

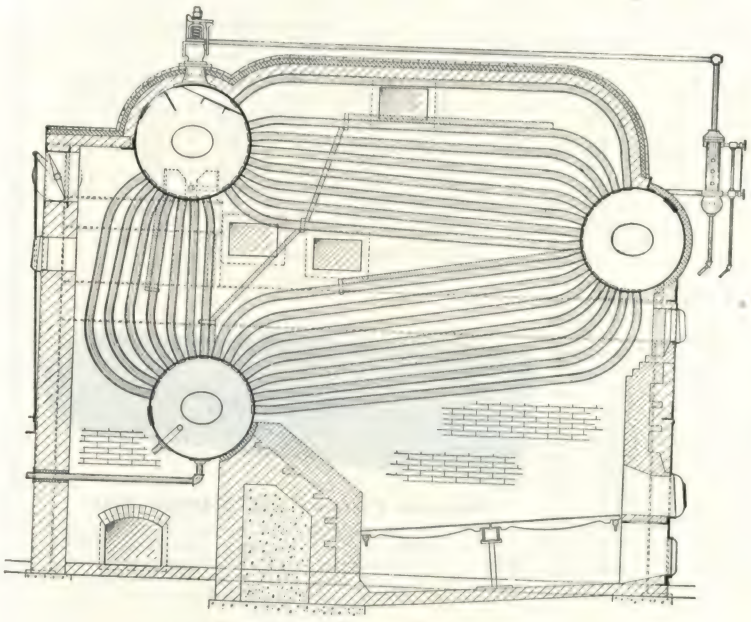
Ample steam liberation and storage capacity.

Dry steam under various conditions of operation.

Suspension framework that permits free expansion and contraction. A flexibility assuring easy maintenance of boiler setting.



Vertical Type



Low Head Room Type

All tubes curved to same radius allowing a precision of construction the accuracy of which cannot be had where the tubes are bent to different radius.

Bends are large enough to permit turbining.

Furnaces adaptable for the use of any type of furnace equipment or fuel.

Boilers are built with three or four drums to cover different requirements.

Prices and detail specification sent on request.

KEWANEE BOILER CORPORATION

KEWANEE, ILL.

BRANCHES

ATLANTA, 955 W. Marietta Street, N. W.
BIRMINGHAM, 1116 Martin Building
BUTTE, 910 So. Arizona Street
CHATTANOOGA, 1104 James Building
CHICAGO, 1858 So. Western Avenue
CINCINNATI, P. O. Box 75
CLEVELAND, 606 B. F. Keith Building
COLUMBUS, 243 No. High Street
DALLAS, 408-9 Dallas National Bank Building
DENVER, 1226-28 California Street
DES MOINES, 707 Hubbell Building
DETROIT, Michigan Theatre Building
EL PASO, 401 No. Santa Fe Street, Box 512
GRAND RAPIDS, 402½ Michigan Trust Building
GREENSBORO, 704 Jefferson Building, Box 536
HOUSTON, 839 Electric Building
INDIANAPOLIS, 221 Indiana Terminal Warehouse
KANSAS CITY, 2014 Wyandotte Street
LOS ANGELES, 1015 E. 8th Street
MEMPHIS, 422-423 Exchange Building
MILWAUKEE, 440 Barclay Street
MINNEAPOLIS, 708 Builders Exchange Building
NEW ORLEANS, 1007 New Orleans Bank Building
NEW YORK, 35 W. 39th Street
OKLAHOMA CITY, 120-22 E. Main Street
PEORIA, 103 Farmington Road
PITTSBURGH, Empire Building
ST. LOUIS, 4200 Forest Park Boulevard
SALT LAKE CITY, 204 Dooly Building
SAN FRANCISCO, 637 Minna Street
SEATTLE, 1206 Fifth Avenue
TAMPA, 504 E. Lafayette Street

DOMINION KEWANEE BOILER COMPANY, LTD., 66 Richmond Street, East, TORONTO 2, ONT.

Products

KEWANEE STEEL TANKS (Storage, Pneumatic Pressure, Gravel Basins, Blow-off and Air Receivers). See plate below.

KEWANEE STEEL HEATING BOILERS, including:

Brick-set Up-draft Boilers, 700 to 14,000 sq. ft. radiation (steam), Plate No. 2.

Portable Down-draft Smokeless Boilers, 3000 to 30,000 sq. ft. radiation (steam), Plate No. 3.

Portable Up-draft Boilers, 2500 to 28,000 sq. ft. radiation (steam), Plate No. 4.

Type K Up-draft, 600 to 13,300 sq. ft. radiation (steam), Plate No. 5.

Type C "Electric-Weld" Coal Burning Boilers, 2300 to 32,000 sq. ft. radiation (steam), Plate No. 6.

Type C "Electric-Weld" Oil Burning Boilers, 2800 to 36,000 sq. ft. radiation (steam), Plate No. 7.

Residence Type R Coal Burning Boilers: Bituminous, 370 to 1960 sq. ft. radiation (steam); Anthracite, 430 to 1960 sq. ft. radiation (steam), Plate No. 8.

Residence Type R Oil Burning Boilers, 450 to 2380 sq. ft. radiation (steam), Plate No. 9.

TABASCO WATER HEATERS and KEWANEE WATER HEATING GARBAGE BURNERS, Plate No. 10.

KEWANEE

TRADE-MARK

Specifications of Kewanee Boilers

Built in accordance with A.S.M.E. boiler code. Working pressure: regular, 15 lb.; special, 100 lbs. This code is used only as a minimum limit.

The equipment on all boilers includes rocking grates, fire door and frame, ash pit front with ash door and draft doors, back rest, or in brick-set type bearing plates with expansion rollers for supporting boiler shell on brick pier at rear and necessary soot doors.

Firing tools include hoe, poker, slice bar and tube scraper. Special firebrick tile to fit header, is furnished with all smokeless boilers. With portable type boilers we furnish all castings for erecting boilers, including cast iron ash pit base for smaller sizes.

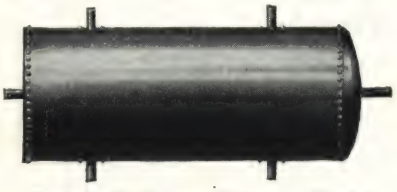
Extra trimmings for steam boilers consist of water column with water gauge and three compression cocks, steam gauge with syphon and cock, pop safety valve, and Automatic Arco Draft Regulator with lever, weights, pulleys and chains. No trimmings are furnished with water boilers.

Sufficient handholes are provided for cleaning purposes, and manholes are included in brick-set and Type K boilers 42 in. in diameter and larger, and in portable boilers 54 in. and larger.

The rated capacity of every Kewanee Boiler is the number of square feet of direct cast iron radiating surface, or equivalent, which the boiler will carry if sufficient radiation is installed to heat the building to a temperature of 70° F.

Rating is based on a standard for steam of 2 lbs. pressure at the boiler, and for water on a mean temperature of 180° F. as the water leaves the boiler.

KEWANEE STEEL TANKS



Standard Water Storage Tank

Tested to 100 lb. hydrostatic pressure. For use where water working pressure does not exceed 65 lb. Can be used either horizontally or vertically. Manholes, handholes, and coils furnished only when ordered. Extra heavy tanks are tested to 150 lb. hydrostatic pressure; working pressure not to exceed 100 lb. Tanks both plain and galvanized.

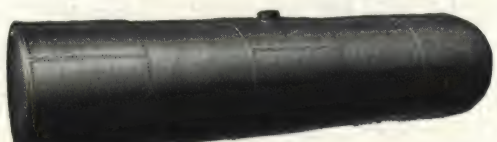
CAPACITIES AND DIMENSIONS OF KEWANEE WATER STORAGE TANKS

Standard and Extra Heavy				Shipping weight, lb.		Standard and Extra Heavy				Shipping weight, lb.	
Cap., gal.	Size, in., ft.	Openings, in.	Size coil (4 pipes) in.	Standard	Extra heavy	Cap., gal.	Size, in., ft.	Openings, in.	Size coil, (4 pipes) in.	Standard	Extra heavy
66	20x4	1½	1	270	.....	315	36x6	2	1½	700	920
85	20x5	1½	1	310	.....	365	36x7	2	1½	780	1030
100	24x4	1½	1¼	330	.....	420	36x8	2	1½	870	1160
120	24x5	1½	1¼	380	390	525	36x10	2	1½	1030	1380
140	24x6	1½	1¼	440	450	430	42x6	2	1½	890	1140
150	30x4	2	1¼	430	440	500	42x7	2	1½	980	1260
180	30x5	2	1¼	500	520	575	42x8	2	1½	1070	1400
220	30x6	2	1¼	560	590	720	42x10	2	1½	1250	1660
250	30x7	2	1¼	630	660	865	42x12	2	1½	1430	1910
295	30x8	2	1¼	700	720	1000	42x14	2	1½	1620	2180

SPECIFICATIONS OF KEWANEE PRESSURE AND STORAGE TANKS

Size tank, ft.	Thickness, in. Shell	Thickness, in. Head	Weight, lb.	Cap., gal.	Size tank, ft.	Thickness, in. Shell	Thickness, in. Head	Weight, lb.	Cap., gal.	Size tank, ft.	Thickness, in. Shell	Thickness, in. Head	Weight, lb.	Cap., gal.
4 x 8	¼	7/16	1700	750	4½x16	5/16	7/16	4300	1890	6x28	5/16	½	9700	5940
4 x10	¼	7/16	2000	940	4½x18	5/16	7/16	4700	2130	6x32	5/16	½	10800	6780
4 x12	¼	7/16	2300	1130	4½x20	5/16	7/16	5200	2360	6x36	5/16	½	11900	7630
4 x14	¼	7/16	2600	1300	4½x24	5/16	7/16	6000	2840	7x20	5/16	½	9200	5760
4 x16	¼	7/16	2900	1500	5 x20	5/16	7/16	5900	2920	7x24	5/16	½	10500	6910
4 x18	¼	7/16	3200	1700	5 x24	5/16	7/16	6900	3470	7x28	5/16	½	11800	8070
4 x20	¼	7/16	3500	1880	5 x28	5/16	7/16	7800	4090	7x32	5/16	½	13200	9220
4 x24	¼	7/16	4100	2260	5 x32	5/16	7/16	8700	4670	7x36	5/16	½	14500	10370
4½x12	5/16	7/16	3500	1420	5 x36	5/16	7/16	9800	5260	8x24	3/8	5/8	14600	9000
4½x14	5/16	7/16	3900	1660	6 x20	5/16	½	7400	4240	8x30	3/8	5/8	17200	11250
					6 x24	5/16	½	8500	5090	8x36	3/8	5/8	20000	13500

Manholes and flanges can be located where desired.



Kewanee Pressure and Storage Tank

Built for all purposes and pressures, and of any size. In making inquiry for prices and specifications, always give pressure to be carried, purpose for which tank is to be used, and number of gallons capacity. Tanks listed in table are for pressures up to 100 lb.

Kewanee Gravel Basins and Blow-off Receivers—Made in diameters from 20 to 36 in.; capacities from 34 to 210 gal. Thickness of shell, ¼ in. Thickness of heads, 5/16 in. Flanges of any size located to suit purchaser.

Kewanee Pneumatic Tanks—Built for 75 lb. water working pressure. Horizontal seam is lap joint, double riveted, all rivet holes reamed to full size. Openings in shell reinforced and threaded. Any size, plain or galvanized.

Kewanee Air Receivers—Shell seams are lap joints, double riveted; circular seams, single riveted. Heads dished to a radius equal to diameter of shell. Tested to 165 lb. hydrostatic pressure. Safe under 110 lb. working pressure.

Continued on next page

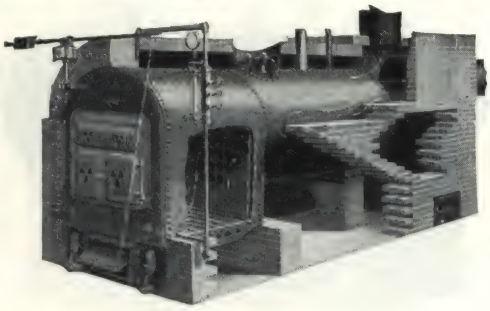
PLATE NO. 2. KEWANEE BRICK-SET UP-DRAFT BOILERS FOR HEATING

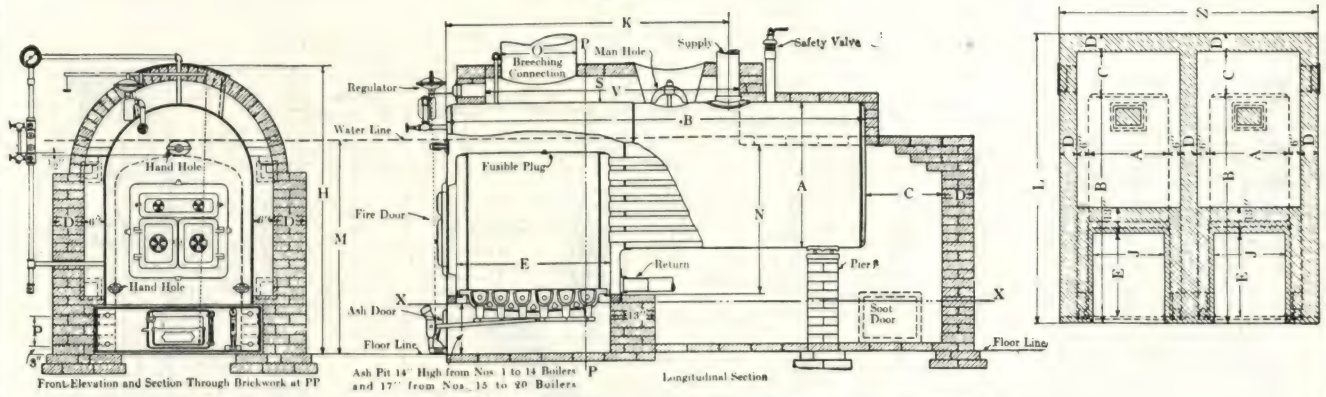
For apartment houses, schools, hotels, office buildings, factories, garages, etc. Will burn any kind of fuel—hard, soft or lignite coal or oil, but, with ordinary firing, should be used for soft coal in territories only where the smoke laws are not too stringent.

Setting can be arranged for either front or rear smoke outlet.

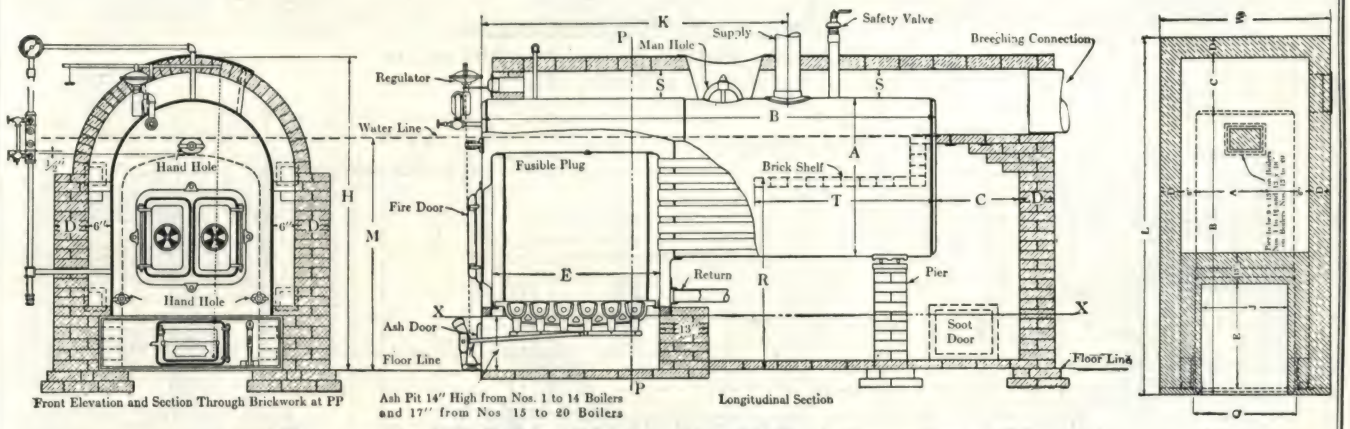
The first cost of this type of boiler set in place with a good brick setting is, approximately, the same as that of the portable up-draft covered with asbestos.

The efficiency and fuel saving of the brick-set is, approximately, the same as the portable up-draft of the same rated capacity and it is generally only a matter of preference with the architect or owner which to select.





Kewanee Up-draft Boilers, Nos. 0 to 20, with Stack Connection at Front



Kewanee Up-draft Boilers, Nos. 0 to 20, with Stack Connection at Rear

Boiler No.	Ratings, sq. ft. Steam	Ratings, sq. ft. Water	Grate area, sq. ft.	Heating surface, sq. ft.	Diameter in. Breeching One boiler	Diameter in. Breeching Two boilers	Diameter in. Stack One boiler	Diameter in. Stack Two boilers	Min. height of stack, ft. One boiler	Min. height of stack, ft. Two boilers	Size of openings, in. Steam	Size of openings, in. Return	Size of openings, in. Safety valve	Measurements shown on dimension diagrams, in inches A	B	C	D	E	H	J	K	L	M	N	O	P	Q	R	S	T	V	W	Z	*Number of common brick
0	700	1150	3.5	84	10	16	10	16	35	40	3	2	1	24	82	14	9	26	64	19	48	104	47	30	10	8	24	41	6	36	38	54	99	1325
1	900	1500	4.4	113	12	18	12	18	40	45	4	2½	1¼	30	77	17	9	26	70	25	48	103	52	32	12	8	30	44	6	30	38	60	111	1450
2	1050	1700	5.4	131	14	20	12	18	40	45	4	2½	1¼	30	90	17	9	32	70	25	56	116	52	32	14	8	30	44	6	38	46	60	111	1600
3	1200	2000	6.4	147	16	22	14	20	40	45	5	3	1¼	30	102	17	9	38	70	25	66	128	52	32	16	8	30	44	6	44	57	60	111	1750
4	1400	2300	6.8	180	16	22	14	20	40	45	5	3	1½	36	90	17	9	32	77	31	59	116	55	36	16	8	36	47	7	36	49	66	123	1900
5	1700	2800	8.0	215	18	24	16	22	40	45	6	3	1½	36	108	17	9	38	77	31	71	134	55	36	18	8	36	47	7	42	61	66	123	2150
6	2000	3300	9.3	250	18	24	16	22	45	45	6	3	2	36	126	17	9	44	77	31	83	152	55	36	18	8	36	47	7	54	73	66	123	2400
8	2600	4300	11.1	305	20	28	18	26	45	50	6	4	2	42	120	22	9	44	83	37	80	151	58½	39	20	8	42	50	7	48	75	72	135	2650
9	3000	5000	12.6	350	22	32	20	28	45	50	6	4	2	42	138	22	9	50	83	37	86	169	58½	39	22	8	42	50	7	60	81	72	135	2900
10	3500	5800	12.9	368	22	32	20	28	45	50	6	4	2	48	126	22	9	44	90	43	84	157	61	42	22	8	48	53	8	54	75	78	147	3000
11	4000	6600	14.7	420	24	32	22	30	50	50	6	4	2½	48	144	22	9	50	90	43	94	175	61	42	24	8	48	53	8	66	87	78	147	3300
12	4500	7400	16.5	472	24	34	22	32	50	50	8	5	2½	48	162	22	9	56	90	43	102	193	61	42	24	8	48	53	8	80	93	78	147	3600
13	5500	9100	18.8	560	28	36	26	34	50	55	8	5	2½	54	167	24	13	56	96	49	110	204	66	48	28	8	54	56	8	84	97	92	171	5300
14	6500	10700	20.8	673	28	36	26	34	50	60	8	5	3	54	197	24	13	62	96	49	116	234	66	48	28	8	54	56	8	102	103	92	171	5900
15	7500	12400	22.9	743	32	40	30	36	55	60	8	5	3	60	186	24	13	62	108	54	114	223	75	51	32	11	60	63	10	90	101	98	183	6500
16	8700	14400	25.1	873	32	40	30	36	55	70	8	5	3½	60	216	24	13	68	108	54	128	253	75	51	32	11	60	63	10	108	115	98	183	7200
17	10000	16500	25.5	954	32	40	30	36	60	70	8	6	3½	66	192	24	13	62	114	60	116	229	80	58	32	11	66	66	10	90	103	104	195	7200
18	11000	18200	28.0	1080	32	42	30	38	60	70	8	6	3½	66	216	24	13	68	114	60	128	253	80	58	32	11	66	66	10	108	116	104	195	7700
19	12000	19800	30.8	1167	36	44	34	40	60	70	8	6	4	72	192	28	13	68	120	66	117	233	85½	63	36	11	72	69	10	84	105	110	207	7700
20	14000	23100	33.5	1329	36	46	34	42	60	70	8	6	4	72	216	28	13	74	120	66	129	257	85½	63	36	11	72	69	10	102	117	110	207	8200

*Foundations not included.

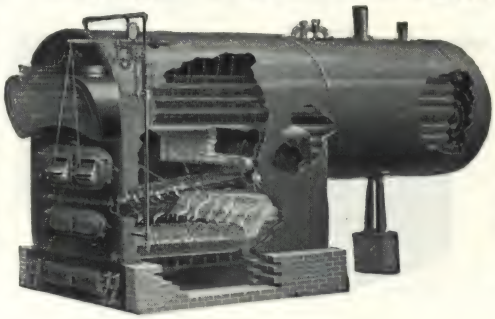
Continued on next page

PLATE NO. 3. KEWANEE SMOKELESS PORTABLE BOILERS

This boiler is intended for use in apartment houses, hotels, office buildings and factories, where the chimney heights are 50 ft. or more, depending on the capacity required.

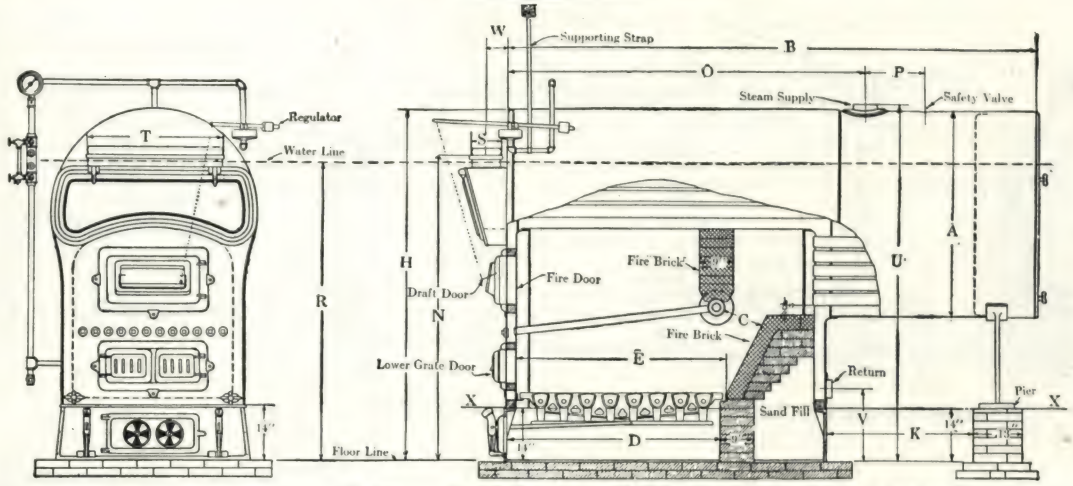
It generally requires less floor space than the brick-set type, and is easier to clean. For this reason it is frequently selected.

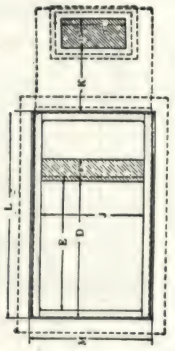
This boiler is designed primarily for soft coal operation, but is also suitable for oil, sawdust, refuse, or hard coal.



The extreme heat of burning oil is developed and absorbed with high efficiency by the large water content kept in rapid circulation by the water grate. Tests show 84% efficiency.

Boilers Nos. 307 to 314 constructed with bell top. Iron ash pit furnished with boiler Nos. 307, 308 and 309. Boiler Nos. 310, 311, 312, 313 and 314 set on brick foundation instead of cast iron base as shown.

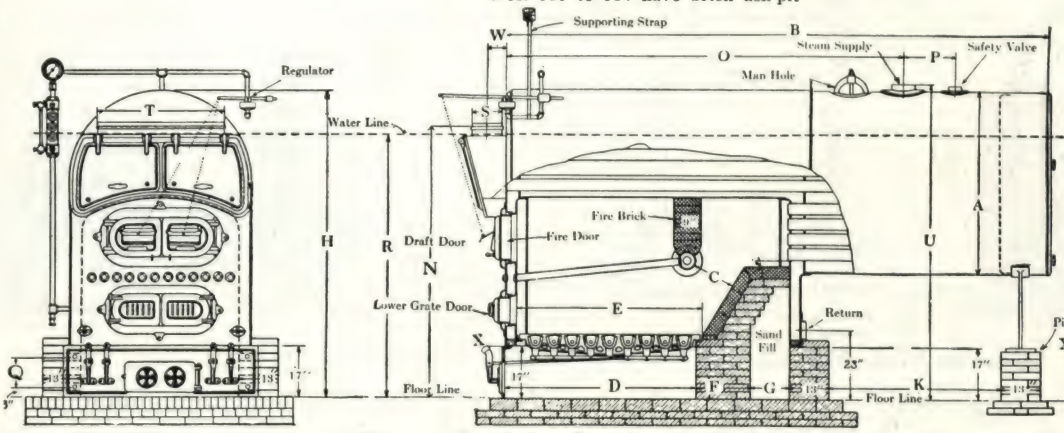


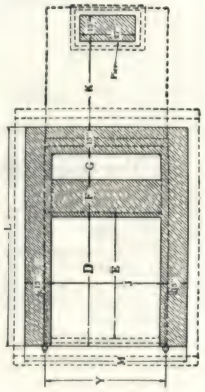


Foundation and Setting Plan at XX, Boilers, Nos. 307 to 309

Kewanee Smokeless Portable Boilers, Nos. 307 to 314

Nos. 310 to 314 have brick ash pit





Foundation and Setting Plan at XX, Boilers Nos. 310 to 324

Kewanee Smokeless Portable Boilers, Nos. 315 to 324

Boiler No.	Ratings, sq. ft. Steam	Ratings, sq. ft. Water	Upper grate area, sq. ft.	Heating surface, sq. ft.	Diameter, in. Breeching One boiler	Diameter, in. Breeching Two boilers	Diameter, in. Stack One boiler	Diameter, in. Stack Two boilers	Min. height of stack, ft. One boiler	Min. height of stack, ft. Two boilers	Size of openings, in. Steam	Size of openings, in. Return	Size of openings, in. Safety valve	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Y	Space required to open rear flue doors, in.	Number of brick *Common	Number of brick Fire	Outside surface to be covered, sq. ft.
307	3000	5000	8.8	297	22	30	20	28	50	60	6	4	2	48	109	9	38	37	9	..	84	37	29	61	46	76	71	12	..	71	10	36	85	19	8	..	26	200	115	148
308	3500	5800	10.1	352	22	30	20	28	55	65	6	4	2	48	125	10	44	43	9	..	84	37	39	67	46	76	80	14	..	71	10	36	85	19	8	..	26	200	115	157
309	4000	6600	11.4	391	22	30	20	28	55	65	6	4	2	48	137	11½	50	49	9	..	84	37	45	73	46	76	87	14	..	71	10	36	85	19	8	..	26	200	115	173
310	4500	7400	12.9	446	24	34	22	31	55	65	6	4	2½	54	131	11	50	49	13	12	89	43	27	84	60	80	90	13	8	76	10	42	90	19	8	48	28	800	155	184
311	5000	8300	14.7	496	24	34	22	31	55	65	6	4	2½	54	143	12½	56	55	13	12	89	43	33	90	60	80	98	13	8	76	10	42	90	19	8	48	28	825	155	212
312	5500	9100	16.5	546	24	34	22	31	60	70	6	4	2½	54	155	14	62	61	13	12	89	43	39	96	60	80	105	15	8	76	10	42	90	19	8	48	28	850	155	221
313	6000	9900	17.1	592	26	38	24	34	60	70	8	5	3	60	155	12½	56	55	13	12	98	49	45	90	66	88	105	15	8	83	12½	46	99	20	9¼	54	32	1025	195	255
314	6500	10700	18.5	643	26	38	24	34	60	70	8	5	3	60	167	14	62	61	13	12	98	49	51	96	66	88	111	18	8	83	12½	46	99	20	9¼	54	32	1050	195	265
315	7500	12400	20.0	721	28	40	26	36	65	75	8	5	3	60	183	14	63	61	18	13	101	53	57	107	79	90	131	16	11	87	12½	46	103	23	9¼	60	32	1300	210	266
316	8500	14000	21.4	773	28	40	26	36	65	75	8	5	3½	60	195	15	69	67	18	13	101	53	63	113	79	90	138	18	11	87	12½	46	103	23	9¼	60	32	1350	215	280
317	10000	16500	23.5	912	30	44	28	40	65	75	8	6	3½	66	189	15	63	61	18	13	107	59	62	107	85	93	132	16	11	90	15	50	109	23	10½	66	35	1300	240	290
318	12000	19800	25.9	1053	32	46	30	42	70	80	8	6	4	66	213	16	69	67	18	13	107	59	80	113	85	93	141	18	11	90	15	50	109	23	10½	66	35	1350	240	330
319	14000	23100	28.5	1204	34	50	32	46	70	80	8	6	4	72	199	16	69	67	18	13	113	65	63	113	91	100	139	15	11	96	17	54	115	22	11½	72	37	1375	255	335
320	16000	26400	29.9	1316	34	50	32	46	70	80	8	6	4	72	215	17	75	73	18	13	113	65	74	119	91	100	146	18	11	96	17	54	115	23	11½	72	37	1450	255	360
321	18000	29700	32.6	1458	36	52	34	48	80	90	8	6	2–2½	78	214	17	75	73	18	13	115	71	72	119	97	101	146	18	11	97	17	60	117	23	11½	78	40	1400	290	370
322	20000	33000	34.6	1549	36	52	34	48	90	100	8	6	2–3	78	226	18	75	73	18	19	115	71	79	125	97	101	153	16	11	97	17	60	117	23	11½	78	40	1475	315	400
323	25000	40000	41.7	2074	40	56	38	54	90	100	10	6	2–3	84	241	18	81	79	18	19	121	77	84	131	103	109	164	18	11	105	20	64	123	23	13	84	43	1575	425	455
324	30000	48000	44.8	2629	42	56	40	54	100	110	10	6	2–3½	84	289	19	87	85	18	19	121	77	126	137	103	109	180	20	11	105	20	64	123	23	13	84	43	1600	425	545

*Foundations not included.

Continued on next page

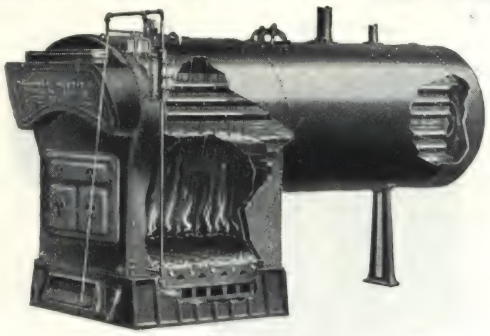
PLATE NO. 4. KEWANEE UP-DRAFT PORTABLE BOILERS FOR HEATING

Designed for hard coal, oil, coke or gas firing.

This boiler now being used extensively in the East with buckwheat coal under natural or forced draft and is found to be very efficient in this kind of service.

Can be used for soft coal where not prevented by stringent smoke laws.

Requires a stack 50 ft. or higher, depending on capacity.

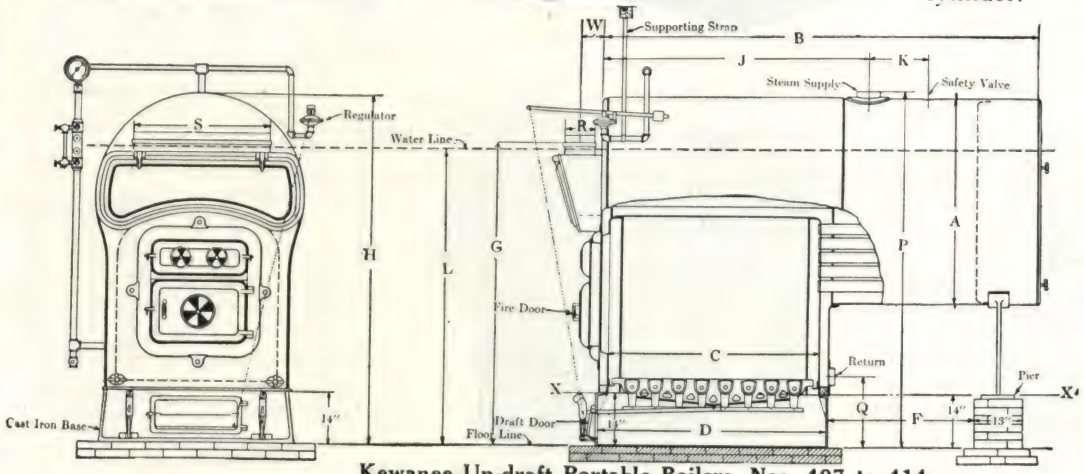


Boiler No. 414 (and smaller) is made with enlarged cylinder as shown.

Iron ash pits, as illustrated furnished with No. 409 (and smaller).

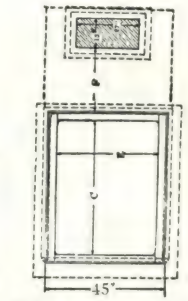
No. 410 (and larger) set on brick foundation.

No. 415 (and larger) made with firebox same width as cylinder.

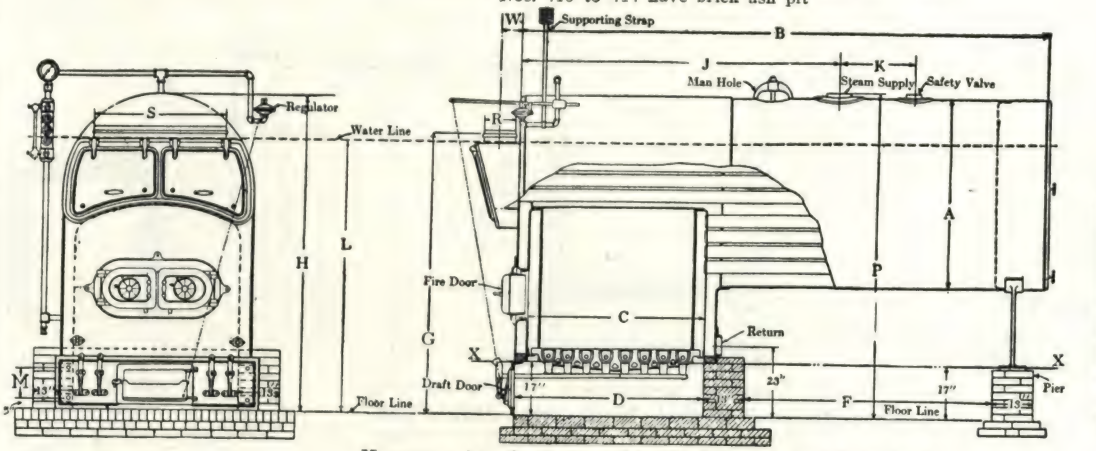


Kewanee Up-draft Portable Boilers, Nos. 407 to 414

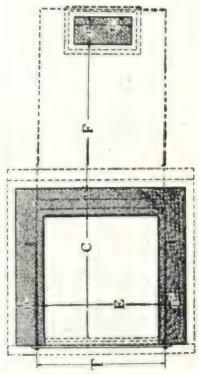
Nos. 410 to 414 have brick ash pit



Foundation and Setting Plan at XX, Boilers Nos. 407 to 409



Kewanee Up-draft Portable Boilers, Nos. 415 to 424



Foundation and Setting Plan at XX, Boilers Nos. 410 to 424

Boiler No.	Ratings, sq. ft. Steam	Ratings, sq. ft. Water	Grate area, sq. ft.	Heating surface, sq. ft.	Diameter, in. Breeching One boiler	Diameter, in. Breeching Two boilers	Diameter, in. Stack One boiler	Diameter, in. Stack Two boilers	Min. height of stack, ft. One boiler	Min. height of stack, ft. Two boilers	Size of openings, in. Steam	Size of openings, in. Return	Size of openings, in. Safety valve	A	B	C	D	E	F	G	H	J	K	L	M	P	Q	R	S	T	W	*Number of common brick	Outside surface to be covered, sq. ft.
407	2500	4100	9.6	278	22	30	20	28	50	60	6	4	2	48	103	38	45	36	39	76	84	56	13	71	....	85	19	10	36	...	8	70	115
408	2900	4800	11.1	310	22	30	20	28	50	60	6	4	2	48	114	44	51	36	44	76	84	63	14	71	....	85	19	10	36	...	8	70	130
409	3500	5800	12.6	373	22	30	20	28	55	65	6	4	2	48	133	50	57	36	57	76	84	75	18	71	....	85	19	10	36	...	8	70	150
410	4000	6600	12.9	416	24	34	22	31	55	65	6	4	2	54	120	44	47	43	45	80	89	66	16	76	8	90	19	10	42	48	8	450	155
411	4500	7400	14.7	465	24	34	22	31	55	65	6	4	2½	54	133	50	53	43	52	80	89	76	18	76	8	90	19	10	42	48	8	480	175
412	5000	8300	16.5	515	24	34	22	31	60	70	6	4	2½	54	145	56	59	43	58	80	89	96	13	76	8	90	19	10	42	48	8	510	185
413	5500	9100	18.8	565	26	38	24	34	60	70	8	5	2½	60	149	56	59	49	62	88	98	99	16	83	8	99	20	12½	46	54	9¼	520	190
414	6000	9900	20.8	626	26	38	24	34	60	70	8	5	3	60	163	62	65	49	70	88	98	104	18	83	8	99	20	12½	46	54	9¼	560	220
415	7000	11600	20.7	676	28	40	26	36	65	75	8	5	3	60	172	56	60	53	79	90	101	101	21	87	11	103	23	12½	46	60	9¼	680	250
416	8000	13200	22.9	778	28	40	26	36	65	75	8	5	3	60	194	62	66	53	95	90	101	113	29	87	11	103	23	12½	46	60	9¼	710	280
417	9500	15700	25.5	929	30	44	28	40	65	75	8	6	3½	66	189	62	66	59	89	93	107	112	18	90	11	109	23	15	50	66	10½	740	290
418	11000	18200	28.0	1040	32	46	30	42	70	80	8	6	3½	66	208	68	72	59	101	93	107	122	32	90	11	109	23	15	50	66	10½	760	310
419	13000	21500	30.8	1168	34	50	32	46	70	80	8	6	4	72	191	68	72	65	83	100	113	116	18	96	11	115	23	17	54	72	11½	790	315
420	15000	24800	33.5	1303	34	50	32	46	70	80	8	6	4	72	210	74	78	65	95	100	113	133	26	96	11	115	23	17	54	72	11½	820	345
421	17500	28500	36.6	1514	36	52	34	48	80	90	8	6	2–2½	78	215	74	78	71	100	101	115	135	24	97	11	117	23	17	60	78	11½	840	385
422	20000	32000	39.6	1711	36	52	34	48	90	100	8	6	2–3	78	239	80	84	71	118	101	115	144	30	97	11	117	23	17	60	78	11½	885	425
423	25000	40000	42.9	2209	40	56	38	54	90	100	10	6	2–3	84	241	80	84	77	118	109	121	150	24	105	11	123	23	20	64	84	13	900	455
424	28000	45000	46.1	2427	42	56	40	54	100	110	10	6	2–3	84	265	86	90	77	136	109	121	150	21	105	11	123	23	20	64	84	13	935	505

*Foundations not included.

Continued on next page

PLATE NO. 5. KEWANEE UP-DRAFT PORTABLE TYPE K BOILERS FOR HEATING

The Type K Boiler for smaller buildings is constructed along the same lines as the larger Kewanee Boilers.

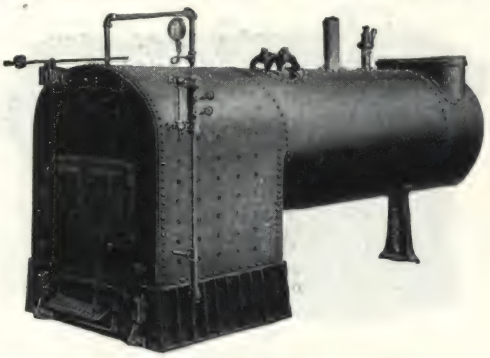
Nos. 0K to 12K have cast iron base; 13K and larger have brick base.

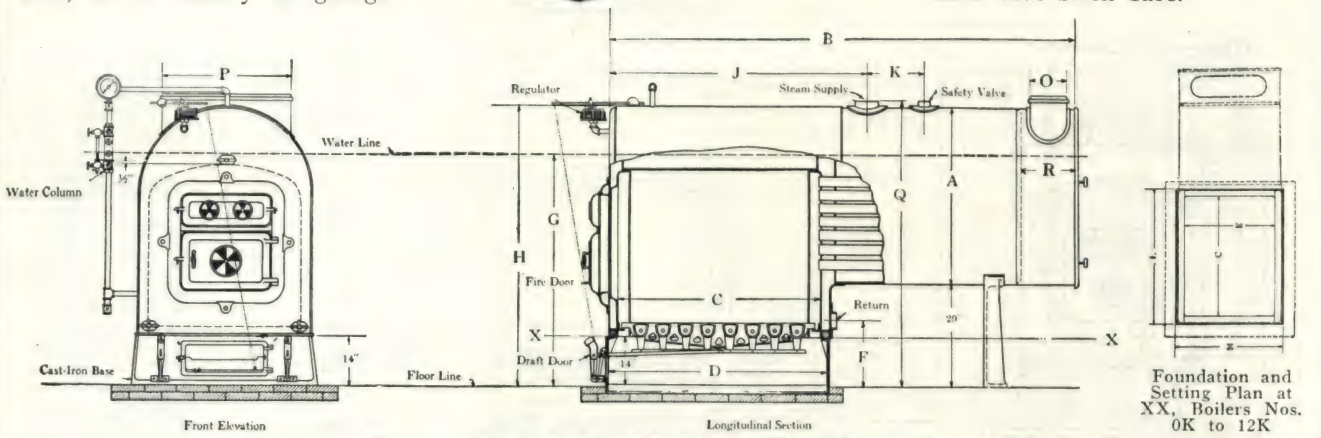
Type K Boilers will carry all their rated capacity.

Designed for conditions where very limited headroom and chimney height are available, as in factory or garage work, though it is suitable in any other type of building where either or both of these limitations exist.

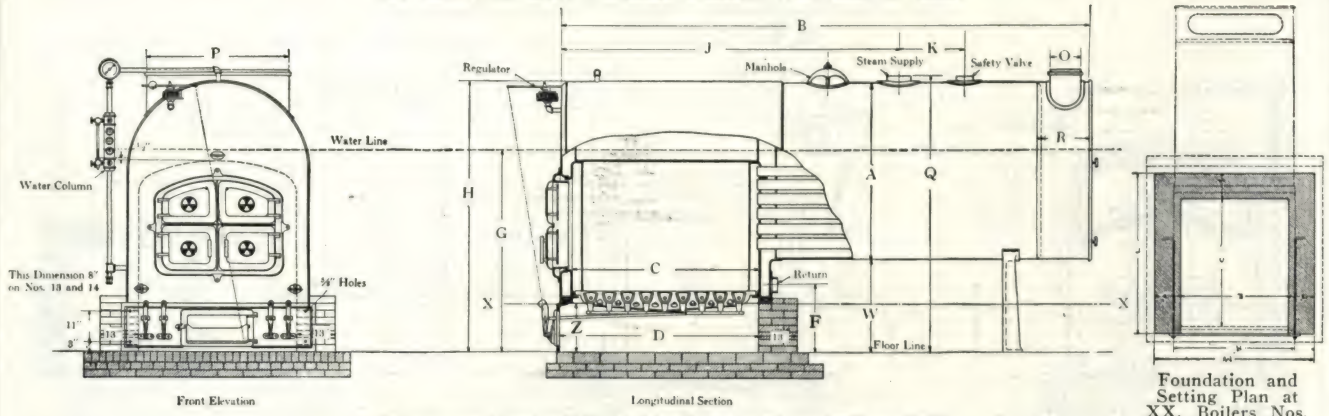
Will burn any kind of fuel with the maximum efficiency, but where soft coal is to be used in territories where there are stringent smoke laws, specify the down-draft smokeless.

The illustration shows the Nos. 0K to 12K boilers; 13K to 20K have brick base.





Kewanee Up-draft Portable Boilers, Nos. 0K to 12K



Kewanee Up-draft Portable Boilers, Nos. 13K to 20K

Boiler No.	Ratings, sq. ft. Steam	Ratings, sq. ft. Water	Grate area, sq. ft.	Heating surface, sq. ft.	Diameter, in. Breeching One boiler	Diameter, in. Breeching Two boilers	Diameter, in. Stack One boiler	Diameter, in. Stack Two boilers	Min. height of stack, ft. One boiler	Min. height of stack, ft. Two boilers	Size of openings, in. Steam	Size of openings, in. Return	Size of openings, in. Safety valve	Measurements shown on dimension diagrams, in inches A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	W	Z	Space required to open rear flue doors, in.	*Number of common brick	Outside surface to be covered, sq. ft.
0K	600	1000	3.5	61	10	16	10	16	35	40	3	2	1	24	93	26	31	19	15½	45	51	48	12	32	27		10	10	53	12	27	14	24		55
1K	850	1400	4.4	83	12	18	12	18	35	40	4	2½	1¼	30	94	26	33	24	18	52	59	48	12	34	34		8	16	61	16	29	14	18		68
2K	1000	1600	5.4	93	14	20	12	18	35	40	4	2½	1¼	30	106	32	39	24	18	52	59	56	15	40	34		8	16	61	16	29	14	18		77
3K	1150	1900	6.4	104	16	22	14	20	35	40	5	3	1¼	30	118	38	45	24	19	52	59	66	16	46	34		8	16	61	16	29	14	18		85
4K	1300	2200	6.8	139	16	22	14	20	35	40	5	3	1½	36	106	32	39	30	19	55	65	59	15	40	40		10	24	67	16	29	14	21		91
5K	1600	2600	8.0	164	18	24	16	22	35	40	6	3	1½	36	124	38	45	30	19	55	65	71	18	46	40		10	24	67	16	29	14	21		106
6K	1900	3100	9.3	190	18	24	16	22	40	40	6	3	2	36	142	44	51	30	19	55	65	83	18	52	40		10	24	67	16	29	14	21		120
8K	2450	4100	11.1	241	20	28	18	26	40	45	6	4	2	42	126	44	51	36	19	58½	71	80	13	52	46		10	30	73	16	29	14	24		133
9K	2850	4700	12.6	275	22	32	20	28	40	45	6	4	2	42	154	50	57	36	19	58½	71	86	13	58	46		10	30	73	16	29	14	24		149
10K	3300	5500	12.9	298	22	32	20	28	40	45	6	4	2	48	142	44	51	42	19	61	77	84	16	52	52		10	36	79	16	29	14	27		157
11K	3800	6300	14.7	338	24	32	22	30	45	45	6	4	2½	48	160	50	57	42	19	61	77	94	18	58	52		10	26	79	16	29	14	27		177
12K	4300	7000	16.5	378	24	34	22	32	45	45	8	5	2½	48	178	56	63	42	20	61	77	102	18	64	52		10	36	79	16	29	14	27		197
13K	5200	8600	18.8	447	28	36	26	34	45	50	8	5	2½	54	184	56	59	49	20	66	83	110	21	72	75	54	10	46	85	16	29	14	30	460	200
14K	6200	10100	20.8	537	28	36	26	34	45	55	8	5	3	54	214	62	65	49	20	66	83	116	30	78	75	54	10	46	85	16	29	14	30	490	235
15K	7100	11800	22.9	603	32	40	30	36	50	55	8	5	3	60	204	62	65	54	23	75	93	114	26	78	80	60	12	50	95	18	33	17	33	710	275
16K	8200	13700	25.1	708	32	40	30	36	50	65	8	5	3½	60	234	68	71	54	23	75	93	128	30	84	80	60	12	50	95	18	33	17	33	740	314
17K	9500	15700	25.5	791	32	40	30	36	55	65	8	6	3½	66	210	62	65	60	23	80	99	116	26¾	78	86	66	12	54	101	18	33	17	36	740	311
18K	10400	17300	28.0	896	32	42	30	38	55	65	8	6	3½	66	234	68	71	60	23	80	99	128	30	84	86	66	12	54	101	18	33	17	36	760	345
19K	11400	18800	30.8	992	36	44	34	40	55	65	8	6	4	72	210	68	71	66	23	85½	105	117	20	84	92	72	13	68	107	18	33	17	39	790	338
20K	13300	21900	33.5	1129	36	46	34	42	55	65	8	6	4	72	234	74	77	66	23	85½	105	129	34	90	92	72	13	68	107	18	33	17	39	820	366

*Foundations not included.

Continued on next page

PLATE NO. 6. KEWANEE "ELECTRIC-WELD" TYPE C COAL BURNING BOILERS

This particular design of boiler is not new in itself—a basic patent having been taken out in 1873. The KEWANEE BOILER CORPORATION has developed some processes of manufacture which have made it possible to overcome the inherent weaknesses of earlier models on the market, and Kewanee improvements have made it permissible to sponsor this line of the fore-shortened type of boiler, fortified with the guarantee of the Kewanee name.

The Kewanee Type C Boiler exemplifies the latest in expert thought. It is built of steel plate, seven simple shapes, solidly welded into a homogeneous unit by the well proven electric metallic-arc-puddling process, same as has been used on welded details of Kewanee Boilers for the past 10 years or more.

This boiler is built to the A.S.M.E. Code for low pressure heating boilers. It is a *real* boiler in construction—a scientifically designed steam generator.

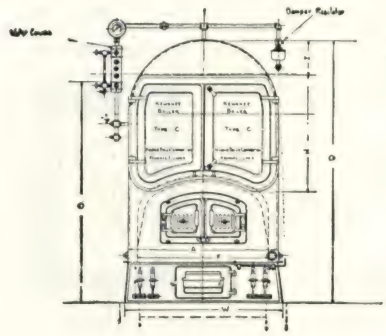
Important Features — The furnace has extra width and height. For bituminous coal an arch is arranged to promote complete combustion. The space is proportioned to handle the expanded volume of the products of combustion. Long travel back and forth for the flue gases prevents them escaping up the stack at too high a temperature.

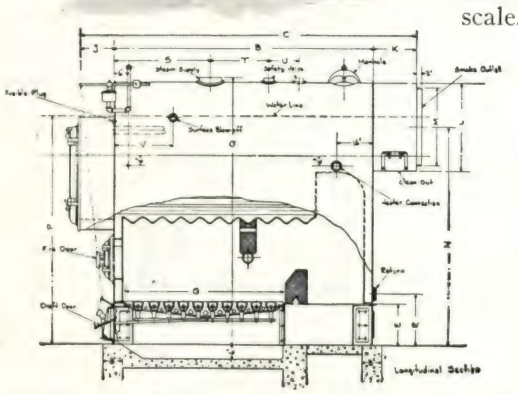
The water content is ample to absorb all the useful heat without undue disturbance, and rapid circulation sweeps the steam bubbles through *free waterways* provided by improved design. The water line remains steady.

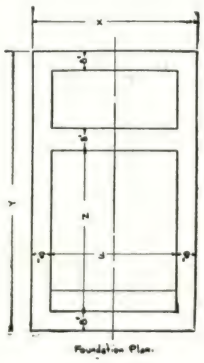
Another improved factor keeps the top flues under the water line—in many makes the water line would be 3 or 4 in. higher under like conditions. In this type, the disengaging area is unbroken. There is no priming and the liberation of steam is unimpeded. The steam space above has unusual height to insure a continuous flow of dry steam in the heating system.

Corrugated Crown Sheet—An exclusive Kewanee feature used in all Type C Boilers. The main advantages:

More heating surface placed most effectively, resulting in quick steaming. Corrugating gives greater resistance to the crushing effect of steam pressure without the use of stay rods, and permits installing crown sheet right-side-up instead of in the objectionable inverted position. Permits greater height for better combustion. Easily takes up expansion and contraction. Is self draining and cleaning from sediment and scale.







Kewanee "Electric-Weld" Type C Coal Burning Boilers

Boiler No.	Code	*Rating, steam boiler, sq. ft.	Grate area, sq. ft.	Heating surface sq. ft.	Diam. in. Breching: One boiler	Breching: Two boilers	Stack: One boiler	Stack: Two boilers	Min. ht. of stack, ft.: One boiler	Min. ht. of stack, ft.: Two boilers	Size of openings, in.: Steam	Return	Safety Valve	Measurements shown on dimension diagrams, in inches: A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	Outside surface to be covered, sq. ft.
749	Cabby	2300	9.1	164	20	28	18	26	45	55	6	4	2	36	50	70	77½	14	30	43	34	10	9	11	26	22	64½	67	69	79½	18	10½	8½	..	12	38½	46	59	43	62
750	Cabdo	2690	10.3	192	22	30	20	28	50	60	6	4	2	36	56	76	77½	14	30	49	34	10	9	11	26	22	64½	67	69	79½	18	14	10	..	12	38½	46	65	49	68
751	Cabem	3250	11.0	232	22	30	20	28	50	60	6	4	2	36	68	88	77½	14	30	56	34	10	9	11	26	22	64½	67	69	79½	18	14	10	..	12	38½	46	77	56	80
752	Cabgy	3630	11.6	262	22	30	20	28	55	65	6	4	2	36	76	96	77½	14	30	56	34	10	9	11	26	22	64½	67	69	79½	18	16	10	..	12	38½	46	85	56	89
753	Cabop	4050	12.4	290	24	34	22	31	55	65	6	4	2	42	70½	94½	83½	14	36	50	34	13	10	14	29	24	69	70	72	85½	18	14	10	..	12	44½	52	80	50	93
754	Cabur	4550	13.9	325	24	34	22	31	55	65	6	4	2	42	78½	102½	83½	14	36	56	34	13	10	14	29	24	69	70	72	85½	18	16	10	..	12	44½	52	88	56	102
755	Cacen	5250	15.5	375	24	34	22	31	60	70	6	4	2½	42	90	114	83½	14	36	62	34	13	10	14	29	24	69	70	72	85½	18	18	11	..	12	44½	52	99	62	115
756	Cacip	5950	18.0	425	26	38	24	34	60	70	8	5	2½	48	73	99	97	14	42	62	42	16	11	15	35½	26	79	80	82	99	19	16	12	..	12	50½	58	82	62	116
757	Cache	6470	19.7	462	26	38	24	34	60	70	8	5	3	48	79	105	97	14	42	68	42	16	11	15	35½	26	79	80	82	99	19	18	13	..	12	50½	58	88	68	124
758	Cacor	7000	21.5	498	26	40	26	36	65	75	8	5	3	48	85	111	97	14	42	74	42	16	11	15	35½	26	79	80	82	99	19	21	14	..	12	50½	58	94	74	132
759	Cacus	8280	22.4	591	28	40	26	36	65	75	8	5	3	54	89½	116½	99	14	47½	68	42	16	12	15	35	28	81½	82	85	101	19	18	13	..	18	56½	63½	106	68	145
760	Cadan	9610	24.3	686	28	44	28	40	65	75	8	5	3½	54	103	130	99	14	47½	74	42	16	12	15	35	28	81½	82	85	101	19	21	14	..	24	56½	63½	112	74	165
761	Cadep	10850	24.7	775	32	46	30	42	70	80	8	6	3½	60	96½	124½	108½	17	52½	68	48	16	12	16	36	32	90½	91	94	110½	22	18	13	..	24	63	68½	106	68	172
762	Cadgo	12110	26.9	865	32	46	30	42	70	80	8	6	3½	60	107	135	108½	17	52½	74	48	16	12	16	36	32	90½	91	94	110½	22	21	14	..	24	63	68½	115	74	187
763	Cadir	14300	27.6	1025	34	50	32	46	70	80	8	6	3½	66	115	143	111½	17	58½	68	48	18	12	16	39	34	93	92½	95	113½	22	18	13	..	24	69	74½	123	68	210
764	Cados	16380	30.1	1170	34	50	32	46	70	80	8	6	4	66	130	158	111½	17	58½	74	48	18	12	16	39	34	93	92½	95	113½	22	21	14	..	24	69	74½	138	74	234
765	Cadut	18660	32.9	1333	36	52	34	48	80	90	8	6	4	72	118½	152½	117½	17	64	74	51	17	14	20	43	36	96	98	101	119½	22	21	14	..	24	75	80	127	74	231
766	Cafis	20750	35.6	1482	36	52	34	48	90	100	8	6	2-2½	72	131	165	117½	17	64	80	51	17	14	20	43	36	96	98	101	119½	22	21	14	10	24	75	80	140	80	252
767	Cafot	22520	36.0	1608	40	54	38	52	90	100	8	6	2-2½	78	130	164	121½	17	70	74	52	19	14	20	45½	40	99	100	103	123½	22	21	14	10	24	81	86	138	74	265
768	Cagar	25530	38.9	1824	40	56	38	54	90	100	10	6	2-3	78	146½	180½	121½	17	70	80	52	19	14	20	45½	40	99	100	103	123½	22	21	14	11	24	81	86	151	80	294
769	Cahas	28780	42.1	2056	42	56	40	54	100	110	10	6	2-3	84	131	165	135	21	76	80	61	21	14	20	49½	42	110	111½	114	137	26	21	14	11	24	87½	92	133	80	294
770	Cahet	33070	45.2	2362	42	56	40	54	100	110	10	6	2-3	84	149	183	135	21	76	86	61	21	14	20	49½	42	110	111½	114	137	26	24	15	12	24	87½	92	157	86	328

Boilers No. 2749-2770 have same rated capacity for anthracite coal and are furnished without arch and drum.
*Rated capacity for water boiler is 60% greater than capacity of steam boiler.

Continued on next page

PLATE NO. 7. KEWANEE "ELECTRIC-WELD" TYPE C OIL BURNING BOILERS

The same predominant qualities which make the Kewanee Type C Boiler so well adapted for burning coal apply just as emphatically in making this boiler suitable for burning oil. Its well balanced features, designed on scientific principles, are enumerated on the previous page. These hold good for the oil burning boilers, and prove its ability to fulfill a definite demand in the heating business for a boiler of minimum advisable dimensions for handling the load for which it is rated.

Extensive tests have been carried on in the laboratory at Kewanee during the last five or six years with the purpose of developing ideal conditions as to boiler settings, furnace requirements, etc., for burning oil with satisfactory results under all types and sizes of Kewanee Boilers when equipped with leading commercial oil burners.

In view of the remarkably high efficiencies attained in numerous instances, the KEWANEE BOILER CORPORATION is well qualified to give expert advice to customers regarding the methods of installing any oil burners of recognized standing, for either front or rear firing. Blue prints cheerfully furnished showing foundation and setting plan recommended in each particular instance.

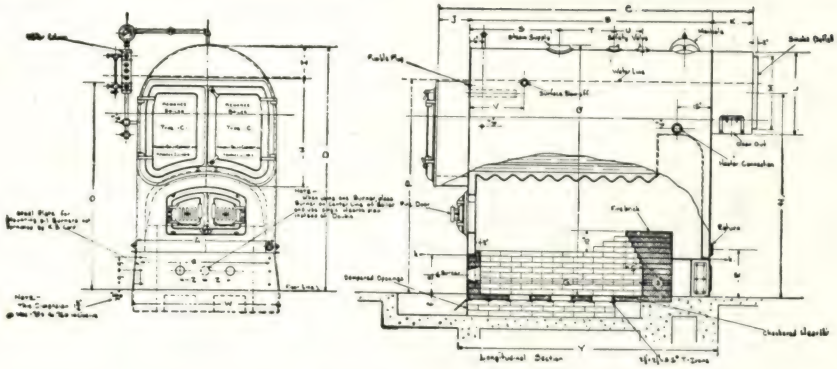
It has become an axiom with experts in heating that "if you burn oil and expect to get steam, you must have a boiler that will steam just as well with coal or any other fuel." That is precisely what Kewanee Type C Steel Boiler will do. It will give very high figures for efficiency with any kind of fuel.

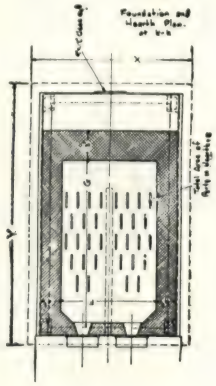
The strong steel plate construction, consisting of simple shapes compactly united by the electric-weld method, is done in the same shops where the well-known Kewanee Boilers have been made for 50 years. This is a guarantee that nothing is skimped in workmanship on Type C Boilers.

The purchaser is sure of an economical "buy" in the Kewanee Type C Steel Boiler. The first cost will be moderate and the upkeep cost will be low. Every dollar expended for fuel will produce a high percentage of heat units.

Corrugated Crown Sheet—An exclusive Kewanee feature used in all Type C Boilers. One of the main advantages:

More heating surface placed most effectively, resulting in quick steaming.





Kewanee "Electric-Weld" Type C Oil Burning Boilers

Boiler No.	Code	*Rating, steam boiler, sq. ft.	Heating surface, sq. ft.	Diam. in. Brng One boiler	Diam. in. Brng Two boilers	Diam. in. Stck One boiler	Diam. in. Stck Two boilers	Min. ht. of stack, ft. One boiler	Min. ht. of stack, ft. Two boilers	Size of openings, in. Steam	Size of openings, in. Return	Size of openings, in. Safety valve	**Measurements shown on dimension diagrams, in inches E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	e	f	g	Size of dampered opening, in.	Number of fire brick required	Outside surface to be covered, sq. ft.
1749	Cobby	2790	164	20	28	18	26	45	55	6	4	2	14	18	37	34	10	9	11	26	22	64½	67	6⅜	79½	18	10½	8½		12	38½	46	59		31½	40	8	4¾	6x8	290	62
1750	Cobdo	3260	192	22	30	20	28	50	60	6	4	2	14	18	43	34	10	9	11	26	22	64½	67	69	79½	18	14	10		12	38½	46	66		31½	46	9	4¾	6x8	320	68
1751	Cobem	3940	232	22	30	20	28	50	60	6	4	2	14	18	50	34	10	9	11	26	22	64½	67	69	79½	18	14	10		12	38½	46	77		31½	60	9	4¾	6x10	350	80
1752	Cobgy	4450	262	22	30	20	28	55	65	6	4	2	14	18	60	34	10	9	11	26	22	64½	67	69	79½	18	16	10		12	38½	46	85		31½	70	9	4¾	6x12	390	89
1753	Cobop	4930	290	24	34	22	31	55	65	6	4	2	14	24	54	34	13	10	14	29	24	69	70	72	85½	18	14	10		12	44½	52	80		37½	80	9	4¾	6x13	450	93
1754	Cobur	5520	325	24	34	22	31	55	65	6	4	2	14	24	58	34	13	10	14	29	24	69	70	72	85½	18	16	10		12	44½	52	88		37½	90	9	4¾	6x15	470	102
1755	Cocen	6370	375	24	34	22	31	60	70	6	4	2½	14	24	62	34	13	10	14	29	24	69	70	72	85½	18	18	11		12	44½	52	99		37½	100	9	4¾	6x17	490	115
1756	Cocip	7220	425	26	38	24	34	60	70	8	5	2½	14	30	57	42	16	11	15	35½	26	79	80	82	99	19	16	12		12	50½	58	82		43½	110	10	4¾	7x16	460	116
1757	Cocke	7850	462	26	38	24	34	60	70	8	5	3	14	30	63	42	16	11	15	35½	26	79	80	82	99	19	18	13		12	50½	58	88		43½	120	10	4¾	7x17	490	124
1758	Cocor	8500	498	26	40	26	36	65	75	8	5	3	14	30	69	42	16	11	15	35½	26	79	80	82	99	19	21	14		12	50½	58	94		43½	140	10	4¾	7x20	520	132
1759	Cocus	10040	591	28	40	26	36	65	75	8	5	3	14	36	68	42	16	12	15	35	28	81½	82	85	101	19	18	13		18	56½	63½	106	8½	49½	160	10	4¾	7x23	610	145
1760	Codan	11670	686	28	44	28	40	65	75	8	5	3½	14	36	74	42	16	12	15	35	28	81½	82	85	101	19	21	14		24	56½	63½	112	8½	49½	180	10	4¾	7x25	640	165
1761	Codep	13180	775	32	46	30	42	70	80	8	6	3½	17	42	68	48	16	12	16	36	32	90½	91	94	110½	22	18	13		24	63	68½	106	9½	55½	210	10	5¾	2- 7x15	720	172
1762	Codgo	14700	865	32	46	30	42	70	80	8	6	3½	17	42	76	48	16	12	16	36	32	90½	91	94	110½	22	21	14		24	63	63½	115	9½	55½	240	10	5¾	2- 7x18	770	187
1763	Codir	17420	1025	34	50	32	46	70	80	8	6	3½	17	48	72	48	18	12	16	39	34	93	92½	95	113½	22	18	13		24	69	74½	123	11		61½	280	11	5¾	2- 8x18	800	210
1764	Codos	19880	1170	34	50	32	46	70	80	8	6	4	17	48	81	48	18	12	16	39	34	93	92½	95	113½	22	21	14		24	69	74½	138	11		61½	320	11	5¾	2- 8x20	850	234
1765	Codut	22650	1333	36	52	34	48	80	90	8	6	4	17	54	85	51	17	14	20	43	36	96	98	101	119½	22	21	14		24	75	80	127	12½	67½	360	11	5¾	2- 8x22	920	231
1766	Cofis	25200	1482	36	52	34	48	90	100	8	6	2-2½	17	54	92	51	17	14	20	43	36	96	98	101	119½	22	21	14	10	24	75	80	140	12½	67½	400	11	5¾	2- 8x25	960	252
1767	Cofot	27300	1608	40	54	38	52	90	100	8	6	2-2½	17	60	88	52	19	14	20	45½	40	99	100	103	123½	22	21	14	10	24	81	86	138	14	73½	440	13	5¾	2-10x22	990	265
1768	Cogar	31000	1824	40	56	38	54	90	100	10	6	2-3	17	60	98	52	19	14	20	45½	40	99	100	103	123½	22	21	14	11	24	81	86	154	14	73½	490	3	5¾	2-10x25	1050	294
1769	Cohas	34900	2056	42	56	40	54	100	110	10	6	2-3	21	66	98	61	21	14	20	49½	42	110	111½	114	137	26	21	14	11	24	87½	92	13	15	79½	560	3	7¾	2-10x28	1220	294
1770	Cohet	40200	2362	42	56	40	54	100	110	10	6	2-3	21	66	110	61	21	14	20	49½	42	110	111½	114	137	26	24	15	12	24	87½	92	15	15	79½	630	13	7¾	2-10x30	1300	328

*Rated capacity for water boiler is 50% greater than capacity of steam boiler.
***Note:* Dimensions A, B, C and D are the same as shown in table, Plate No. 6.

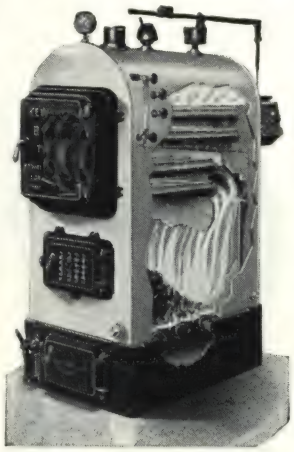
Continued on next page

PLATE NO. 8. KEWANEE RESIDENCE TYPE R BOILER FOR BURNING COAL

Type R Boiler is a later Kewanee development employing characteristically sound steel construction in the compacted style of heating unit. It is designed to serve the smaller kind of building—such as garage, store, school, church, apartment, office or residence.

This design in detail consists of a spacious firebox in one piece with the rear combustion chamber (a feature with patents pending) where fuel is ignited first, then the burning process is completed before the products of combustion are drawn through the bank of first pass tubular flues.

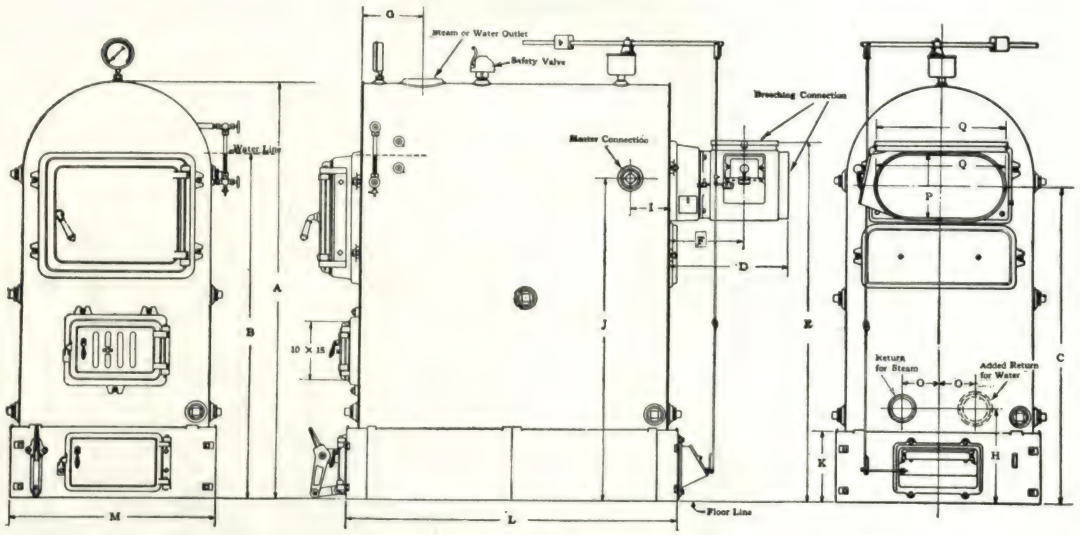
The flow of hot gases is reversed in the cast iron refractory insulated front smokebox and directed back into the second pass bank of tubes where the rest of the useful heat is abstracted by the surrounding water which is thereby kept in active circulation.



Two ends and a single wrapper sheet forming the enclosure for water content and steam space complete this simple unit. It merely has to be set down on the cast iron base which comes with the removable rocking grate bars, shaker and doors all ready assembled. This permits the heating boiler to be piped up and placed in operation without delay.

Equipment for coal burning steam boiler includes firedoor, front clean-out door, rear opening, two-way smoke hood, four clean-out plugs, base complete with ash pit door, rear draft pouch, rocking grate with removable bars, levers and shaker arm and handle; firing tools—hoe, poker, slice bar and tube scraper.

Trimmings for coal burning steam boiler include water gauge, two compression gauge cocks, steam gauge, pop safety valve, Automatic Arco Draft Regulator with lever, weight, jointed rod and collar.



Kewanee Residence Type R Boiler—For Burning Coal

Boiler No.	Code	Rated capacity, sq. ft. Steam	Rated capacity, sq. ft. Water	Grate area, sq. ft.	Heating surface, sq. ft.	Width, boiler, in.	Length, boiler, in.	Diam., in. Chimney	Diam., in. Breeching	Chimney height, ft.	Breeching connection size, PxQ	Size openings, in. Steam or water outlet	Size openings, in. Steam return inlet	Size openings, in. Inlet acoed for water	Size openings, in. Safety valve	Measurements shown on dimension diagram, in inches A	B	C	D	E	F	G	H	I	J	K	L	M	O	Heater connection size, in.	Outsuue surface to cover, unjacketed, sq. ft.	Approx. weight, lb.
For Bituminous Coal																																
740	Resam	370	590	2.6	49	27	27½	12	14	35	8½x17	3	2½	2½	1	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	31½	30	5	2	38	1800
741	Resay	510	820	3.5	60	27	33½	12	14	35	8½x17	3	2½	2½	1	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	37½	30	5	2	44	2000
742	Rescu	690	1100	4.4	71	27	39½	12	14	35	8½x17	4	2½	2½	1¼	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	43½	30	5	2	49	2300
743	Reset	920	1470	5.3	82	27	45½	12	14	35	8½x17	4	2½	2½	1¼	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	49½	30	5	2	54	2500
745	Resew	1210	1940	6.3	101	31	45½	16	18	40	11 x22	5	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	49½	34	6	2	60	2800
746	Resin	1560	2500	7.3	114	31	51½	16	18	40	11 x22	6	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	55½	34	6	2	66	3050
747	Resol	1780	2850	8.4	127	31	57½	16	18	40	11 x22	6	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	61½	34	6	2	71	3300
748	Rest	1960	3140	9.4	140	31	63½	16	18	40	11 x22	6	3	4	2	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	67½	34	6	2	77	3550
For Anthracite Coal																																
2740	Rusam	430	690	3.6	49	27	27½	12	14	35	8½x17	3	2½	2½	1	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	31½	30	5	2	38	1800
2741	Rusay	590	940	3.9	66	27	33½	12	14	35	8½x17	3	2½	2½	1	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	37½	30	5	2	44	2000
2742	Ruscu	790	1260	4.8	71	27	39½	12	14	35	8½x17	4	2½	2½	1¼	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	43½	30	5	2	49	2300
2743	Ruset	1000	1600	5.6	82	27	45½	12	14	35	8½x17	4	2½	2½	1¼	66½	56½	52	17½	58½	11¼	11	15¼	6½	52¼	12	49½	30	5	2	54	2500
2745	Rusew	1350	2160	6.7	10	31	45½	16	18	40	11 x22	5	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	49½	34	6	2	60	2800
2746	Rusin	1600	2560	7.8	114	31	51½	16	18	40	11 x22	6	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	55½	34	6	2	66	3050
2747	Rusol	1780	2850	8.8	127	31	57½	16	18	40	11 x22	6	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	61½	34	6	2	71	3300
2748	Rust	1960	3140	9.9	140	31	63¼	16	18	40	11 x22	6	3	4	2	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	67½	34	6	2	77	3550

Continued on next page

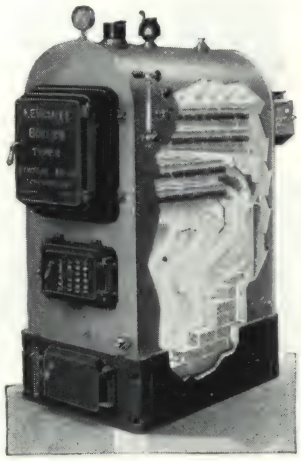
PLATE NO. 9. KEWANEE RESIDENCE TYPE R BOILER FOR BURNING OIL

The same favorable conditions for complete combustion which insure success with solid fuel in the Type R Boiler produce high efficiency with any commercially established oil burner.

There is height, width and length in the firebox so that the flames can expand and swirl.

There is a high combustion chamber where the burning process is completed before the hot gases of combustion are strained through the first and second banks of tubes.

It is highly important that the water content be sufficient to absorb intense and intermittent heat—a characteristic of oil operation—as in Type R Boilers, otherwise the water level in the gauge glass would be jumpy and subject to sudden disappearance or flooding. Likewise the water content must be in active circulation around the heating surfaces so as to sweep away the steam bubbles as fast as they are formed. Transmission of heat depends upon the velocity of the fluid and gases. Fast circulation of water is encouraged by the short wide water ways of the Type R Boiler.



It is an axiom that any boiler that will not burn coal successfully will not burn oil successfully, so "if you burn oil and expect to get steam, you must have a boiler that steams as well with coal or any other fuel."

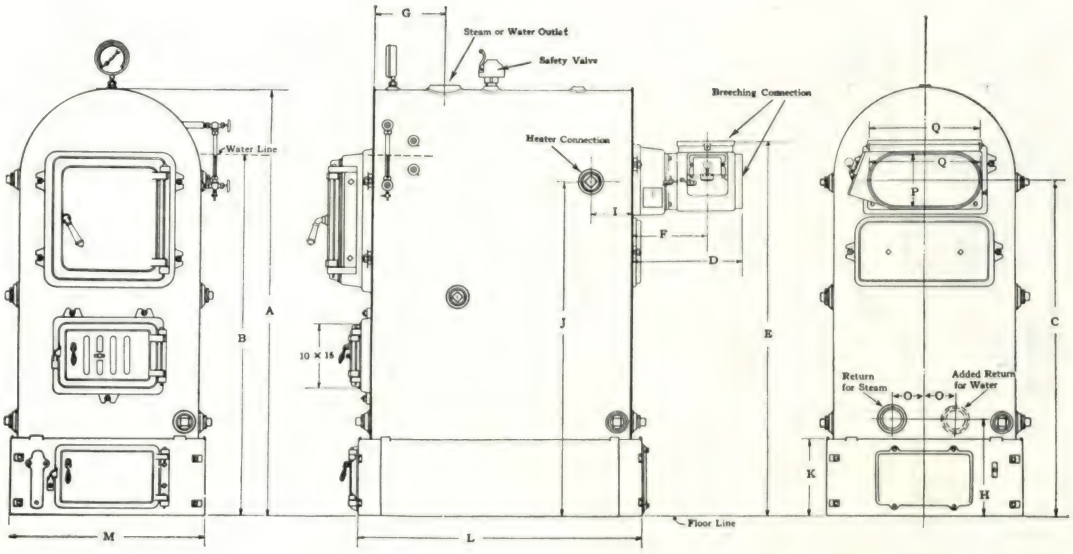
Through years of experience in the field, supplemented by extended laboratory tests, Kewanee is qualified to offer expert suggestions on practical setting plans for the efficient burning of oil when fired from front, side, rear or below.

Equipment for oil burning steam boiler includes fire door, front clean-out door, rear opening cover, two-way smoke hood, four clean-out plugs; base complete including front and rear door, plates, tube scraper.

Trimmings for oil burning steam boiler include water gauge, two compression gauge cocks, steam gauge, pop safety valve.

Uniform Rating—"The ratings published in this catalogue are in conformity with the Steel Heating Boiler Institute's Code for Rating Low Pressure Heating Boilers."

Type R rating is Total Radiation Load at boiler outlet expressed in equivalent surface of cast iron radiators emitting 240 units of heat or B.t.u.'s per square foot per hour for steam, at 2 lb. pressure, and 150 B.t.u.'s for water at 180 degrees temperature.



Kewanee Residence Type R Boiler—For Burning Oil

Boiler No.	Code	Rated capacity, sq. ft. Steam	Rated capacity, sq. ft. Water	Furnace volume, cu. ft.	Heating surface, sq. ft.	Width, boiler, in.	Length, boiler, in.	Diameter, in. Chimney	Diameter, in. Breeching	Chimney height, ft.	Breeching connection size, PxQ	Size openings, in. Steam or water outlet	Size openings, in. Steam return inlet	Size openings, in. Inlet added for water	Size openings, in. Safety valve	Measurements shown on dimension diagram, in inches A	B	C	D	E	F	G	H	I	J	K	L	M	O	Heater connection size, in.	Outside surface to cover, unjacketed, sq. ft.	Number of fire brick	Approx. weight, lb.
1740	Rosam	450	720	6.8	49	27	27½	12	14	35	8½x17	3	2½	2½	1	66½	56½	5_	17½	58½	11¾	11	15¼	6½	52¼	12	31¼	30	5	2	38	65	1630
1741	Rosay	620	990	8.8	60	27	33½	12	14	35	8½x17	3	2½	2½	1	66½	56½	52	17½	58½	11¾	11	15¼	6½	52¼	12	37½	30	5	2	44	70	1800
1742	Roscu	840	1340	10.8	71	27	39½	12	14	35	8½x17	4	2½	2½	1¼	66½	56½	52	17½	58½	11¾	11	15¼	6½	52¼	12	43½	30	5	2	49	80	2050
1743	Roset	1120	1790	12.7	82	27	45½	12	14	35	8½x17	4	2½	2½	1¼	66½	56½	52	17½	58½	11¾	11	15¼	6½	52¼	12	49½	30	5	2	54	90	2200
1745	Rosew	1470	2350	16.5	101	31	45½	16	18	40	11 x22	5	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	49½	34	6	2	60	95	2500
1746	Rosin	1900	3040	19.0	114	31	51½	16	18	40	11 x22	6	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	55½	34	6	2	66	105	2730
1747	Rosol	2160	3460	21.6	127	31	57½	16	18	40	11 x22	6	3	4	1½	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	61½	34	6	2	71	115	2920
1748	Rost	2380	3810	24.2	140	31	63½	16	18	40	11 x22	6	3	4	2	70¼	58½	54	20	61½	12½	12	16	6½	54¼	12	67½	34	6	2	77	125	3120

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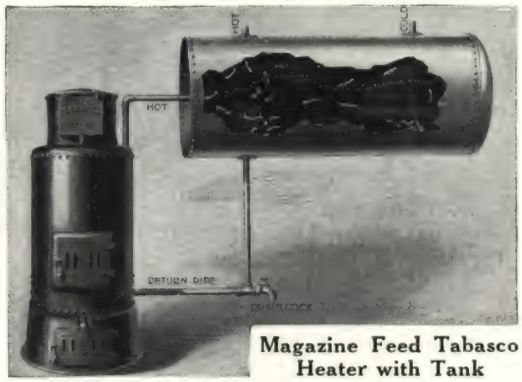
PLATE NO. 10. KEWANEE TABASCO WATER HEATERS

Economical and simple to operate with any kind of fuel. Safe for high city water pressures. Riveted steel construction insures against repairs from cracking or breaking. Brass clean-out plugs or handholes furnished on all Tabasco Heaters. Equipped with Tabasco improved rocking grate—a sectional, clinker-cutting, dumping grate. Maximum working pressure 60 lb. Standard, 100 lb. Extra Heavy.



Magazine Feed Tabasco Heater with Tank

STANDARD TYPE TABASCO WATER HEATERS
Magazine Feed or Surface Burning Types

Heater No.	Water heating cap., gal. per hr.	Size of heater, in.	Total height, in.	Sizes, flow and return, each, in.	Weight, lb.		Equiv. diam. smoke connection, in.	Diam. grate, in.	Water rad., cap. sq. ft.
					Magazine feed	Surface burner			
17	130	17x32	57	Two 1¼	650	600	6	12½	200
18	150	17x36	61	Two 1¼	710	650	6	12½	250
21	200	21x30	55	Two 1½	830	730	7	15	300
22	250	21x36	62	Two 1½	890	790	7	15	350
25	300	25x37	63	Two 2	1130	990	8¼	19	430
26	350	25x43	69	Two 2	1200	1050	8¼	19	500
27	400	25x49	75	Two 2	1300	1130	8¼	19	550
30	500	30x43	70	Two 2½	1600	1410	8¼	24	600
31	600	30x49	76	Two 2½	1750	1550	8¼	24	700
32	700	30x58	85	Two 2½	1900	1710	8¼	24	800

All above ratings are based on raising temperature of water 50° an hour. Heaters No. 21 and above have four 2-in. brass clean-out plugs. Maximum working pressure 60 lb.

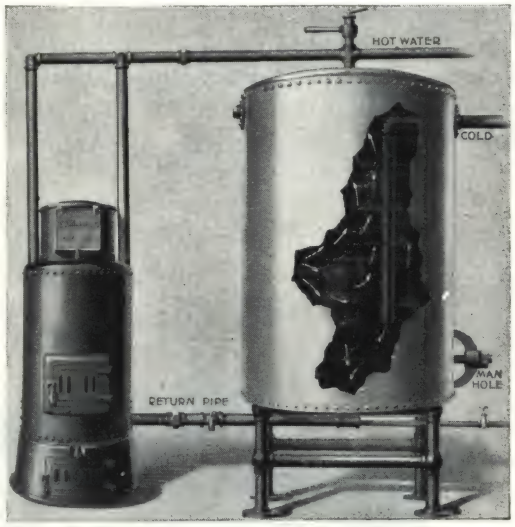
Extra Heavy Type—Built same as Standard Tabasco Water Heater. Serves its full rated capacity in bungalow, cottage, garage, or other building requiring a small heating plant.

EXTRA HEAVY HEATERS, TYPE R

No.	Cap., gal. per hr.	Total height, ft.	Total height, in.	Diam. fire pot, in.	Sizes flow and return, each, in.	Approx. shipping weight, lb. Surface burner	Approx. shipping weight, lb. Magazine feed
150	150	5	1	12	Two 1¼	650	710
200	200	4	7	16	Two 1½	730	830
300	300	5	3	20	Two 2	1020	1170
400	400	6	3	20	Two 2	1180	1350
500	500	5	10	25	Two 2½	1410	1600
600	600	6	4	25	Two 2½	1550	1750
700	700	7	1	25	Two 2½	1710	1900

TYPE R HEATERS WITH TYPE S TANKS AND STANDS

Size, in.	Size, ft.	Cap., gal.	Total height tank and stand, ft.	Total height tank and stand, in.	Weight of tank, lb.	Weight of tank stands, lb.
36	5	265	7	2	1000	160
42	5	360	7	3	1300	180
48	5	470	7	4	1500	200
54	5	590	7	5	2000	220
60	5	730	7	6	2400	250
60	5′ 6″	800	8	0	2500	250
60	6	875	8	6	2600	250

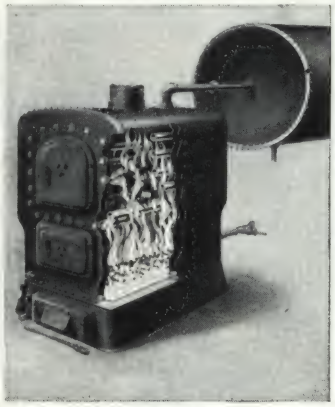


Type R Heater **Type S Tank**

KEWANEE WATER HEATING GARBAGE BURNERS

Type A

Type D



Type H

Built of riveted steel for a working pressure of 125 lb. per sq. in. to withstand any city water pressure without cracking or bursting. They eliminate unpleasant features of accumulated garbage in such buildings as apartments, clubs, sanitariums, hotels, restaurants, and in producing hot water by incineration cut the fuel bill of an ordinary heater in half. The operation is very simple. A small fire is started on the lower grates, and the garbage thrown into the upper chamber in any quantity; even when filled, the garbage is dried to a combustible condition in a short time by means of the patented by-pass and burns without odor, leaving only a small amount of ash. These burners will produce the best results when hot water storage tank attached has a capacity 50% greater than the hourly heating capacity of the burner.

	Type A				Type D							Type H				
No.	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Capacity, gal. per hr. 50° raise	200	300	400	600	500	600	800	1000	1200	1500	1800	1200	1500	1800	2200	2600
Capacity, garbage chamber, one charge, bu.	1	2	3	4	2	3	4	5	7	9	12	6	8	9	11	12
Height over all, in.	62	68	68	68	57	57	57	57	57	57	57	65	65	65	65	65
Floor space required, in.	22	25	30	36	26x29	29x35	35x35	35x41	35x47	41x53	41x59	38x36	38x42	38x48	38x54	38x60
Dimensions over all, in.					26x25	26x32	32x32	32x38	32x44	38x50	38x56	32x38	38x38	38x44	38x50	38x56
Height to bottom of garbage door, in.	33	37	37	39	32	32	31	31	31	31	31	37	37	37	37	37
Garbage door, in.	7x8	7x8	7x8	9x12	14x16	14x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16	16x16
Coal or fire door, in.	7x8	7x8	7x8	9x12	14x10	14x10	16x10	16x10	16x10	16x10	16x10	16x8	16x8	16x8	16x8	16x8
Lower or coal grates, in.	12	16	20	24	18x18	18x24	24x24	24x30	24x36	30x42	30x48	24x24	24x30	24x36	24x42	24x48
Size, flow and return flanges, in.	Two 1½	Two 2	Two 2	Two 2	2	2	2½	2½	2½	3	3	3	3	4	4	4
Diameter of smoke pipe, in.	6	8	8	8½	9	9	10	10	10	12	12	10	10	10	12	12
Approx. shipping weight, lb.	600	800	1000	1500	1550	1750	2100	2300	2500	3000	3300	2800	3100	3400	3700	4000

Above ratings all based on raising temperature of water in storage tank 50° an hour.

OIL CITY BOILER WORKS

MAIN OFFICE AND WORKS

OIL CITY, PA.

BRANCH OFFICES

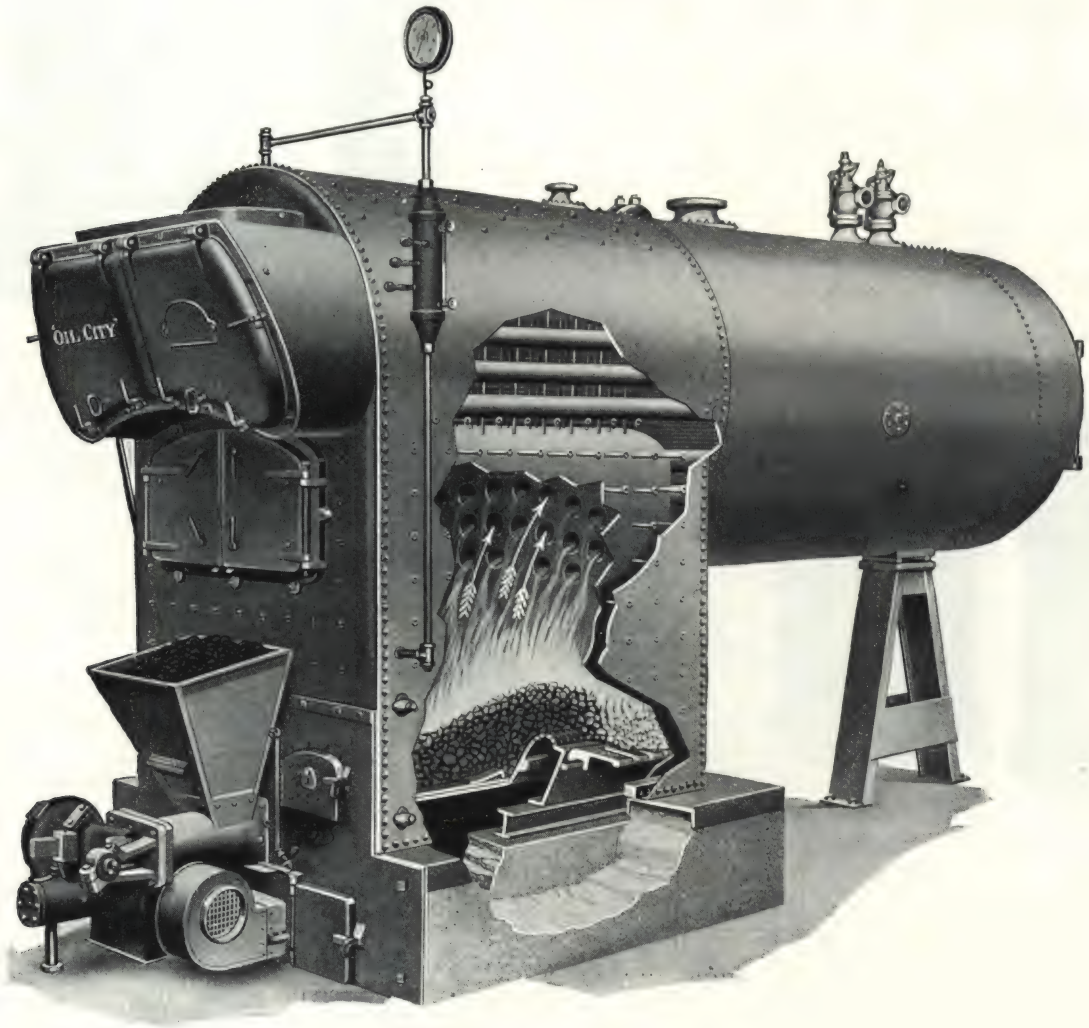
ALBANY, N. Y.
ATLANTA, GA.
BALTIMORE, MD.
BOSTON, MASS.
CHARLOTTE, N. C.
CHICAGO, ILL.
CLEVELAND, OHIO
CINCINNATI, OHIO
DETROIT, MICH.
TOLEDO, OHIO
FORT WORTH, TEX.
INDIANAPOLIS, IND.
KNOXVILLE, TENN.
LOS ANGELES, CAL.
MEMPHIS, TENN.
NEW YORK, N. Y.
OKLAHOMA CITY, OKLA.
PITTSBURGH, PA.
PHILADELPHIA, PA.
RICHMOND, VA.
ROCHESTER, N. Y.
SAN ANTONIO, TEX.
SHREVEPORT, LA.
ST. LOUIS, MO.
TORONTO, ONT.

Manufacturers of

Water Tube Boilers; Stoker-Unit Firebox Boilers; Smokeless Firebox Boilers; Direct Draft Firebox Boilers; Riveted and Welded Steel Heating Boilers; Bent Tube Type Boilers.

Facilities of the Company

Oil City Boilers are designed and built by an organization complete as to plant and equipment, and with an engineering personnel thoroughly equipped to handle any boiler problem.



"Oil City" Stoker Unit Boiler

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STANDARD SPECIFICATIONS—SU-BOILERS

Boiler number	SU–75		SU–100		SU–125		SU–150		SU–175		SU–200		SU–225		SU–250		SU–275		SU–300	
Working pressure ..... lbs.	15	100|125	15	100|125	15	100|125	15	100|125	15	100|125	15	100|125	15	100|125	15	100|125	15	100|125	15	100|125
Code word	Sabot	Skate	Sahib	Skelp	Scald	Smoke	Scape	Skiff	Sedan	Slate	Seine	Sleek	Shack	Slept	Shake	Sling	Silex	Snare	Singe	Spade
Steam cap.:																				
At rating ..... sq. ft.	9300	9000	12400	12100	15700	15100	18800	18200	22000	21200	24900	24100	27900	27100	30500	30100	33800	33300	36500	36100
(At 150% rating) ..... sq. ft.	13900	13500	18600	18200	23500	22600	28200	27300	33000	31800	37300	36200	41800	40700	45700	45100	50700	50000	54700	54200
Heating surface ..... sq. ft.	777	751	1031	1001	1315	1255	1574	1512	1837	1762	2076	2009	2332	2258	2543	2506	2817	2776	3048	3004
Firebox:																				
Length ..... in.	63	63	75	75	75	75	75	75	87	87	87	87	87	87	99	99	99	99	111	111
Height (above tuyeres) ..... in.	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72
Height (above wall) ..... in.	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Width (above grate) ..... in.	52	52	58	58	64	64	70	70	70	70	76	76	76	76	82	82	82	82	82	82
Width (at grate) ..... in.	54	54	60	60	66	66	72	72	72	72	78	78	78	78	84	84	84	84	84	84
Steam outlet flange ..... in.	8	....	8	....	8	....	8	....	8	....	10	....	10	....	10	....	10	....	10	....
Steam outlet nozzle ..... in.	....	6	....	6	....	6	....	8	....	8	....	8	....	8	....	8	....	8	....	8
Safety valves (number and size) ..... in.	1–4	2–2½	2–3	2–3	2–3	2–3	2–3½	2–3½	2–4	2–3½	2–4	2–4	2–4	2–4	2–4½	2–4½	2–4½	2–4½	3–4	4–3½
Return flange ..... in.	6	....	6	....	6	....	6	....	6	....	6	....	6	....	8	....	8	....	8	....
Feed flange ..... in.	....	1½	....	1½	....	2	....	2	....	2	....	2	....	2	....	2½	....	2½	....	2½
Blow-off flange ..... in.	2	2	2	2	2	2	2	2	2	2	2½	2½	2½	2½	2½	2½	2½	2½	2½	2½
Diameter of Boiler ..... A ..... in.	60	60	66	66	72	72	78	78	78	78	84	84	84	84	90	90	90	90	90	90
Length of Boiler ..... B ..... ft. in.	13–11	13–11	15–10	15–10	16–1	16–1	16–7	16–7	19–1	19–1	17–10	17–10	19–6	19–6	19–10	19–10	21–5	21–5	23–2	23–2
Height above foundation ..... C ..... ft. in.	12–2	12–2	12–5	12–5	12–8	12–8	12–11	12–11	12–11	12–11	13–2	13–2	13–2	13–2	13–5	13–5	13–5	13–5	13–5	13–5
Front to steam outlet ..... D ..... ft. in.	9–4	9–4	10–4	10–4	10–4	10–4	10–4	10–4	11–4	11–4	11–4	11–4	11–4	11–4	12–4	12–4	12–4	12–4	13–4	13–4
Smoke box extension ..... E ..... in.	20	20	21	21	23	23	24	24	24	24	26	26	26	26	30	30	30	30	30	30
Smoke uptake width ..... F ..... in.	14	14	15	15	17	17	18	18	18	18	20	20	20	20	24	24	24	24	24	24
Smoke uptake length ..... G ..... ft. in.	3–2	3–2	3–8	3–8	4–4	4–4	4–6	4–6	4–6	4–6	5–2	5–2	5–2	5–2	5–8	5–8	5–8	5–8	5–8	5–8
Height water line ..... H ..... ft. in.	10–11	11–1	10–11	11–1	11–3	11–5	11–3	11–5	11–3	11–5	11–8	11–10	11–8	11–10	11–9	11–11	11–9	11–11	11–9	11–11
Height bottom gage cock ..... I ..... ft. in.	10–8	10–10	10–8	10–10	11–0	11–2	11–0	11–2	11–0	11–2	11–5	11–7	11–5	11–7	11–6	11–8	11–6	11–8	11–6	11–8
Height steam outlet ..... J ..... ft. in.	12–4	12–9	12–7	13–0	12–10	13–3	13–1	13–6	13–1	13–6	13–4	13–9	13–4	13–9	13–7	14–0	13–7	14–0	13–7	14–0
Height smoke box ..... K ..... ft. in.	10–11	10–11	10–11	10–11	11–2	11–2	11–4	11–4	11–4	11–4	11–9	11–9	11–9	11–9	11–10	11–10	11–10	11–10	11–10	11–10
Height ash pit ..... L ..... ft. in.	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2
Thickness ash pit walls ..... M ..... in.	8	8	8	8	8	8	9	9	9	9	9	9	9	9	10	10	10	10	10	10
Height return ..... N ..... in.	2–9	.....	2–9	.....	2–9	.....	2–9	.....	2–9	.....	2–9	.....	2–9	.....	2–10	.....	2–10	.....	2–10	.....
Depth rear chamber ..... O ..... in.	20	20	21	21	21	21	21	21	21	21	22	22	22	22	24	24	24	24	24	24
Rear to stand ..... P ..... in.	26	26	27	27	27	27	27	27	27	27	28	28	28	28	30	30	30	30	30	30
Centers stand anchors ..... Q ..... in.	42	42	41	41	40	40	39	39	39	39	38	38	38	38	37	37	37	37	37	37
Height steam space ..... R ..... in.	15	13	18	16	16	14	19	17	19	17	17	15	17	15	20	18	20	18	20	18
Stack:																				
Diam., one boiler ..... in.	30	30	34	34	36	36	40	40	42	42	42	42	44	44	46	46	48	48	50	50
Height, one boiler ..... in.	90	90	90	90	100	100	100	100	100	100	110	110	110	110	110	110	110	110	110	110
Diam., two boilers ..... in.	44	44	50	50	54	54	58	58	62	62	65	65	68	68	70	70	73	73	76	76
Height, two boilers ..... in.	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
Breeching:																				
Diam., one boiler ..... in.	32	32	37	37	39	39	44	44	46	46	46	46	48	48	50	50	52	52	55	55
Diam., two boilers ..... in.	48	48	55	55	59	59	63	63	67	67	71	71	74	74	76	76	80	80	83	83
Space required at rear ..... in.	32		35		37		40		40		43		43		46		46		46	
Covering surface ..... sq. ft.	295		354		375		412		449		461		498		533		570		602	
Boiler weight:																				
15 lb. welded	15200		19900		22700		25700		28600		32600		35000		38300		40700		43300	
15 lb. riveted	16600		21200		24000		27400		30600		34600		37100		40600		42900		45000	
100 lb. riveted	19800		24200		27900		32300		36600		38300		40800		45800		48300		50400	
125 lb. riveted	20300		25400		28900		33300		37400		39100		42300		46900		50100		52600	

RICHARDSON & BOYNTON CO.

SINCE 1837

Manufacturers of "Richardson" "Perfect" Heating and Cooking Apparatus, Steam and Water Boilers, Furnaces, Ranges, Radiation Equipment

EXECUTIVE OFFICES
260 Fifth Avenue
NEW YORK, N. Y.

BOSTON, MASS. BROOKLYN, N. Y. BUFFALO, N. Y. CHICAGO, ILL. CINCINNATI, OHIO DETROIT, MICH.
MINNEAPOLIS, MINN. DOVER, N. J. PHILADELPHIA, PA. PORT CHESTER, N. Y. PROVIDENCE, R. I. UTICA, N. Y.

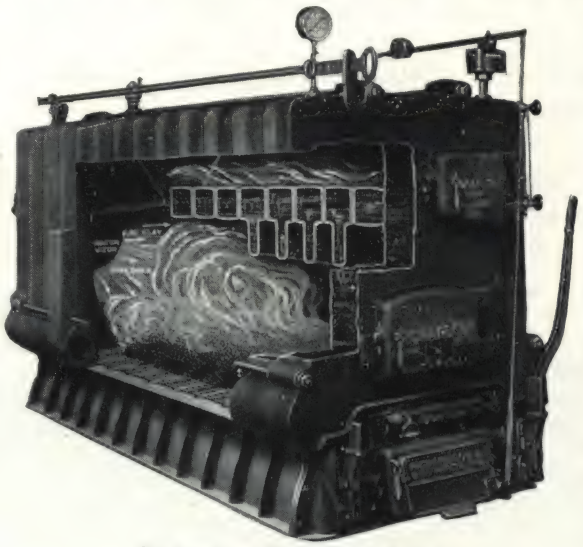
RICHARDSON CAST IRON SECTIONAL SMOKELESS BOILERS

Richardson sectional smokeless boilers are designed to provide *perfect and complete* combustion of the cheaper grades of bituminous coal.

The result is the entire elimination of smoke (which the ordinary boiler pours out of the stack), and an enormous economy in fuel, since the volatile gases wasted in the ordinary system of combustion are converted into active heat units and used.

Principle of Operation—Perfect combustion of soft coals is accomplished by supplying the proper amount of oxygen at the right place and the right temperature.

In order to effect a complete chemical union, the air supplying the oxygen must reach the fire *at a high temperature*. The air is taken from outside the boiler from both sides — openings being provided with dampers for graduating the supplies (see illustration). The rear of the firebox is heated to a high temperature and the air, in turn, is pre-heated and is pulled down by the vacuum created over the bridgewall section. The hot gases distilled from the coking coal in the front of the boiler meet the hot blast of air, producing an intimate mixture of gases and oxygen perfectly united, therefore giving intense combustion. The flame produced from this action is intensely hot and travels with such a motion as to throw its full heating force against the whole length of the boiler's heating surface.



Richardson Smokeless Boiler

Natural Fire Travel and Draft—Does not require excessive heights of chimneys.

Long Smoke Travel—No obstruction to flames, which aids combustion to perfection point and utilizes maximum heat from the fuel.

Combustion Chamber—During process of coking gases are drawn back into a large chamber in front of bridgewall, which has two portholes at the top, making it impossible for gases to accumulate and explode.

Twin or Battery Jobs—Provide extra large range of capacities, are economical in fuel consumption in mild weather and never necessitate absence of steam in case of the plant being shut down for repairs. Flue data, in these cases, furnished upon request.

SMOKELESS SECTIONAL BOILERS

No.	Steam rating, sq. ft.	Water rating, sq. ft.	Grate area sq. ft	Width, in	Length over all, in.	Height, in.	Water line, steam, in.	Smoke pipe, in.	Ash pit, inside, in.	Outlets, in.		To center of smoke pipe, in.
										Steam	Water	
3207	3500	5600	10.00	46½	64¼	55	48	14	38⅞x47½	3—4	3—4	38½
3208	4050	6450	11 67	46½	71⅝	55	48	14	38⅞x54⅞	3—4	3—4	38½
3209	4600	7300	13.34	46½	79	55	48	14	38⅞x62¼	4—4	4—4	38½
3210	5150	8150	15 01	46½	86⅜	55	48	14	38⅞x69⅝	4—4	4—4	38½
3907	5150	8150	13.80	53½	73	63	56	16	44⅞x53¾	3—5	3—5	48½
3908	5950	9400	16.10	53½	81⅜	63	56	16	44⅞x62⅛	3—5	3—5	48½
3909	6750	10650	18 40	53½	89¾	63	56	16	44⅞x70½	4—5	4—5	48½
3910	7550	11900	20.70	53½	97⅞	63	56	16	44⅞x78⅞	4—5	4—5	48½
745	6750	10800	15 90	59½	75	68	59	20	50¾x53¾	3—5	3—5	49½
845	7700	12300	18.55	59½	83⅜	68	59	20	50¾x62⅛	3—5	3—5	49½
945	8650	13800	21 20	59½	91¾	68	59	20	50¾x70½	4—5	4—5	49½
1045	10600	15300	23 85	59½	100⅛	68	59	20	50¾x78⅞	4—5	4—5	49½
1145	11550	16800	23 85	59½	108½	68	59	20	50¾x87¼	5—5	5—5	49½
1245	12500	18300	23 85	59½	116⅞	68	59	20	50¾x87¼	5—5	5—5	49½
1345	13450	19800	23.85	59½	125¼	68	59	20	50¾x87¼	6—5	6—5	49½
1445	14500	21300	23.85	59½	133⅝	68	59	20	50¾x87¼	6—5	6—5	49½
1545	15450	22800	23.85	59½	142	68	59	20	50¾x87¼	7—5	7—5	49½
1645	16400	24300	23 85	59½	150⅜	68	59	20	50¾x87¼	7—5	7—5	49½
1745	17350	25800	23 85	59½	158¾	68	59	20	50¾x87¼	8—5	8—5	49½
1845	18300	27300	23.85	59½	167⅛	68	59	20	50¾x87¼	8—5	8—5	49½
1945	19250	28800	23 85	59½	175½	68	59	20	50¾x87¼	9—5	9—5	49½
2045	20200	30300	23 85	59½	183⅞	68	59	20	50¾x87¼	9—5	9—5	49½

Continued on next page

RICHARDSON END FEED CAST IRON SECTIONAL BOILERS FOR STEAM, VAPOR AND WATER

Richardson boilers are so constructed as to present to the fire a large amount of correctly proportioned direct heating surface. This surface being entirely backed by water in thin, shallow bodies causes rapid circulation and a quick absorption of the heat units given off by the fire. The flames pass three times the full length of the boiler and are constantly in contact with the water heating surfaces, thus securing an effective and positive transfer of heat from the products of combustion to all parts of the boiler.

Richardson end feed sectional boilers are made in sizes to meet practically any steam, hot water or vapor heating requirement for dwellings of moderate or large size, apartment house, office and commercial buildings, hospitals, schoolhouses, etc. The prime features are the ease with which they can be operated, their ability to carry their ratings for long periods and an economical operating expense. This is accomplished by securing the proper proportion and arrangement of the heating surface to the grate area with large flues, admitting of a low rate of combustion.

Heating Surface—Richardson boilers present to the fire a large amount of correctly proportioned direct heating surface. This surface being entirely backed by water in three shallow bodies causes rapid circulation and a quick absorption of the heat units given off by the fire. The flames pass three times the full length of the boiler and are constantly in contact with the water heating surfaces, thus securing an effective and positive transfer of heat from the products of combustion to all parts of the boiler.

Overhanging Prime Heating Surface—At the maximum, assuring highest evaporative power.

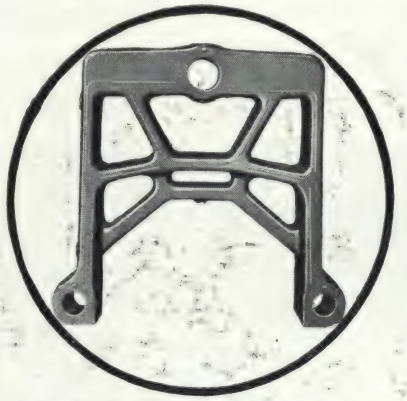
Grates—The grate bars are extra heavy sectional shaking and dumping pattern, operated in sections from the front of the boiler and controlled by a lock plate.

Ash Pit—The ash pit is high and wide and is fitted with a large door making the removal of ashes easy. The ash pit door is provided with an air inlet, butterfly draft door for supplying oxygen to the fuel. The slicer door in the ash pit front permits cleaning the grate of clinkers and ashes without disturbing the top of the fire.

Firing and Clean-out Doors—Firing doors are large, permitting easy firing. Two large clean-out doors furnish access to the flue surfaces for cleaning.

Fuel—Richardson end feed sectional boilers are especially adapted for the burning of oil, besides anthracite and bituminous coal.

End Feed Boiler—24-32-39-45 Size



Leg Section of "Richardson" End Feed Sectional Boilers

53 Size End Feed Steam and Hot Water Boilers

END FEED SECTIONAL BOILERS

No.	Steam rating, sq. ft.	Water rating, sq. ft.	Grate area, sq. ft.	Width, in.	Length overall, in.	Height, in.	Water line, in.	Smoke pipe, in.	Ash pit, inside, in.	Outlets, in.		To center of smoke pipe, in.
										Steam	Water	
24-in. Series												
244	800	1275	2.84	34 3/16	32 3/8	49 3/8	43 3/8	9	26 1/4 x 21 1/4	1—3	1—3	38 5/8
245	1050	1675	3.78	34 3/16	38 5/8	49 3/8	43 3/8	9	26 1/4 x 28	2—3	2—3	38 5/8
246	1300	2075	4.74	34 3/16	44 7/8	49 3/8	43 3/8	9	26 1/4 x 34 1/4	2—3	2—3	38 5/8
247	1550	2475	5.68	34 3/16	51 1/8	49 3/8	43 3/8	9	26 1/4 x 40 1/2	3—3	3—3	38 5/8
248	1800	2875	6.62	34 3/16	57 3/8	49 3/8	43 3/8	9	26 1/4 x 46 3/4	3—3	3—3	38 5/8
32-in., 39-in., and 45-in. Series												
325	2250	3600	6.66	46 1/2	49 1/2	55	48	12	38 1/8 x 32 3/4	2—4	2—4	38 1/2
326	2800	4475	8.33	46 1/2	56 7/8	55	48	12	38 7/8 x 40 1/8	2—4	2—4	38 1/2
327	3350	5350	10.00	46 1/2	64 1/4	55	48	12	38 7/8 x 47 1/2	3—4	3—4	38 1/2
328	3900	6225	11.67	46 1/2	71 5/8	55	48	12	38 7/8 x 54 7/8	3—4	3—4	38 1/2
329	4450	7100	13.34	46 1/2	79	55	48	12	38 7/8 x 62 1/4	4—4	4—4	38 1/2
395	3400	5450	9.20	53 1/2	56 1/4	63	56	14	44 7/8 x 37	2—5	2—5	48 1/2
396	4200	6725	11.50	53 1/2	64 5/8	63	56	14	44 7/8 x 45 3/8	2—5	2—5	48 1/2
397	5000	8000	13.80	53 1/2	73	63	56	14	44 7/8 x 53 3/4	3—5	3—5	48 1/2
398	5800	9275	16.10	53 1/2	81 3/8	63	56	14	44 7/8 x 62 1/8	3—5	3—5	48 1/2
399	6600	10550	18.40	53 1/2	89 3/4	63	56	14	44 7/8 x 70 1/2	4—5	4—5	48 1/2
457	6600	10550	15.90	59 1/2	75	68	59	16	50 3/4 x 53 3/4	3—5	3—5	49 1/2
458	7600	12150	18.55	59 1/2	83 3/8	68	59	16	50 3/4 x 62 1/8	3—5	3—5	49 1/2
459	8600	13750	21.20	59 1/2	91 3/4	68	59	16	50 3/4 x 70 1/2	4—5	4—5	49 1/2
4510	9600	15350	23.85	59 1/2	100 1/8	68	59	16	50 3/4 x 78 7/8	4—5	4—5	49 1/2
4511	10600	16950	26.50	59 1/2	108 1/2	68	59	16	50 1/4 x 87 1/4	5—5	5—5	49 1/2
53-in. Series												
536	6700	10700	18.94	69 1/2	78 1/4	82	70 1/2	17	55x55	2—6	2—6	60 7/8
537	8000	12700	22.68	69 1/2	89	82	70 1/2	17	55x65 3/4	2—6	2—6	60 7/8
538	9300	14700	26.40	69 1/2	99 3/4	82	70 1/2	19	55x76 1/2	3—6	3—6	60 7/8
539	10600	16700	30.12	69 1/2	110 1/2	82	70 1/2	21	55x87 1/4	3—6	3—6	60 7/8
5310	11900	18700	33.88	69 1/2	121 1/4	82	70 1/2	21	55x98	3—6	3—6	60 7/8

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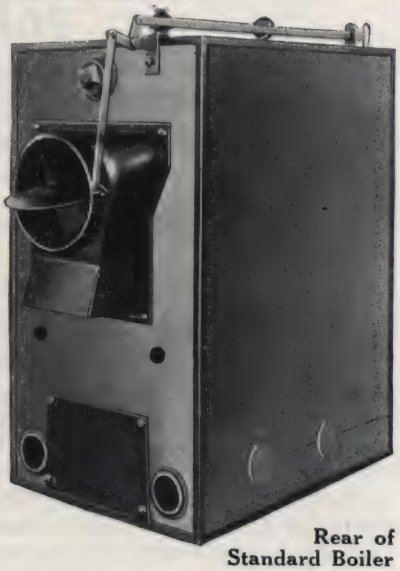
RICHARDSON STEEL SECTIONAL BOILERS

Front of Standard Boiler

Outstanding Features

(1) Can be assembled in small space because of compact sections.
(2) A lower water line than is usually found in steel boilers.
(3) No special bases required. Can be assembled directly on floor.
(4) Overhead damper regulation permits easy control of rear dampers.
(5) Seamless steel tubes, the same thickness as the boiler plates, will last the life of the boiler.
(6) Ample flue travel and combustion space are provided, with back and forth fire travel.
(7) Removal of installation of grates is exceptionally easy and requires no tools.
(8) Adaptable for oil burner or coal stoker.
(9) Can be fired from front or rear with oil burner or stoker.
(10) Attractive blue casings, highly insulated, prevent excessive heat losses in the basement.



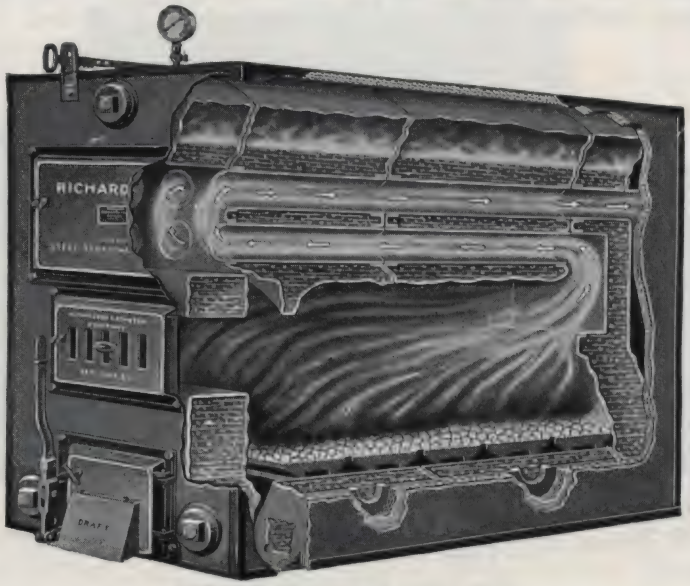
Rear of Standard Boiler

General Construction

Small Units Easily Assembled—Formerly steel boilers were obtainable only in large units, precluding their use where space was at a premium. Now the Richardson Steel Sectional Boiler with its small easily assembled units is available for every heating requirement, especially where oil burners and stokers are used. All parts of the Richardson Steel Sectional Boiler will pass through the ordinary door or window and can be installed in places inaccessible to the usual steel boiler.

Other Advantages—The boiler is built in excess of the A.S.M.E. Standard Boiler Code. It is enclosed in a beautiful blue, all-steel casing made entirely without bolts and lined with heavy insulation. Special grate bars can be furnished for smaller sizes of fuel. Since all small castings on the boiler are made of malleable iron, breakage is almost unknown. Gas passages with long fire travel are large, easily cleaned, and highly efficient. Doors are large, tight fitting, with easily removable durable linings. Shaking and dumping mechanism is smooth acting, with removable waist-high shaker handle. Large washout openings are conveniently located on both sides of the front section. A bar is welded to the bottom of each section which forms an airtight contact with the floor.

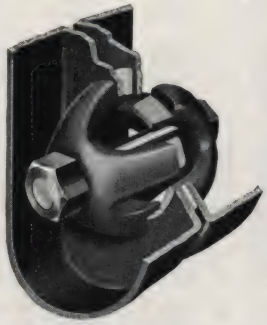
Extra openings are provided in case additional returns are needed. Ample steam space is provided to prevent priming. Deep sections reduce the number of pieces required in a complete boiler. The low water line and large volume of water conserve headroom and eliminate fluctuation. Water is broken into small volumes producing unusually quick heat. A recess in the rear section permits flames and gases to pass from the firebox. The firebox is roomy and the combustion space is surrounded by highly efficient heat-absorbing surface. The water space extends below the grates, which utilizes the ash pit heat and aids rapid circulation. The boiler is protected from radiation losses by a heavy rock wool insulation. Grates are scientifically proportioned and may be installed without bolts or cotter pins.



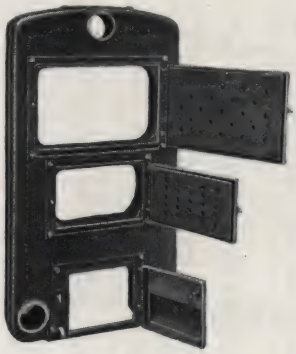
Richardson Steel Sectional Boiler

The boiler has a perfect long life joint that is very easy to assemble. A copper-cased asbestos gasket is placed between the sections and the sections are drawn together by a bolt which passes through two crabs or spiders. The bolts are made of heat treated steel and are practically free from corrosion. The spiders or crabs are of certified malleable iron.

Arc-welded Construction—Each section is made of two flanged plates butted together and electrically arc-welded (by the same process used in modern battleship construction).



Detail Showing Method of Joining Boiler Sections



Front Section

Intermediate Section
Made in 16 and 24-in. depths

Back Section

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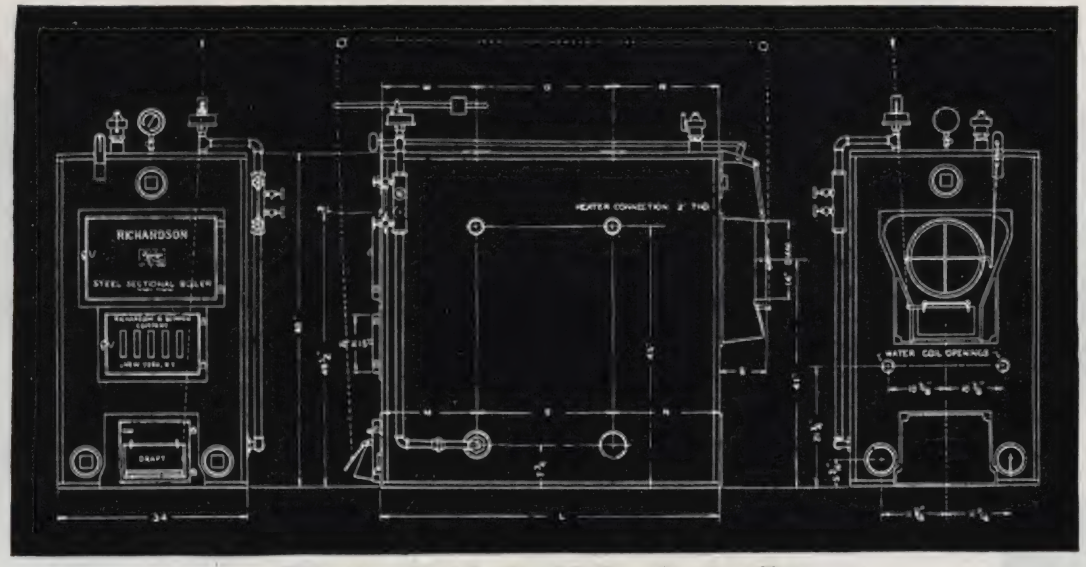


Richardson Steel Sectional Boiler—Standard Type

BOILER DATA

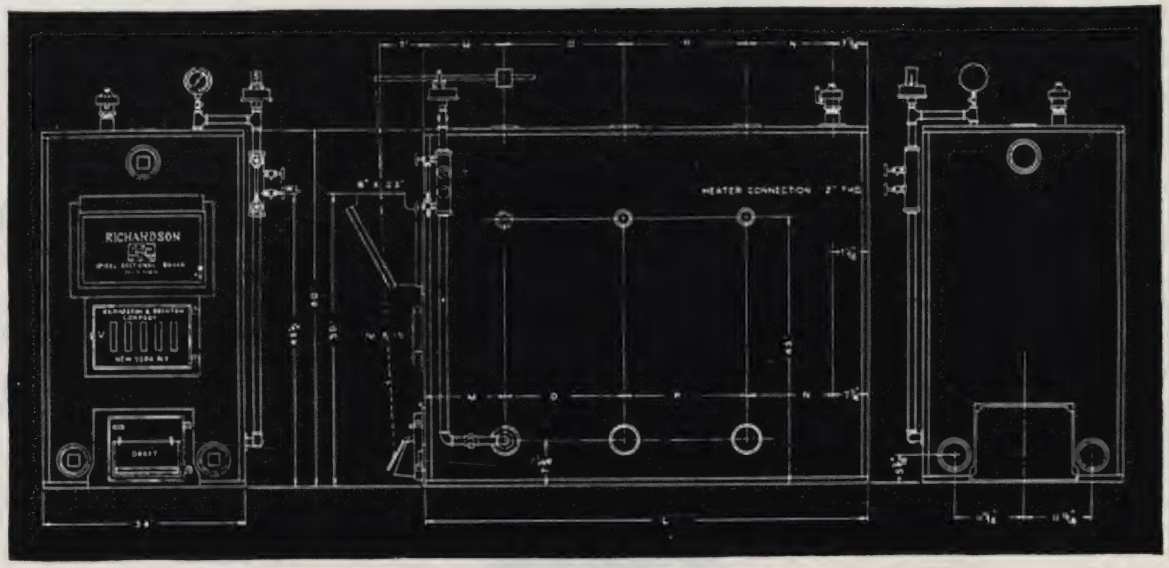
Boiler No.	Rating, sq. ft.		Outlets, in.	Number inlets, in.	Grate area, sq. ft.	Chimney		Dimensions, in.			
	Steam	Water				Size, in.	Hgt., ft.	M	O	N	L
2416	650	975	1–4	2–4	2.66	8x12	30	13 11/32	.....	15 11/32	28 11/16
2424	1000	1500	1–4	2–4	4.00	12x12	30	17 3/8	.....	19 3/8	36 3/4
2432	1300	1950	2–4	2–4	5.33	12x16	30	13 11/32	16 1/8	15 11/32	44 13/16
2440	1700	2550	2–4	2–4	6.66	12x16	40	13 11/32	20 5/32	19 3/8	52 7/8
2448	2100	3150	2–4	2–4	8.00	16x16	30	17 3/8	24 5/16	19 3/8	60 15/16

Note: In addition, each section, except front and back, has one 4-in. inlet in each side. Also a combination surface blowoff and indirect heater trapping.

ARRANGEMENT OF SECTIONS ASH PIT DIMENSIONS

Boiler No.	Assembly	Boiler No.	X, in.	Y, in.	Z, in.
2416	A-C-B	2416	29	8	8
2424	A-D-B	2424	37	16	8
2432	A-C-C-B	2432	46	25	8
2440	A-C-D-B	2440	54	33	8
2448	A-D-D-B	2448	62	41	8

Note: A—front section; B—back section; C—16-in. intermediate section; D—24-in. intermediate section.



Richardson Steel Sectional Boiler—Standard Rear Smoke Outlet Type

BOILER DATA

Boiler No.	Rating, sq. ft.		Grate area, sq. ft.	Number inlets, in.	Chimney		Dimensions, in.				
	Steam	Water			Size, in.	Hgt., ft.	M	O	P	N	L
2456	2500	3750	9.33	2–4	20x20	50	13 11/32	20 5/32	20 5/32	14 5/32	75 1/2
2464	2900	4350	9.33	2–4	20x24	60	13 11/32	20 5/32	24 3/16	18 3/16	83 9/16
2472	3500	5000	9.33	2–4	24x24	60	17 3/8	24 3/16	24 3/16	18 3/16	91 5/8

Note: Each boiler has four 4-in. top outlets. In addition, each section, except front and back has one 4-in. inlet in each side, also a combination surface blowoff and indirect heater tapping.

ARRANGEMENT OF SECTIONS ASH PIT DIMENSIONS

Boiler No.	Assembly	Boiler No.	X, in.	Y, in.	Z, in.
2456	A-C-D-C-E	2456	77	49	15
2464	A-C-D-D-E	2464	85	57	15
2472	A-D-D-D-E	2472	93	57	23

Note: A—front section; E—back section; C—16-in. intermediate section; D—24-in. intermediate section.

Continued on next page

RICHARDSON "B" SERIES ROUND BOILERS FOR STEAM AND WATER

Fitted with Triangular Ventilated Grate Bars

Large Water and Steam Space—The large water and steam space in the Richardson Boiler acts as a reservoir of heat so that large demands in extreme weather can be easily met.

Staggered Heating Surface—The heating surface in the Richardson Boiler is scientifically staggered so as to extract the last possible degree of temperature from the smoke and thus put it to useful work.

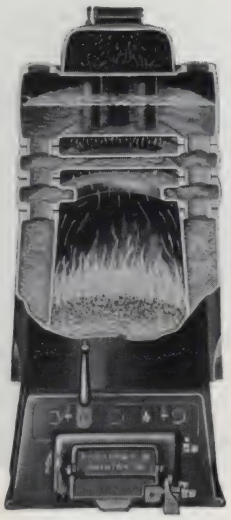
Ash Pit Door and Damper—The large ash pit door permits the easy removal of ashes. The ash pit door flap—supplying oxygen to the fuel—is operated from the automatic damper regulator on steam boilers and with a ratchet on water boilers.

Vertical Self-cleaning Flues—The steam dome of the Richardson Boiler is unique in construction in that the large vertical flues are self-cleaning.

Deep Fire—A deep fire is more economical to maintain than a shallow one and will last longer. It lengthens the time between firings and saves labor as well as coal.

Grates—The base section is fitted with our celebrated "Perfect" Revolving Triangular Grate Bars, which grind and crush clinkers and eliminate one of the worst features of the home heating plant.

Coal—Richardson Boilers are regularly shipped with grates for burning stove size coal, but can be furnished with special bars for pea coal. When soft coal is to be used for fuel, increase the boiler one size.



RATINGS AND DATA FOR RICHARDSON "B" SERIES ROUND BOILERS

Steam only							Water only						Steam and water				
No.	Rating, sq. ft.	Diam., of grate, in.	Height of boiler, in.	Height of water line, in.	Tappings, flow, return, in.	Height to center smoke pipe, in.	No.	Rating, sq. ft.	Diam., of grate, in.	Height of boiler, in.	Tappings, flow, return, in.	Height to center smoke pipe, in.	No.	Width at base, in.	Depth at base, in.	Hgt. to center of return tappings, in.	Diam., smoke flue, in.
173	300	17	45¼	40	2–2½	48¼							173	24	25¼	14½	7
174	350	17	49½	44¼	2–2½	53¼	174	550	17	42¾	2–2½	46½	174	24	25¼	14½	7
175	425	17	53¾	48½	2–2½	57¼	175	675	17	47	2–2½	50½	175	24	25¼	14½	7
203	475	20	46¼	41	2–3	50¾							203	27	28½	15½	8
204	550	20	50½	45¼	2–3	54¾	204	850	20	43¾	2–3	48	204	27	28½	15½	8
205	650	20	54¾	49½	2–3	58¾	205	1050	20	48	2–3	52	205	27	28½	15½	8
233	700	23	49¼	44	2–3	54							233	30	31½	16½	9
234	800	23	53½	48¼	2–3	58½	234	1350	23	45¾	2–3	51¼	234	30	31½	16½	9
235	900	23	57¾	52½	2–3	62½	235	1500	23	50	2–3	55¼	235	30	31½	16½	9
263	950	26	51¼	45¼	2–3½	56¼							263	33½	35	17½	10
264	1050	26	55½	49½	2–3½	60¼	264	1700	26	47⅛	2–3½	52¼	264	33½	35	17½	10
265	1150	26	59¾	53¾	2–3½	64¼	265	1900	26	51⅛	2–3½	56¼	265	33½	35	17½	10
266	1250	26	64	58	2–3½	68½	266	2050	26	55⅛	2–3½	60¼	266	33½	35	17½	10
294	1300	29	60	53½	2–3½	67⅞	294	2100	29	50½	2–3½	55⅞	294	38	40	18	10
295	1425	29	65⅜	58⅞	2–3½	70⅛	295	2300	29	55⅞	2–3½	61⅛	295	38	40	18	10
296	1550	29	70¾	64¼	2–3½	75⅜	296	2500	29	61¼	2–3½	66⅜	296	38	40	18	10

THE RICHARDSON BLUE COMET SQUARE SECTIONAL BOILER FOR STEAM

Where heating requirements demand a sectional boiler of small or medium size, at a moderate price, specify the new Richardson & Boynton Blue Comet.

This new addition to the R & B line has been designed by skilled engineers in accordance with the most approved scientific heating principles. Due to the care with which it was designed, the Blue Comet develops the maximum amount of heat from the fuel. Its economy of operation and quick response to firing insure comfort at all times and appeal to owners whose fuel bills are a matter of interest.

In the feed door of this remarkable boiler is an air intake device. This is of especial interest since, by its use, a more complete combustion of fuel can be had, thus adding to the economy of operation.

Both steam and hot water Blue Comet boilers are completely equipped with attractive accessories for easy operation and regulation. The grates are designed for all sizes of coal, even the small sizes of anthracite. In fact the same high efficiency and economy of operation can be had from the Blue Comet regardless of the type of fuel used. On this point alone there is a distinct advantage in the use of this boiler.

Exterior View

All parts of the boiler are carefully fitted, thus insuring minimum time of installation and protection against failure of satisfactory operation when first installed. In addition, great care is taken to protect the user from the annoyance and delay caused by defective parts. Blue Comet boilers come ready to be installed and to give immediate lasting and highly efficient service.

The matter of appearance is highly important. The boiler comes cased in a beautiful jacket of lustrous blue. In cellars and basements where interior decoration has been accomplished the Blue Comet is entirely at home and can be placed with the pride of ownership that comes usually only from much higher priced equipment.

These jackets are not alone for the purpose of beauty. Each case is thoroughly insulated with air cell asbestos linings. Much of the heat that is lost from the ordinary, uncased boiler is saved by this insulation and goes still further to increase the total efficiency. Also, where basements are used for living rooms, pantries, etc., and large heat losses are undesirable, the Blue Comet proves most satisfactory because of the insulated jacket which helps to keep the air from becoming too warm.

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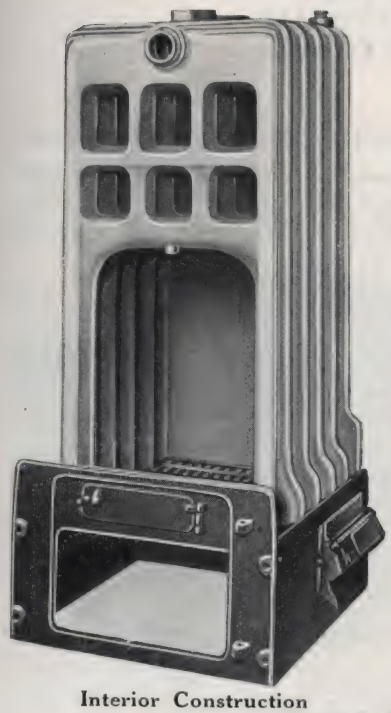


Interior Construction

Special Features of the Blue Comet

(1) Attractive appearance combined with high efficiency.
(2) Porcelain enameled jacket thoroughly insulated to prevent heat loss.
(3) Complete equipment and accessories for regulation and operation included.
(4) Special grates for small sizes of coal.
(5) Convenient grate shaking mechanism, easily operated.
(6) Scientifically designed fuel chamber with abundant coal capacity permits long firing periods.
(7) Long double flue travel insures high operating efficiency.
(8) All doors carefully fitted and adjusted—firedoor easy to open and close.
(9) Air intake in firedoor assists complete combustion.
(10) Ruggedly built throughout—long life with minimum repairs.

Easily Operated Grate Mechanism

RATINGS AND DATA

No.	Steam rating, sq. ft.	Water rating, sq. ft.	Grate area, sq. ft.	Number outlets, in.	Number inlets, in.	Chimney size, in.	Chimney height, ft.	Dimensions, in. For locating flow tappings A	B	C	L	Assembly of sections
714	400	675	1.48	2–2½	2–2½	8x8	30	5 13/16	4¼	5 13/16	32½	FTTB
715	575	950	1.95	2–2½	2–2½	8x8	30	5 13/16	8½	5 13/16	36¾	FTMTB
716	750	1250	2.45	2–2½	2–2½	8x8	30	10 1/16	8½	5 13/16	41	FMTMTB
717	925	1550	2.91	2–2½	2–2½	8x12	35	10 1/16	8½	5 13/16	45¼	FMTMTMB
718	1100	1850	3.51	3–2½	2–2½	8x12	35	10 1/16	8½	5 13/16	49½	FMTMTMTB
719	1275	2150	3.96	3–2½	2–2½	8x12	35	10 1/16	8½	5 13/16	53¾	FMTMTMTMB

F—front section. M—middle or intermediate section. T—tap or flow section. B—back section.

THE NEW RICHARDSON SQUARE CASED ROUND BOILER

In design and appearance this new boiler is a striking departure. It is as good looking equipment as has ever been placed in the cellar. But it is not a new, untried heating system. It retains all the proven, time-tested advantages of the round boiler—which has been so successful a type for home heating.

The same features that have won so many friends for RICHARDSON & BOYNTON Co. apparatus are embodied in this latest product.

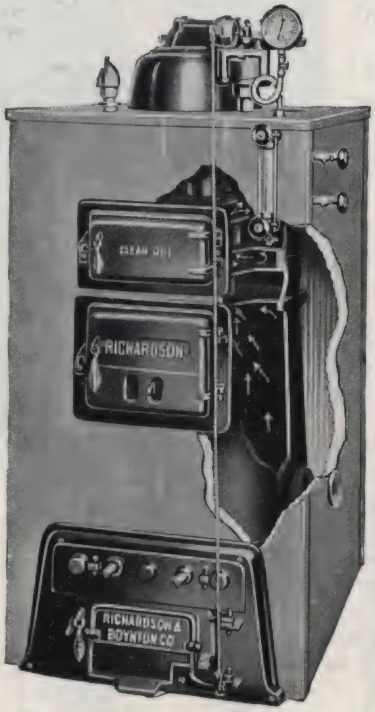
The square cased boiler is not a new heating experiment, but an improvement over a principle that is already successful.

Finish—The outer casing is finished with high luster blue japan that is durable, easy to clean, and will not crack or peel.

The doors, ash pit front and smoke box—in other words, all cast iron parts not covered by the casing—are coated with black enamel.

Insulation—The lining or insulation of the Richardson boiler is of 1-in. 8-ply asbestos air cell and is attached to the cases when shipped. It thus cannot be damaged in transit or in handling.

The air space between the heating unit and the outer casing provides extra heat conserving insulation.



Sectional View of Richardson Square Cased Boiler

Showing round interior construction, extra air space insulation and heavy asbestos insulation on outer casing

Casings—The casings are cut in half from side to side at the flow openings on the top of the boiler and horizontally at the return tappings so that they can be attached after all piping connections to the boiler are made.

Fire Pot—The fire pots have deep fire chambers which will carry fire and generate heat for a long time without attention. It is easy to carry sufficient fire all night to insure a warm house in the early morning.

Grates—These Richardson Boilers are fitted with our celebrated "Perfect" Revolving Triangular Grate Bars, noted for their convenience and ease of operation, their durability, and their exceptional clinker-clearing properties.

Tappings—Provision has been made on the right and left sides of the casing for the attachment of an indirect water heater when desired, as well as tappings for the fire pot generator.

Guarantee—All Richardson Boilers are guaranteed perfect in manufacture and to maintain their ratings, provided radiation is figured ample to heat building to 70°, piping system properly arranged, and a flue of sufficient size and draft is furnished. This company will replace without charge any parts that prove to be defective in material or workmanship.

RICHARDSON SQUARE CASED BOILER 1-S AND 1-W SERIES

Steam No.	Steam Rating, sq. ft.	Water No.	Water Rating, sq. ft.	Grate area, sq. ft.	Diam. of grate, in.	Height of jacket, in. Water	Height of jacket, in. Steam	Water line, steam, in.	Smoke pipe, in.	Square of base, in.	Outlets, in. Steam	Outlets, in. Water	To center of smoke pipe, in. Steam	To center of smoke pipe, in. Water
1-S-1	350	1-W-1	550	1.58	17	43	49¾	44¼	7	26½	2—2½	2—2½	53¼	46½
1-S-2	425	1-W-2	675	1.58	17	47	53¾	48½	7	26½	2—2½	2—2½	57¼	50½
1-S-3	550	1-W-3	850	2.18	20	43¾	50¼	45¼	8	29½	2—3	2—3	54¾	48
1-S-4	650	1-W-4	1050	2.18	20	47¾	54¼	49½	8	29½	2—3	2—3	58¾	52
1-S-5	800	1-W-5	1350	2.89	23	46¼	53½	48¼	9	32½	2—3	2—3	58½	51¼
1-S-6	900	1-W-6	1500	2.89	23	50¼	57½	52½	9	32½	2—3	2—3	62½	55¼
1-S-7	1050	1-W-7	1700	3.70	26	47	55	49½	10	36	2—3½	2—3½	60¼	52¼
1-S-8	1150	1-W-8	1900	3.70	26	51	59	53¾	10	36	2—3½	2—3½	64¼	56¼
1-S-9	1300	1-W-9	2100	4.59	29	51	60	53½	10	41	2—3½	2—3½	67⅞	55⅞
1-S-10	1425	1-W-10	2300	4.59	29	56½	65	58⅞	10	41	2—3½	2—3½	70⅛	61⅜

MOLBY BOILER COMPANY, INC.

SUBSIDIARY OF THE UNIVERSAL PIPE AND RADIATOR COMPANY
Graybar Building, 420 Lexington Avenue (43rd Street)
NEW YORK, N. Y.
BRANCHES
PHILADELPHIA, PA., 2401 Chestnut Street
LANSDALE, PA., 50 Central Avenue
CHICAGO, ILL., 332 S. Michigan Avenue

The
MOLBY
MAGAZINE-FEED
Buckwheat-Burning
BOILER
TRADE-MARK

Products

The MOLBY MAGAZINE-FEED HEATING BOILERS for residences, apartment houses, schools, churches and industrial buildings. Low pressure steam, vapor and hot water heating and large volume hot water supply.

Service to Architects

Architects are invited to consult our heating engineers. Information will be gladly furnished as to type and size of boiler or tank heater best suited to individual requirements.

Advantages of the Molby Boiler

The Molby Boiler is constructed throughout in accordance with the codes of the American Society of Mechanical Engineers and the American Society of Heating and Ventilating Engineers. It is recognized by heating experts as a boiler of the highest efficiency.

(1) Coal bills are reduced as much as one-half, sometimes more, as the Molby burns No. 1 buckwheat at a saving of $5.00 to $8.00 per ton. It requires no mixing with expensive larger sizes of coal.

(2) Self-feeding. Only once every 12 to 24 hours is it necessary to refill the magazine, depending on the weather. The magazine or "coal hopper" built into and a part of the boiler itself feeds the fire by gravity. No night attendance is necessary.

(3) No forced draft is necessary. There is no cost for current, no noise of motors and fans and no machinery to get out of order.

(4) No waste. The Molby down-draft and cross-draft are exclusive features. Smoke and gases instead of escaping up the chimney are changed into heat.

(5) In the smaller residence installations the self-feeding feature relieves the owner, or whoever tends the boiler, of much arduous work and frequent firing.

In apartment houses, greenhouses or other large places, the magazine-feed means a real saving in service costs.

(6) Made in twenty-one sizes. Where a Molby replaces another boiler no changes are necessary in present radiator and piping system.

Laboratory Tests and Performance Charts

Tests were made, not only by our own engineers, but in the nationally known Frost Research Laboratory, at Norristown, Pa., and these laboratory tests are certified by Robinson V. Frost, C.E., Member A.S.M.E. and A.S.H. & V.E.

Ask nearest office for Frost Laboratory Charts of boiler performances, efficiencies and ratings.

Construction—All Cast Iron

The sections are connected top and bottom by tight, non-corroding, cast iron push nipples. All parts are accurately finished.

The No. 1 series has one magazine. The No. 2 series and No. 3 series have a magazine on each side with two fires and a combination chamber between the two water grates. The gases burning from the two fires unite in the combustion chamber, assuring perfect combustion.

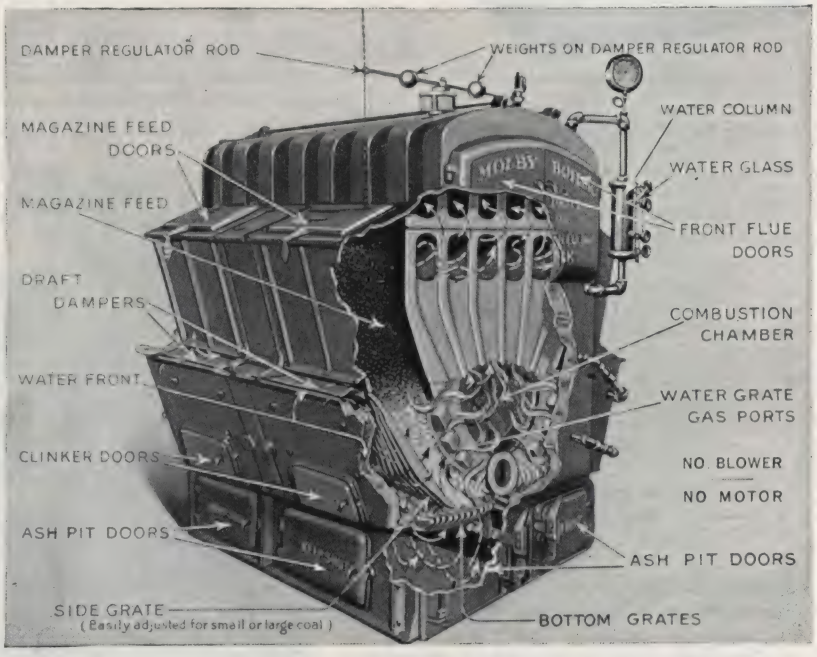
A magazine on each side makes it possible to carry one or two fires as desired. Each magazine is fired separately. In mild weather one fire is sufficient, which is still another economy feature of the Molby heating boiler.

Molby boilers are fitted with grates having a very high throw when open and a tremendous crushing power as they close. When closed, the grates prevent the smaller coal from dropping into the ash pit; when open, they will dump ash and slate freely. Ashes are easily shaken into deep ash pit. Ash pit doors and boiler cleanout doors are large.

Fuel

No. 1 buckwheat anthracite is used without mixing with the expensive larger sizes and without the aid of forced draft accessories, such as blower, motor, electric current, etc. The Molby also burns pea, stove, nut or egg coal.

Sized bituminous coal, of the free-burning, non-caking variety, may be used. Coke may also be used.



SIZES, CAPACITIES, DIMENSIONS, RATINGS

Steam			Steam and Water							Water		Ratings			
			Size—inches									Com. Rat. 8 hr. basis		Advised load	
No.	Water line, in.	Returns, number; size, in.	Height	Width	Length	Smoke pipe	Outlets	Chimney flue	Approximate shipping wt.	No.	Returns, number; size, in.	Steam	Water	Steam	Water
1-4	43	2-3	54	41	35½	10	2-3	8x12	1890	1-4	2-3	375	600	275	450
1-5	43	2-3	54	41	42	10	2-3	8x12	2230	1-5	2-3	507	813	375	615
1-6	43	2-3	54	41	48½	10	2-3	8x12	2580	1-6	2-3	646	1035	475	780
1-7	43	2-3	54	41	55	10	2-3	12x12	2950	1-7	2-3	779	1247	575	945
1-8	43	2-3	54	41	61½	10	2-3	12x12	3300	1-8	2-3	908	1450	675	1110
2-5	48	2-4	62½	61	37⅝	14	2-3	8x12	3820	2-5	2-4	1158	1852	839	1343
2-6	48	2-4	62½	61	44	14	2-3	12x12	4290	2-6	2-4	1466	2356	1087	1739
2-7	48	2-4	62½	61	50⅜	14	2-3	12x12	4690	2-7	2-4	1785	2856	1334	2135
2-8	48	2-4	62½	61	56¾	14	2-3	12x16	5100	2-8	2-4	2106	3370	1585	2537
2-9	48	2-4	62½	61	63⅛	14	2-3	12x16	55'0	2-9	2-4	2431	3890	1852	2964
2-10	48	2-4	62½	61	69½	14	2-3	16x16	5930	2-10	2-4	2759	4414	2138	3422
2-11	48	2-4	62½	61	75⅞	14	2-3	16x16	6350	2-11	2-4	3093	4934	2405	3969
3-6	61	2-5	80	75½	50½	14	2-4	12x16	7150	3-6	2-5	1817	2907	1900	3135
3-7	61	2-5	80	75½	59	14	2-4	16x16	8310	3-7	2-5	2470	3952	2275	3750
3-8	61	3-5	80	75½	67½	16	3-4	16x16	9500	3-8	3-5	2785	4456	2650	4370
3-9	61	3-5	80	75½	76	16	3-4	16x20	10650	3-9	3-5	3312	5300	3025	4990
3-10	61	3-5	80	75½	84½	18	3-4	16x20	11840	3-10	3-5	3898	6236	3400	5610
3-11	61	3-5	80	75½	93	18	4-4	20x20	13000	3-11	3-5	4351	6962	3775	6225
3-12	61	3-5	80	75½	101½	18	4-4	20x20	14150	3-12	3-5	4769	7631	4150	6845
3-13	61	3-5	80	75½	110	18	4-4	20x24	15320	3-13	3-5	5226	8361	4525	7465
3-14	61	3-5	80	75½	118½	18	4-4	20x24	16590	3-14	3-5	5660	9057	4900	8085

THE H. B. SMITH CO.

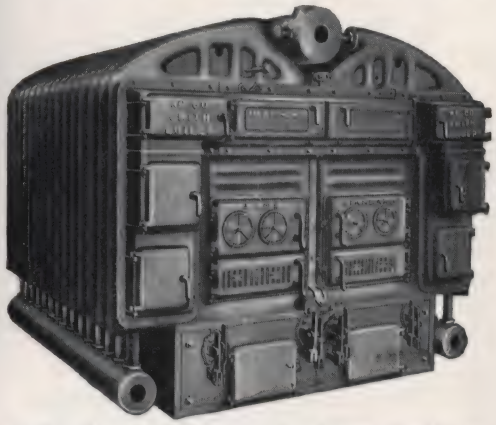
WESTFIELD, MASS.

BRANCH OFFICES AND WAREHOUSES

BOSTON, 640 Main Street, Cambridge, Mass. NEW YORK, N. Y., 10 East 41st Street

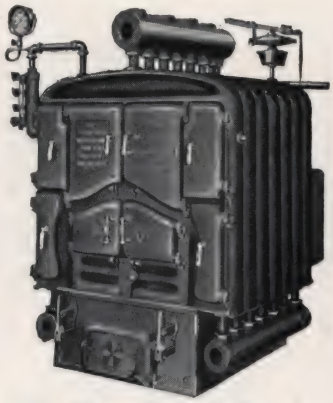
PHILADELPHIA, PA., 2209 Chestnut Street

COMPLETE LINE OF LOW PRESSURE BOILERS FOR STEAM OR HOT WATER HEATING PLANTS, RADIATORS AND ACCESSORIES FOR ANY SIZE INSTALLATION



Smith Smokeless Boilers for Large Buildings

Pages 4, 5 and 8



Mills Water Tube Boilers for Medium to Large Buildings

Pages 6 and 7

The "No. 16" Smith

A jacketed boiler for residential use.

Pages 2 and 3

Jacketed Without Jacket

The "H-B" Boilers for Residential Use

Page 9

Menlo Boilers Hy-Test Boilers

Hot Water Supply Boilers for All Services

Page 12

"144" Full Surface Radiator

Page 10

Continued on next page

THE "No. 16" SMITH BOILER

Latest Addition to the Smith Line of Boilers

A Boiler of Unusual Design and Performance for Steam or Hot Water Systems for Residences

Commercial Steam Ratings from 350 to 1250 sq. ft. of Radiation

The new "No. 16" Smith Boiler is a section boiler built in sizes suitable for small homes. It embodies the same design features which have proved so efficient in the large Smith Smokeless Boilers, namely:

Extra deep fire box giving generous fuel capacity, long firing periods.

Ample combustion space and auxiliary air intake scientifically devised to burn any fuel with highest efficiency.

Fire brick lining which prevents dead spots in the fuel bed, and conserves the heat.

Abundant surface for absorbing heat.

Smooth water ways with all corners rounded giving free and balanced circulation.

The Efficiency of the "No. 16" Boiler

In burning fuel, roughly one-half of the combustion takes place in the fuel bed and one-half in the combustion space above it. For completely burning the gases in the combustion space and preventing smoke, additional air besides that coming through the fuel bed is essential, particularly in the case of bituminous coals.

The "No 16" has an extra deep fire box in which the fuel is thoroughly burned, and an ample space above for completing combustion of the gases. Special air ports are scientifically placed in the back section close to the surface of the burning fuel to provide additional air as required. These holes are proportioned to allow ample air for bituminous coals and a damper is provided to regulate the amount required for any fuel.

The "No. 16" Smith Boiler

The Deep Firebrick Lined Fire Pot

The most vital factor relative to combustion, however, is the firebrick lining so ingeniously incorporated in the "No. 16" Smith Boiler. Without firebrick there is a tendency for the fuel next to the boiler to remain unburned. This in reality reduces the effective grate area. A brick lined furnace keeps the fuel bed hot and absolutely uniform, even at very low rates of combustion and therefore makes the full grate area available. A uniform fuel bed results in better combustion and hence better economy.

The extra distance from the bottom of the fire door to the grates gives a longer firing period which means less care and attention.

The Large Proportion of Heating Surface in Relation to the Grate Area

After proper and complete combustion of the fuel is obtained the resulting heat must be absorbed by the heating surface in order to be delivered to the system. Any heat that is not absorbed is wasted up the chimney. The "No. 16" has an unusually large heating surface for a boiler of equal grate area, and therefore absorbs the maximum heat.

Grates

The grates are very rugged and designed to chew up the ash rapidly. The grate supports are separate and bolted strongly to the ashpit. The ashpit is neat, rugged and accurately aligned. The shaking apparatus is convenient and ingeniously designed so the grates cannot lift out of position.

Rear View
Showing all damper controls including side damper for control of auxiliary air

Perfect Circulation Produces Rapid Steaming

The sections are well balanced and all interior corners and angles are rounded to facilitate circulation. Most of the surface is of tubular shape which means greater effectiveness. These features make the "No. 16" a rapid steamer yet it does not prime.

Easily Adapted to Any Fuel

The "No. 16" burns all of the various house-heating fuels with equal efficiency. The extra deep fire box is well suited to burn coke as well as anthracite and bituminous coal. For use with gas or oil the recessed walls of the ashpit (with grate assembly removed) may be lined with firebrick. This gives a properly proportioned combustion space for these fuels and makes the "No. 16" a universal boiler.

The Exterior Features of the "No. 16"

The boiler sections are entirely enclosed by an efficient air cell asbestos cover which in turn is covered by a rugged sheet steel casing finished in scarlet enamel double baked. The metal jacket is carefully fitted so that it is easily put on. It is very durable.

The automatic regulators for maintaining an even temperature and the usual trimmings are neatly arranged and can be adjusted to suit every requirement.

Cross Section
Showing ashpit bricked for use in burning oil, accomplished without sacrifice of combustion space

Continued on next page

THE SPECIAL FEATURES OF THE "NO. 16" SMITH BOILER

Automatic Damper Regulator

Damper controls all on the rear leaving the front clear

Air cell asbestos cover on four sides and top retains the heat

Plenty of flues to provide ample heating surface and efficient heat transfer.

Sheet steel casing finished in scarlet enamel double baked

Smooth waterways. Balanced circulation

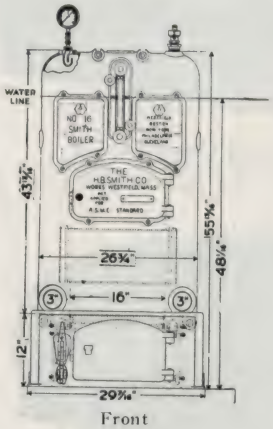
Firebrick lining on all four sides. Extra deep firepot for long firing periods

Abundant combustion space

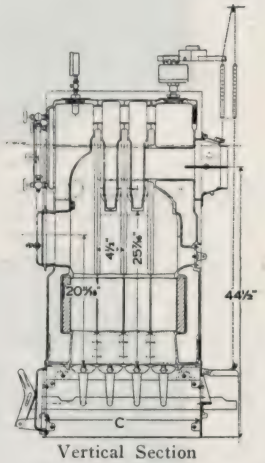
Secondary air ports for combustion efficiency and smokeless operation

Grate bars chew up ash rapidly. Cannot lift out of position

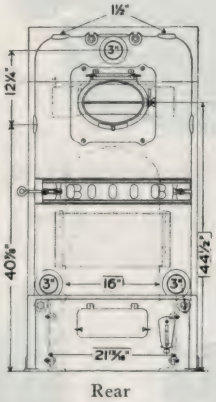
Elevation with Front Section Removed



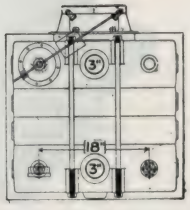
Front



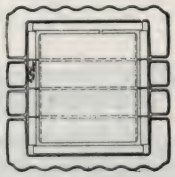
Vertical Section



Rear



Top



Horizontal Section

DIMENSIONS OF "NO. 16" SMITH BOILER

Tested to A.S.M.E. Standard Hydrostatic Pressure. Maximum Allowable Working Pressure—Steam 15 lb., Water 30 lb.

Steam Boiler		Water boiler		Heating surface, sq. ft.	Grate		Recommended chimney sizes		Number of double sections	Number of 4½-in. leg sections	A Total length, in.	C Foundation length, in.	Steam safety valve, in.	Water relief valve, in.
No.	Rating, ft.	No.	Rating, ft.		Size, in.	Area, sq. ft.	Dim., in.	Height, ft.						
16-S-4	350	16-W-4	600	21.55	16x 9	1.0	8x8	25	2	0	31¼	18¼	1	½
16-S-5	500	16-W-5	850	32.00	16x13½	1.5	8x8	30	2	1	35¾	22¾	1	½
16-S-6	650	16-W-6	1100	42.45	16x18	2.0	8x8	30	2	2	40¼	27¼	1	¾
16-S-7	800	16-W-7	1350	52.90	16x22½	2.5	8x12	25	2	3	44¾	31¾	1	¾
16-S-8	950	16-W-8	1600	63.35	16x27	3.0	8x12	30	2	4	49¼	36¼	1	¾
16-S-9	1100	16-W-9	1850	73.80	16x31½	3.5	8x12	30	2	5	53¾	40¾	1	¾
16-S-10	1250	16-W-10	2100	84.25	16x36	4.0	8x12	35	2	6	58¼	45¼	1	¾

Length of grate bars, 16 in.
Distance between centers of grates, 4½ in.
Diameter of supply and return tappings, 3 in.
Size of smoke pipe, 9 in.

Computing size of boiler: direct cast iron radiation (or equivalent) up to two-thirds of No. 16 Smith Boiler Rating may be used satisfactorily.

Continued on next page

SMITH SMOKELESS BOILERS FOR ALL BITUMINOUS AND ANTHRACITE COALS, OIL, GAS AND COKE

The Smith Smokeless Boiler is an up-draft type of cast iron vertical section boiler so designed that it may be operated smokelessly without regard to the type or grade of fuel.

There are many important developments in these boilers which account for their satisfactory and economical operation under all conditions, i. e.:

Maximum Grate Area in Minimum Space—The semi-circular Reed Grate is standard on all Smith Smokeless Boilers. All Smith Smokeless Boilers shake from the front and grate bars are so constructed and reinforced as to insure satisfactory operation with any type of fuel. Reed Grates for buckwheat coal or Segment Grates on order. (See Plate 1 for illustrations and descriptions of all grates.)

Maximum Heat Absorbing Surface—The design and arrangement of the heating surface in Smith Smokeless Boilers is the perfection attained after many years of testing in our Research Laboratory coupled with the knowledge of our product gained from three generations of tests under actual working conditions, burning all grades of fuel.

The design of the sections exposes the maximum amount of heating surface it is possible to put into a given area and still maintain proper circulation. Thus the heat of the burning gases is absorbed as rapidly as generated.

Free Circulation in Sections—The cross section illustrations show how free circulation of steam and water is obtained. Front and back sections are all of uniform diameter—no bottle-neck restriction.

Header Type Construction Insures Continuous Operation—With the header type of construction each section is connected separately to steam and return headers. In case of accidental breakage of a section it is only necessary to disconnect the three nipples and plug the headers. The section can then remain in place until it is convenient to replace it without disturbing the heating service.

Auxiliary Air Supply on Smith Smokeless Boilers—All Smith Boilers have a means of admitting auxiliary or secondary air, which aids materially in completing combustion of the gases. This may be accomplished by one of three methods or by a combination of methods.

(1) Oxygen Torch—This is probably the greatest development in smokeless operation for large boilers employing fuels of over 22½% volatile and should be specified when it is certain that such fuels will be continuously used. Fig. 4 shows the oxygen torch installed and Fig. 5 shows the torch before installation (see description under Fig. 5). Can be furnished on all Smith Smokeless Types.

(2) Auxiliary Side Air Intake—This is an opening at the sides and towards the rear for only on the 27 or 36 Smith Smokeless Boilers. It admits a curtain of air at the proper place in the combustion chamber and so speeds up complete combustion.

(3) Fire Door Intake—The butterfly dampers or slide dampers (as the case may be) in the fire doors may be opened to admit secondary air. This auxiliary device may be used independently or in conjunction with the oxygen torch or auxiliary side air intake.

Fig. 1. Smith Smokeless Boiler with Front Removed

Showing fire travel and auxiliary side air inlet

Fig. 2. Longitudinal Cross Section

Showing long fire travel, correct design of sections, so as to obtain maximum heating surface and rapid circulation of water. Also special air intake section

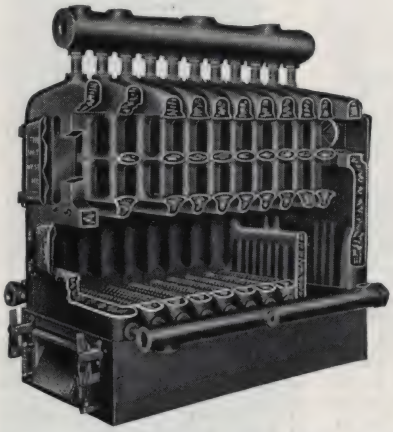


Fig. 3. Smith Smokeless Boiler with Bridgewall and Reduced Grates

Used where boilers in any series may be too long for comfortable firing.

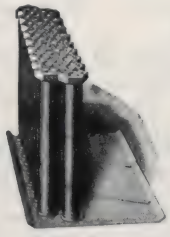


Fig. 5. Oxygen Torch

A scientific application of secondary air, obtaining successful results by bringing volatile gases into violent surging and swirling contact with oxygen, supplied through 500 torch holes

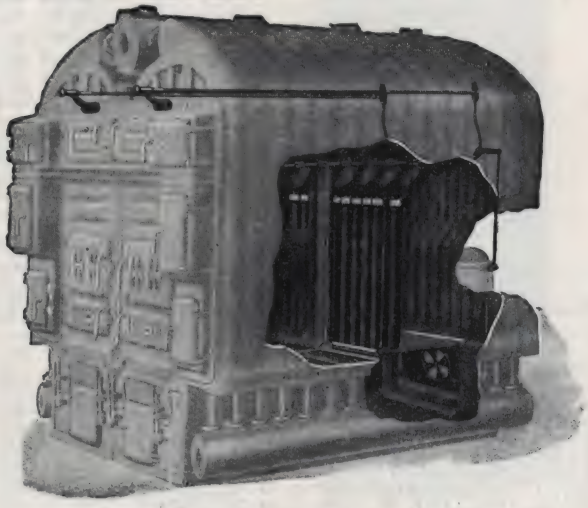


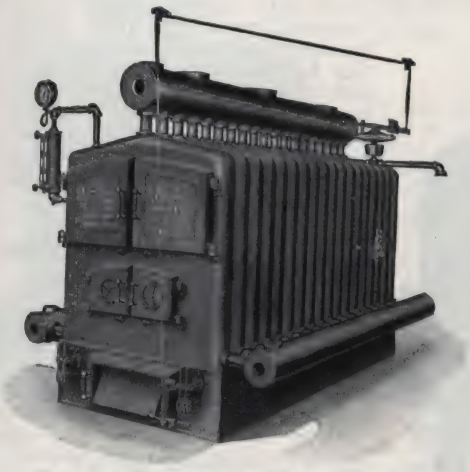
Fig. 4. Smith Smokeless Boiler with Bridgewall, Reduced Grate and Oxygen Torch

This combination used especially for fuels of more than 22½% volatile

Continued on next page

NOS. 27 AND 36 SMITH SMOKELESS BOILERS

Commercial Steam Ratings: No. 27—from 1200 to 3900 sq. ft. of radiation.
No. 36—from 2300 to 6300 sq. ft. of radiation.



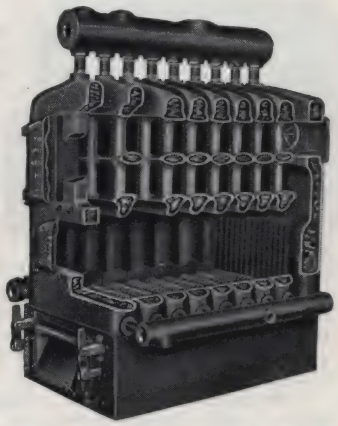
Exterior Showing Auxiliary Air Inlet

Nos. 27 and 36 Smith Boilers can be furnished with or without auxiliary air inlet; with or without oxygen torches

The Nos. 27 and 36 Smith Smokeless Boilers are of similar construction and where capacities overlap either one can be specified to take care of a boiler load which is common to both. The principal factor in these cases which would determine the boiler to select and specify would be:

What will be the maximum capacity which might ever be required for the particular building because of future additions. If the installation requirements will most likely be the maximum ever demanded then a boiler from the No. 27 Series should be selected. Should future addition be contemplated then a No. 36 boiler of a capacity sufficient for installation requirements should be specified. Additional sections and extension base can then be added as future heating requirements increase.

Both series are made with full size grate in the smaller capacities and reduced grate and bridgewall in the larger capacities. Oxygen torch can be furnished where specified—see previous page for description.

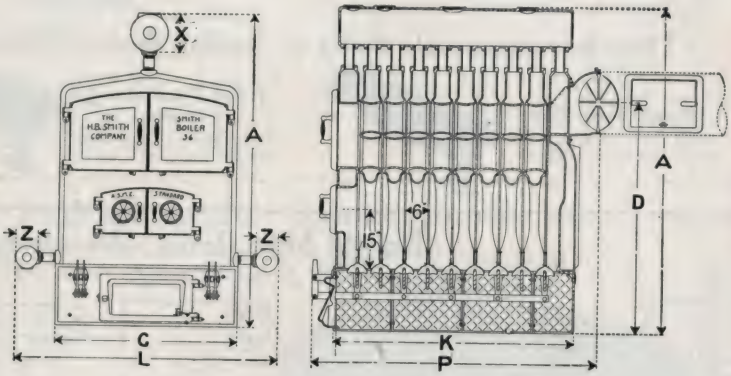


No. 27 Interior Showing Full Size Grate

No. 36 with full size grate is of similar construction

No. 36 Smith Smokeless Boiler (grate reduced)

No. 27 with grate reduced is of similar construction



Front Longitudinal

Dimension Diagram for Nos. 27 and 36

Important: Add 24 in. to dimension "P" for wall clearance

SIZES, CAPACITIES AND PRINCIPAL DIMENSIONS OF NOS. 27 AND 36 BOILERS

Number of sections	Rating, ft. Steam	Rating, ft. Water	Heating surface, sq. ft.	Grate area, sq. ft.	Nominal size of firepot in.	Recommended chimney sizes Diam., in.	Recommended chimney sizes Height, ft.	Height of water line, in.	Steam safety valve, in.	Water relief valve, in.	Dimensions (inches) of key letters on diagram A	C	L Steam	L Water	Z Steam	Z Water	P	K	D	†Ash pit dimensions, in. Grate full size and grate reduced X	Y	Z	With oxygen torch No. sect.	X	Y	Z
No. 27 Smith Boiler																										
5	1200	1975	67.5	4.50	27x24	8x12	30	55¾	1¼	¾	80	35	56	59	4½	6	47	32	55	31	27	½				
6	1500	2475	81.5	5.63	27x30	12x12	30	55¾	1¼	1	80	35	56	59	4½	6	53	38	55	37	27	½				
7	1800	2975	95.5	6.75	27x36	12x12	30	55¾	1½	1	80	35	56	59	4½	6	59	44	55	43	27	½				
8	2100	3475	109.5	7.88	27x42	12x12	35	55¾	1½	1	80	35	56	59	4½	6	65	50	55	49	27	½				
9	2400	3950	123.5	9.00	27x48	12x16	35	55¾	1½	1	80	35	56	59	4½	6	71	56	55	55	27	½				
10	2700	4450	137.5	10.13	27x54	12x16	40	55¾	2	1¼	80	35	56	59	4½	6	77	62	55	61	27	½				
11	3000	4950	151.5	11.25	27x60	16x16	45	55¾	2	1¼	80	35	56	59	4½	6	83	68	55	67	27	½	10	38	27	23½
12	3300	5450	172.5	11.25	27x60	16x16	55	55¾	2	1¼	80	35	56	59	4½	6	89	74	55	62	27	11½	11	44	27	23½
12	3300	5450	165.5	12.38	*27x66	16x16	55	55¾	2	1¼	80	35	56	59	4½	6	89	74	55	73	27	½	12	50	27	23½
13	3600	5950	186.5	12.38	*27x66	16x20	60	55¾	2	1¼	80	35	56	59	4½	6	95	80	55	68	77	11½	13	56	27	23½
13	3600	5950	179.5	13.50	*27x72	16x20	60	55¾	2	1¼	80	35	56	59	4½	6	95	80	55	79	27	½	14	62	27	23½
14	3900	6425	200.5	12.38	*27x66	16x20	65	55¾	2	1¼	80	35	56	59	4½	6	101	86	55	68	27	17½	15	68	27	23½
14	3900	6425	193.5	14.63	*27x78	16x20	65	55¾	2½	1¼	80	35	56	59	4½	6	101	86	55	85	27	½	16	74	27	23½
No. 36 Smith Boiler																										
7	2300	3800	133.5	9.00	36x36	16x16	30	57¾	1½	1	83	48¼	72	76	6	8	56	44	59	42	36	½				
8	2800	4625	153.0	10.50	36x42	16x16	35	57¾	2	1¼	83	48¼	72	76	6	8	62	50	59	48	36	½				
9	3300	5450	172.5	12.00	36x48	16x16	40	57¾	2	1¼	83	48¼	72	76	6	8	68	56	59	54	36	½				
10	3800	6275	192.0	13.50	36x54	16x20	45	57¾	2	1¼	83	48¼	72	76	6	8	74	62	59	60	36	½				
11	4300	7100	211.5	15.00	36x60	16x20	55	57¾	2½	1¼	83	48¼	72	76	6	8	80	68	59	66	36	½				
12	4800	7925	241.0	15.00	36x60	16x20	60	57¾	2½	1¼	83	48¼	72	76	6	8	86	74	59	62	36	10½	11	44	36	22½
12	4800	7925	231.0	16.50	*36x66	16x20	60	57¾	2½	1½	83	48¼	72	76	6	8	86	74	59	72	36	½	12	50	36	22½
13	5300	8750	260.5	16.50	*36x66	20x20	65	57¾	2½	1½	83	48¼	72	76	6	8	92	80	59	68	36	10½	13	56	36	22½
13	5300	8750	250.5	18.00	*36x72	20x20	65	57¾	2½	1½	83	48¼	72	76	6	8	92	80	59	78	36	½	14	62	36	22½
14	5800	9575	280.0	16.50	*36x66	20x20	70	57¾	2½	1½	83	48¼	72	76	6	8	98	86	59	68	36	16½	15	68	36	22½
14	5800	9575	270.0	19.50	*36x78	20x20	70	57¾	3	1½	83	48¼	72	76	6	8	98	86	59	84	36	½	16	74	36	22½
15	6300	10400	299.5	18.00	*36x72	20x20	75	57¾	2½	1½	83	48¼	72	76	6	8	104	92	59	74	36	16½	17	80	36	22½
15	6300	10400	289.5	21.00	*36x84	20x20	75	57¾	3	1½	83	48¼	72	76	6	8	104	92	59	90	36	½	18	86	36	22½

*Maximum size of firepot, not shipped as regular.
†For diagram of ash pit see Page 8.

Continued on next page

MILLS WATER TUBE CAST IRON SECTIONAL BOILERS

The Mills Boiler is different in construction from any other sectional cast iron boiler. It is so designed that it has an immense, quick acting direct fire surface which condition is especially desirable for either oil or gas burners. While primarily designed for use with coal or coke, laboratory tests have proved that the boiler can practically achieve the maximum theoretical efficiency when either oil or gas is burned.

The Quick Acting, Direct Heating Fire Surface—Above the grate, the fire chamber is unusually large and extending down into the fire chamber are cast iron tubes as shown in the section.

The heat envelops the center tubes and passes through the side flues and forward to the front of the boiler, then passes downward and out through another set of flues to the smoke bonnet.

Protection Against Breakdown—The Mills Boiler is assembled in vertical cast iron tubular sections.

The sections are not connected in any way except through nipples to the top header and return mains at the sides. In case anything should happen to one section it can readily be cut off from the headers and the boiler continued to be used until a new section is obtained.

Each section of the boiler acts as a separate boiler as the sections are entirely independent of each other except through the header construction. Any section can be disconnected in case of necessity and the boiler kept in operation. The boiler was originally designed for high pressure steam work and its extra strength for this construction has been retained.

Fire Action on the Tube Surface of the Mills Boiler

The More Heating Surface the Greater the Efficiency

In selecting a proper size boiler for heating, the amount of direct heating surface in comparison with the grate area should always be considered. In order to absorb the greatest number of B.t.u.'s from fuel it is necessary to have the largest heating surface possible. While this requires a larger boiler in proportion to the fire pot, it is thereby increased.

We have any number of letters from owners who have replaced other boilers with the Mills boilers on account of their economy of fuel.

Three Interchangeable Styles of Shaking Grates Which Can Be Furnished with Any Mills Boiler

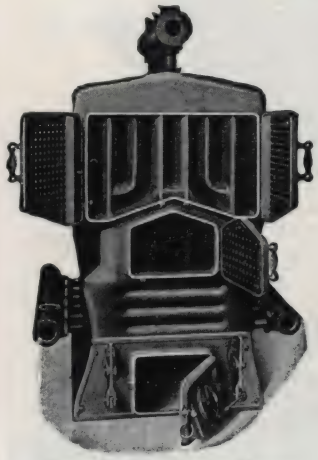
Reed Grate Bar
Reed Grate standard for all sectional boilers

Reed Buckwheat Grate
Buckwheat Coal Grate shipped on special order

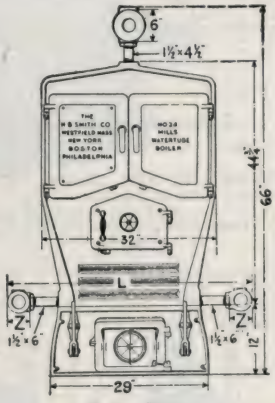
Segment Grate Bar
Shipped on special order for bituminous coal and anthracite of fine grade

No. 24 Mills Boiler (for medium size residences)

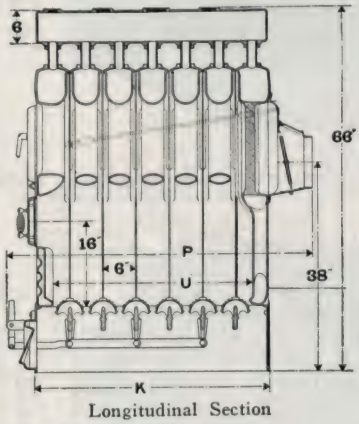
Commercial Steam Ratings from 900 to 2025 ft. of Radiation



Front with Doors Open



Front View



Longitudinal Section

Dimension Diagram for No. 24 Mills Boiler

Important: Add 24 in. to dimension "P" for wall clearance

Rear View

SIZES, CAPACITIES AND PRINCIPAL DIMENSIONS OF NO. 24 MILLS BOILER

Number of sections	Rating, ft.		Heating surface, sq. ft.	Grate area, sq. ft.	Nominal size of firepot, in.	*Recommended chimney sizes		Diam. of smoke pipe, in.	Height of water line, in.	Steam safety valve, in.	Water relief valve, in.	Dimensions (inches) of key letters on diagram							†Ash pit dimen., in.		
															Steam		Water				
	Steam	Water				Diam., in.	Height, ft.					P	U	K	L	Z	L	Z	X	Y	Z
5	900	1500	75.5	3.33	21x24	8x12	25	9	47¾	1	¾	43	24	32	45	4½	48	6	30	24	½
6	1125	1875	91.0	4.17	24x30	8x12	30	9	47¾	1¼	¾	54	30	38	45	4½	48	6	36	24	½
7	1350	2250	106.5	5.00	24x36	12x12	25	10	47¾	1¼	¾	60	36	44	45	4½	48	6	42	24	½
8	1575	2600	122.0	5.84	24x42	12x12	30	10	47¾	1¼	1	66	42	50	45	4½	48	6	48	24	½
9	1800	2975	137.5	6.67	24x48	12x12	35	12	47¾	1½	1	72	48	56	45	4½	48	6	54	24	½
10	2025	3350	153.0	7.50	24x54	12x16	35	12	47¾	1½	1	78	54	62	45	4½	48	6	60	24	½

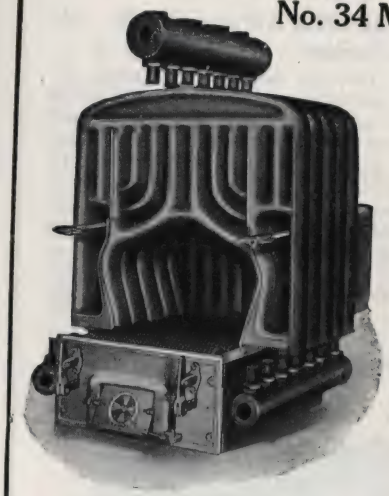
*For small sizes of coal or deep beds of fuel higher chimneys are required.
†For dimension diagram of ash pit see page 8.

Continued on next page

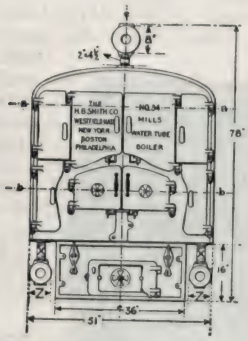
MILLS WATER TUBE CAST IRON SECTIONAL BOILERS

No. 34 Mills Boiler (for large residences and small buildings)

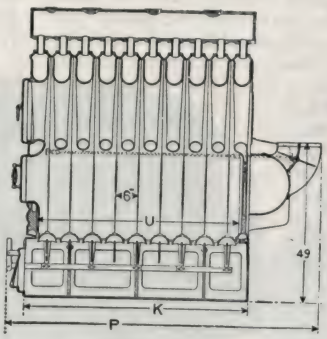
Commercial Steam Ratings from 2000 to 5200 sq. ft. of Radiation



No. 34 Interior

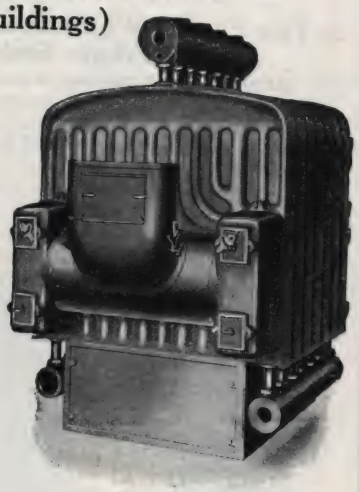


Front View



Longitudinal View

Important: Add 24 in. to dimension "P" for wall clearance



No. 34 Rear View

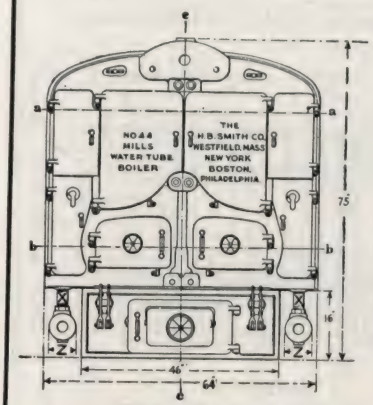
SIZES, CAPACITIES AND PRINCIPAL DIMENSIONS OF NO. 34 MILLS BOILER

Number of sections	Rating, ft. Steam	Rating, ft. Water	Heating surface, sq. ft.	Grate area, sq. ft.	Nominal size of firepot, in.	*Recommended chimney sizes Diam., in.	*Recommended chimney sizes Height, ft.	Size of smoke pipe opening, in.	Height of water line, in.	Steam safety valve, in.	Water relief valve, in.	Dimensions (inches) of key letters on diagram P	U	K	Steam Z	Water Z	†Ash pit dimen., in. X	Y	Z
6	2,000	3,300	165.0	5.83	34x30	12x16	30	12 x12 =12 round	55¼	1¼	1	60	30	37	4½	6	55	23	½
7	2,400	3,950	192.5	7.00	34x36	12x16	35	12 x12 =12 round	55¼	1½	1	66	36	43	4½	6	41	28	½
8	2,800	4,625	220.0	8.17	34x42	16x16	30	12 x12 =12 round	55¼	1½	1	72	42	49	4½	6	47	28	½
9	3,200	5,275	247.5	9.33	34x48	16x16	35	12⅛x15⅜=14 round	55¼	2	1	78	48	55	4½	6	53	28	½
10	3,600	5,950	275.0	10.50	34x54	16x16	40	12⅛x15⅜=14 round	55¼	2	1¼	84	54	61	4½	6	59	28	½
11	4,000	6,600	302.5	11.67	34x60	16x20	30	12⅛x15⅜=14 round	55¼	2	1¼	90	60	67	4½	6	65	28	½
12	4,400	7,250	330.0	12.83	34x66	16x20	35	12 x20 =16 round	55¼	2	1¼	96	66	73	4½	6	71	28	½
13	4,800	7,925	357.5	14.00	34x72	16x20	40	12 x20 =16 round	55¼	2	1¼	102	72	79	4½	6	77	28	½
14	5,200	8,575	385.0	15.17	34x78	16x20	45	12 x20 =16 round	55¼	2½	1¼	108	78	85	4½	6	83	28	½

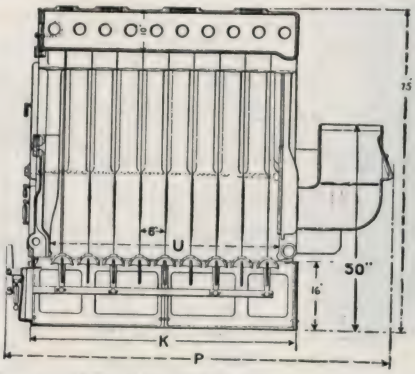
*For small sizes of coal or for deep beds of fuel higher chimneys are required.
†For diagram of ash pit see page 8.

No. 44 Mills Boiler (for public buildings such as libraries, schools, etc.)

Commercial Steam Ratings from 3600 to 9000 sq. ft. of Radiation

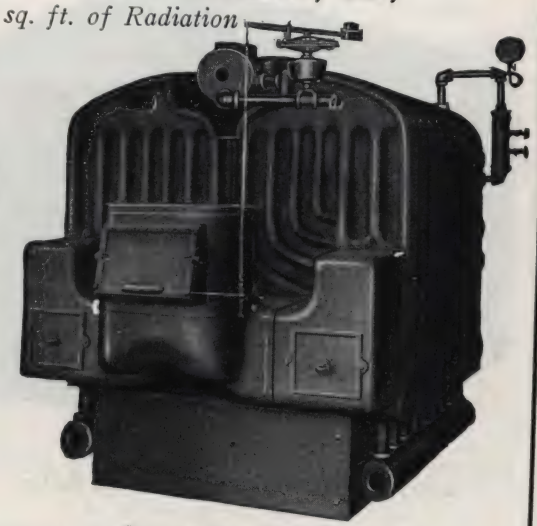


Front View



Longitudinal View

Important: Add 24 in. to dimension "P" for wall clearance



No. 44 Rear View—Steam
Interior view (see preceding page)

SIZES, CAPACITIES AND PRINCIPAL DIMENSIONS OF NO. 44 MILLS BOILER

Number of sections	Rating, ft. Steam	Rating, ft. Water	Heating surface sq. ft.	Grate area, sq. ft.	Nominal size of firepot, in.	*Recommended chimney sizes Diam., in.	*Recommended chimney sizes Height, ft.	Size of smoke pipe opening, in.	Height of water line, in.	Steam safety valve, in.	Water relief valve, in.	Dimensions (inches) of key letters on diagram P	U	K	Steam Z	Water Z	†Ash pit dimen., in. X	Y	Z
7	3,600	5,950	262	9.50	44x36	16x16	35	13x16⅜=15 round	58	2	1	72	36	43	6	8	41	38	½
8	4,200	6,925	298	11.10	44x42	16x20	35	13x16⅜=15 round	58	2	1¼	78	42	49	6	8	47	38	½
9	4,800	7,925	334	12.70	44x48	16x20	40	13x16⅜=15 round	58	2	1¼	84	48	55	6	8	53	38	½
10	5,400	8,900	370	14.25	44x54	16x20	45	13x22⅜=18 round	58	2½	1¼	90	54	61	6	8	59	38	½
11	6.000	9,900	406	15.80	44x60	20x20	35	13x22⅜=18 round	58	2½	1½	96	60	67	6	8	65	38	½
12	6,600	10,900	442	17.40	44x66	20x20	40	13x22⅜=18 round	58	2½	1½	102	66	73	6	8	71	38	½
13	7,200	11.875	478	19.00	44x72	20x24	35	15x24½=20 round	58	2½	1½	108	72	79	6	8	77	38	½
14	7,800	12.875	514	20.60	44x78	20x24	40	15x24½=20 round	58	3	1½	114	78	85	6	8	83	38	½
15	8,400	13,850	550	22.20	44x84	20x24	45	15x24½=20 round	58	3	1½	120	84	91	6	8	89	38	½
16	9 000	14.850	586	23.75	44x90	20x24	50	15x24½=20 round	58	3	1½	126	90	97	6	8	95	38	½

*For small sizes of coal or for deep beds of fuel, higher chimneys are required.
†For diagram of ash pit see page 8.

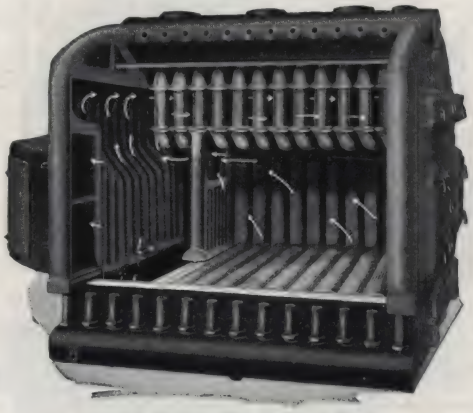
Continued on next page

BOILERS FOR STRICTLY ENGINEERING PURPOSES

A Few Factors Which Determine the Selection of the Proper Boiler

Many times in making a boiler selection numerous conditions other than the heating capacity required are not taken into consideration. Sometimes a boiler is desired which will give the maximum amount of heat in the shortest space of time at different periods and in the time between these periods only a small quantity may be required. This requires a different size boiler than where a medium amount of steady heat is required for the same amount of radiation. The kind of coal obtainable or possibly the suggestion of a cheaper type of coal to burn affects the type of boiler, grate, etc.

On account of our experience with the results of the use of these boilers under actual working conditions in all types of service we are in a position to offer constructive advice regarding the correct No. 42 or No. 60 boiler to select. For this reason it is always advisable before specifying either of these types to let us check selection after all conditions are taken into consideration.



No. 42 Smith Smokeless Boiler (grate reduced)

General Information on the No. 42 and the No. 60 Smith Smokeless Boilers

These two boilers are for use when a boiler of the greatest efficiency for its particular size is desired. On account of their large proportion of heating surface to grate area they obtain the greatest possible amount of absorbed heat per pound of fuel burned. In order to secure this efficiency many features have been incorporated in an overall "bigness" not found in the ordinary boiler.

This necessitates a small additional first cost which is soon absorbed by the saving in fuel. This has been proven in a great many instances where they have been tested side by side with other boilers under exactly the same conditions.

The No. 42 Smith Smokeless Boiler

In order to assure the purchaser the utmost in value, we prefer and will appreciate the opportunity to consult with the Architect or Engineer in regard to specifications and purchases of this boiler.

The No. 60 Smith Smokeless Boiler

This boiler may be used for the largest type of heating installation. The general conditions given above influence the selection of the size and use of this boiler. Ratings are given so as to show the architect the range of sizes rather than the actual connected loads which are in many cases much more than the published commercial ratings.

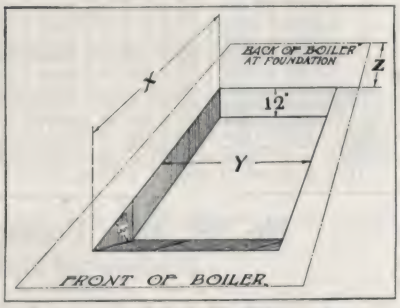
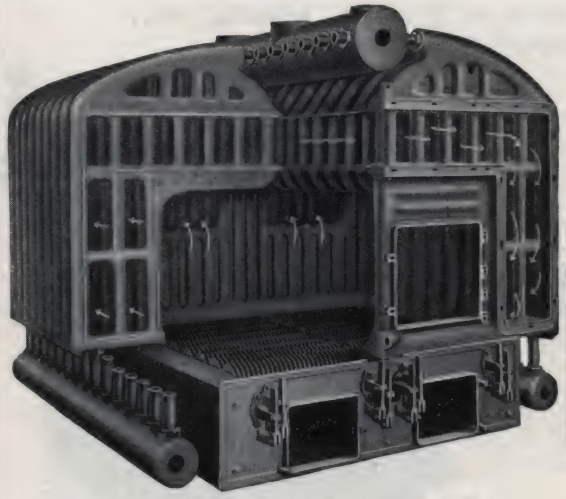
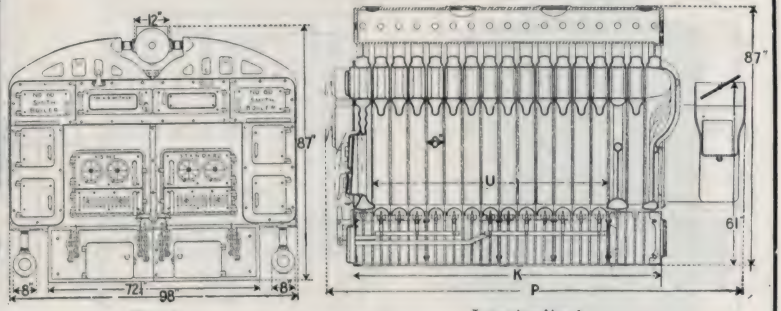


Diagram of Ash Pit Dimensions



Interior—No. 60 Smith Smokeless Boiler



Dimension Diagram No. 60 Boiler

Important: Add 24 in. to dimension "P" for wall clearance

SIZES, CAPACITIES AND PRINCIPAL DIMENSIONS OF NO. 60 SMITH SMOKELESS BOILERS

Number of sections	Rating, sq. ft.		Heating surface, sq. ft.	Grate area, sq. ft.	Nominal size of firepot, in.	Recommended chimney sizes		Height of water line, in.	Steam safety valve, in.	Dimensions (inches) of key letters on diagram			Ash pit dimensions, in.					
													No. 60 with grate full size and grate reduced			No. 60 with oxygen torch		
	Steam	Water				Diam., in.	Height, ft.			P	K	U	X	Y	Z	X	Y	Z
10	8,400	13,850	413	20.00	60x48	20x24	40	69	3	98	61	48	53	60	4½	.....	.....	.....
11	9,600	15,850	448	22.50	60x54	20x24	50	69	3	104	67	54	59	60	4½	.....	.....	.....
12	10,800	17,800	488	25.00	60x60	24x24	60	69	3½	110	73	60	65	60	4½	47	60	24
13	12,000	19,800	527	27.50	60x66	24x24	70	69	3½	116	79	66	71	60	4½	53	60	24
14	13,200	21,800	566	30.00	60x72	24x28	75	69	4	122	85	72	77	60	4½	59	60	24
15	14,400	23,750	602	32.50	60x78	28x28	85	69	4	128	91	78	83	60	4½	65	60	24
16	15,600	25,750	641	35.00	60x84	28x28	95	69	4½	134	97	84	89	60	4½	71	60	24
17	16,800	27,700	704	32.50	*60x78	28x28	105	69	4½	140	103	78	83	60	16½	71	60	30
18	18,000	29,700	743	35.00	*60x84	28x32	110	69	4½	146	109	84	89	60	16½	77	60	30
19	19,200	31,700	783	35.00	*60x84	28x32	115	69	4½	152	115	84	89	60	22½	83	60	30
20	20,400	33,650	822	35.00	*60x84	28x32	120	69	4½	158	121	84	89	60	28½	83	60	36

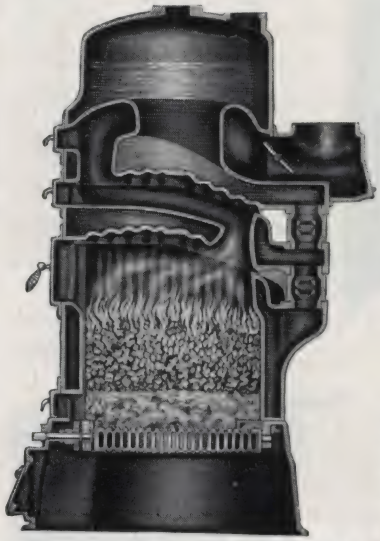
*Boilers shipped with grate reduced as indicated unless otherwise specified.

Continued on next page

H-B BOILERS—ROUND SECTIONAL, WITH AND WITHOUT THE SCARLET ENAMEL JACKET

H-B Boilers will last a generation and with a minimum of attention will conserve coal, gas or oil, and provide satisfactory heat. An automatically controlled air supply insures proper draft to a boiler whose grate, fuel capacity, concentrated heating surfaces, gas travel, and water circulation are properly proportioned and co-related.

For oil burner use the H-B is an exceptional round boiler because the large fire chamber assures almost perfect combustion. As oil burner operation is intermittent, a much greater number of heat units must be released in a given time than with coal as fuel. These heat units are rapidly absorbed in the H-B Boiler because of the more liberal fire surface employed in its design. Note from Fig. 1 how the maximum fire surface, consistent with free flow of the gases, is crowded into the H-B Boiler by making the burning gases travel horizontally around the large vertical waterways—a distance equal to more than three times the diameter of the boiler.



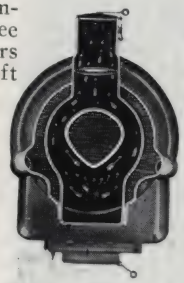
Horizontal Fire Travel and Large Vertical Water Ways

Selection of Proper Number H-B Boiler

H-B Boilers are made in two series with practically the same rated capacity. The selection is governed by whether buildings have average draft conditions or poor draft conditions. The table below gives the proper boiler as determined from the chimney sizes. From this table it will be seen that where poor draft conditions exist a low boiler is indicated and vice versa, for example:

A No. 317 H-B Boiler means three sections, 17-in. diameter firepot — three section high boilers are used where draft conditions are average.

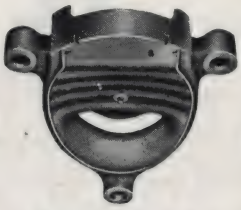
A No. 217 H-B Boiler means two sections, 17-in. diameter firepot—two section high boilers are used where draft conditions are poor.



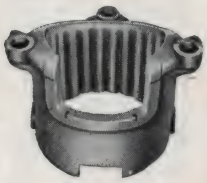
Section Through Dome
Arrows indicate fire travel

Bonnet Used on Boilers without Jackets

Dome Section Showing Crown Sheet



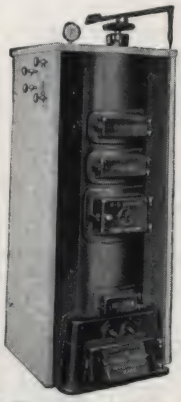
Intermediate Section
Boilers with numbers beginning with 3 (as 317) have the intermediate section



Fire Pot

The H-B Jacketed Boiler

This is the latest word in heating economy and beauty. Without sacrificing the distinctive engineering features which have made the H-B Boilers so favorably known we have added an efficient air cell asbestos cover which is enclosed by eighteen gauge sheet steel to assure its ruggedness. It is finished in Mountain Ash Scarlet by a double baking process and will not chip or fade.



The New H-B Jacketed Boiler

***COMMERCIAL RATINGS AND RECOMMENDED CHIMNEY SIZES FOR H-B BOILERS**

*Commercial ratings of H-B boilers					**Chimney sizes recommended	
Number of boiler	Area of grate, sq. ft.	Nominal diam. of fire pot, in.	Ratings, sq. ft.		For small sizes or deep beds of fuel, higher chimneys may be necessary	
			Steam	Water	Diam., in.	Height, ft.
For Installation Where Favorable Chimney Conditions Exist						
115	1.19	15	250	425	8x 8	25
317	1.43	17	375	625	8x 8	30
319	1.83	19	475	775	8x 8	30
321	2.25	21	550	900	8x 8	30
323	2.71	23	700†	1150	8x12	30
324	2.91	24	800	1325	8x12	30
327	3.77	27	1000	1650	8x12	35
For Installation Where Less Favorable Chimney Conditions Exist						
115	1.19	15	250	425	.....	.....
217	1.43	17	325	550	8x 8	25
219	1.83	19	425	700	8x 8	25
221	2.25	21	500	825	8x 8	30
223	2.71	23	600	1000	8x 8	30
224	2.91	24	650	1075	8x12	30
227	3.77	27	900	1500	8x12	30

*See first page of this catalogue for "Basis of Boiler Ratings."
**The draft of the chimney and sizes of coal used have a large effect on the efficiency of any boiler.

PRINCIPAL DIMENSIONS OF H-B BOILERS (INCHES)

Number of boiler	115	317	319	321	323	324	327	217	219	221	223	224	227
Total height of boiler, reg.	47	62¼	62¼	63½	63½	65½	65½	55¼	55¼	56½	56½	58	58
Total height of jacketed boilers.	.....	64¾	65⅜	67½	67½	68⅞	68⅞	57½	58⅛	59¾	59¾	61	61
Height of ash pit	12	12	12	12	12	14	14	12	12	12	12	14	14
Height of fire pot	.....	22½	22½	22½	22½	22	22	22½	22½	22½	22½	22	22
Height of intermediate sec.	.....	7	7	7	7	7½	7½	.....	.....	.....	.....	.....	.....
Height of dome	35	20¾	20¾	22	22	22	22	20¾	20¾	22	22	22	22
Height of water line	39½	56¾	56¾	56¾	56¾	58½	58½	49¾	49¾	49¾	49¾	51	51
Distance from floor to smoke pipe opening, reg.	35	49	49	49	49	51½	51½	42	42	42	42	44	44
Diam. of S. P. opening, reg.	6	7	7	8	8	8	8	7	7	8	8	8	8
Diam. of S. P. opening of jacketed boilers	.....	8	8	9	9	9	9	8	8	9	9	9	9
Length at floor of jacketed boilers	.....	29⅛	29⅛	36¾	36¾	40⅝	40⅝	29⅛	29⅛	36¾	36¾	40⅝	40⅝
Length at floor, reg.	25	25	27¾	29¾	32	35 1/16	38½	25	27¾	29¾	32	35 1/16	38½
Width at floor, reg.	24¾	24¾	27¼	29¼	31½	33 7/16	37	24¾	27¼	29¼	31½	33 7/16	37
Width at floor of jacketed boilers	.....	29⅞	29⅞	34	34	40	40	29⅞	29⅞	34	34	40	40
Outside diam. of fire pot	19	20½	22⅜	24⅝	26⅝	28¼	31¼	20½	22⅜	24⅝	26⅝	28¼	31¼
Outside diam. of intermediate section	.....	17	17	21	21	24	24	.....	.....	.....	.....	.....	.....
Outside diam. of dome	19	17	17	21	21	24	24	17	17	21	21	24	24

A Few Features of the H-B Boiler

Outside Water Ways and Connections—Outside water ways allow full diameter of fire box for fuel and combustion, and permit designer to make ample provision for circulation of water without encroaching upon fire box measurements. The H-B has three water ways between sections, insuring rapid circulation, quick heat and a steady water line. Outside connections assist in the ease of erection, remove joints from the intense heat of the direct fire and are always accessible.

Circulation—The H-B Boiler has an unique provision insuring perfect circulation that is found in no other round boiler. In other boilers the upward circulation of the water heated by the gases and the cooler water descending are circulated through the same connections. This results in back pressure, retarded circulation, slow transmission of heat and an unsteady water line. In the H-B, in connecting the intermediate section to the fire pot section the rear connection is made at a point below the top of the fire pot section, while the side connections are taken from the top of the section. Similarly in connecting the dome section to the intermediate section the rear connections are made at a point below the top of the intermediate section, while the side connections are taken from the top of the section. The result is that the heated water, rising to the top of each section, circulates upward through the side connections and the cooler water descending circulates downward through the rear connection. This perfect circulation results in rapid transmission of heat and this feature of the H-B means much on a cold day when it is desirable to raise temperatures rapidly.

Horizontal Fire Travel with Diving Flue—Retards gases, giving opportunity for absorption of heat by the water backed surfaces and results in extremely low chimney temperatures. The heat goes into the system.

Automatic Damper Control—Operates the check draft and the draft door in the ashpit. It is controlled by a weight that slides on a rod and is easily adjusted to any desired pressure.

Intermediate Section—The capacity of an H-B Boiler may be increased by the addition of an intermediate section. Note that even the surfaces of the intermediate sections are corrugated to obtain the maximum surface.

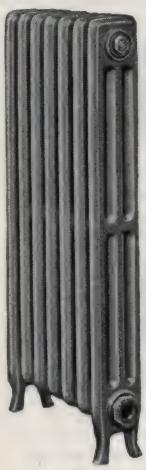
Continued on next page

THE SMITH "144" RADIATORS

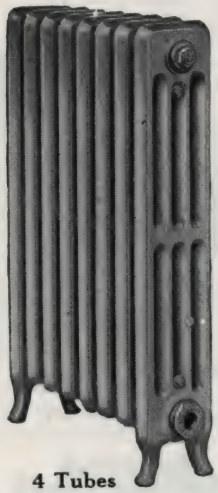
The "144" Radiator is an attractive design which conforms with the new ideas of modern interior decoration. It has lightness and slender quality of appearance quite different from the older type radiator. The new beauty has been obtained, however, without sacrificing efficiencies. It has been subjected for several years to careful and exhaustive engineering tests, the same as all H. B. Smith products.

All Radiators Tested Before Shipment

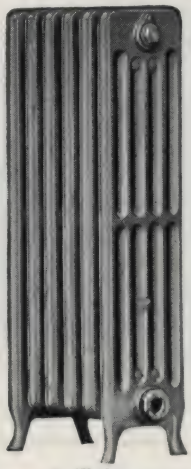
All assembled radiators are thoroughly tested before shipment, leaving nothing undone to assure the architect and steamfitter that there will be no leaky joints in the radiator to cause trouble after installation.



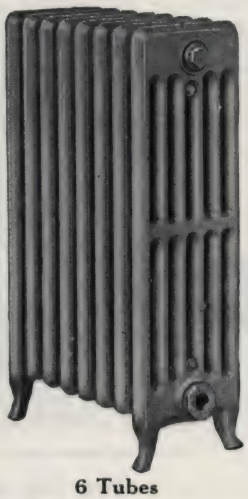
3 Tubes



4 Tubes



5 Tubes

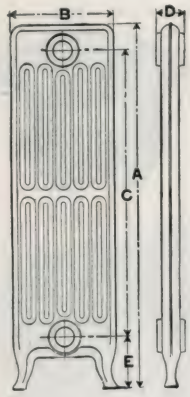


6 Tubes

The following is the actual sq. ft. per section in the "144" radiator. The table at the bottom of the page gives commercial rating.

ACTUAL SQ. FT. PER SECTION

Style tube	Height, in.	Sq. ft. per sec.
3	37	3
	32	2½
	25	2
	21	1½
4	37	4
	32	3⅛
	25	2½
	21	2
5	37	5⅛
	32	4¼
	25	3¼
	21	2½
6	37	6
	32	5
	25	3¾
	21	3
	14	2



DIMENSIONS IN INCHES

A	B	C	D	E*	Height legless
Three Tubes					
37	4 21/32	30 11/32	2½	4½	34 5/16
32	4 21/32	24 15/16	2½	4½	28 7/8
25	4 21/32	18 3/16	2½	4½	22 1/8
21	4 21/32	14 3/64	2½	4½	18
Four Tubes					
37	6	30 11/32	2½	4½	34 5/16
32	6	24 15/16	2½	4½	28 7/8
25	6	18 3/16	2½	4½	22 1/8
21	6	14 3/64	2½	4½	18
Five Tubes					
37	8	30 11/32	2½	4½	34 5/16
32	8	24 15/16	2½	4½	28 7/8
25	8	18 3/16	2½	4½	22 1/8
21	8	14 3/64	2½	3	18
Six Tubes					
37	9 1/8	30 11/32	2½	4½	34 5/16
32	9 1/8	24 15/16	2½	4½	28 7/8
25	9 1/8	18 3/16	2½	4½	22 1/8
21	9 1/8	14 3/64	2¼	4½	18
14	9 1/8	8 25/32	2 1/16	3	12¾

*Regularly furnished.

Tappings for "144" Radiators

All "144" Radiators are tapped 1½ in. at top and 2 in. at bottom, both ends. Tappings are bushed as shown in the table unless otherwise ordered. When "144" Radiators are ordered for special systems, specific instructions should be given as to tapping for supply, return and vent.

REGULAR TAPPING

Size radiator, ft.	Steam, 2 pipe	Water	Size radiator, ft.	Steam, 1 pipe
Up to 50	1 x ¾	1 x1	Up to 30	1
50 to 120	1¼x1	1¼x1¼	30 to 60	1¼
Over 120	1½x1¼	1½x1½	60 to 120	1½
			Over 120	2
Air valve	⅛	⅛	Air valve	⅛

Special Notice—If radiators are required tapped top and bottom same end, or top and bottom opposite ends, so specify on order. Be sure to specify if top tapping is required. All tappings will be made *right hand* unless otherwise specified.

Can be supplied on special order with 6-in. legs or without legs. No other special legs can be supplied. This does not apply to 14-in. 6 tubes.

No. 10 Bracket

TABLE OF COMMERCIAL CAPACITIES FOR THE "144" RADIATOR

Sections	Total length ft.	Total length in.	Three Tubes 37″ 3½-ft. sec.	32″ 3-ft. sec.	25″ 2⅛-ft. sec.	21″ 1¾-ft. sec.	Four Tubes 37″ 4¼-ft. sec.	32″ 3½-ft. sec.	25″ 2¾-ft. sec.	21″ 2¼-ft. sec.	Five Tubes 37″ 5-ft. sec.	32″ 4⅛-ft. sec.	25″ 3½-ft. sec.	21″ 2⅝-ft. sec.	Six Tubes 37″ 6-ft. sec.	32″ 5-ft. sec.	25″ 4-ft. sec.	21″ 3-ft. sec.	14″ 2½-ft. sec.
3	0	7½	10½	9	7	5¼	12¾	10½	8¼	6¾	15	13	10½	8	18	15	12	9	7½
4	0	10	14	12	9⅛	7	17	14	11	9	20	17⅓	14	10⅔	24	20	16	12	10
5	1	½	17½	15	11⅜	8¾	21¼	17½	13¾	11¼	25	21⅔	17½	13⅓	30	25	20	15	12½
6	1	3	21	18	14	10½	25½	21	16½	13½	30	26	21	16	36	30	24	18	15
7	1	5½	24½	21	16⅛	12¼	29¾	24½	19¼	15¾	35	30⅓	24½	18⅔	42	35	28	21	17½
8	1	8	28	24	18⅜	14	34	28	22	18	40	34⅔	28	21⅓	48	40	32	24	20
9	1	10½	31½	27	21	15¾	38¼	31½	24¾	20¼	45	39	31½	24	54	45	36	27	22½
10	2	1	35	30	23⅛	17½	42½	35	27½	22½	50	43⅓	35	26⅔	60	50	40	30	25
11	2	3½	38½	33	25⅜	19¼	46¾	38½	30¼	24¾	55	47⅔	38½	29⅓	66	55	44	33	27½
12	2	6	42	36	28	21	51	42	33	27	60	52	42	32	72	60	48	36	30
13	2	8½	45½	39	30⅛	22¾	55¼	45½	35¾	29¼	65	56⅓	45½	34⅔	78	65	52	39	32½
14	2	11	49	42	32⅝	24½	59½	49	38½	31½	70	60⅔	49	37⅓	84	70	56	42	35
15	3	1½	52½	45	35	26¼	63¾	52½	41¼	33¾	75	65	52⅓	40	90	75	60	45	37½
16	3	4	56	48	37⅛	28	68	56	44	36	80	69⅓	56	42⅔	96	80	64	48	40
17	3	6½	59½	51	39⅔	29¾	72¼	59½	46¾	38¼	85	73⅔	59½	45⅓	102	85	68	51	42½
18	3	9	63	54	42	31½	76½	63	49½	40½	90	78	63	48	108	90	72	54	45
19	3	11½	66½	57	44⅓	33¼	80¾	66½	52¼	42¾	95	82⅓	66½	50⅔	114	95	76	57	47½
20	4	2	70	60	46⅔	35	85	70	55	45	100	86⅔	70	53⅓	120	100	80	60	50
21	4	4½	73½	63	49	36¾	89¼	73½	57¾	47¼	105	91	73½	56	126	105	84	63	52½
22	4	7	77	66	51⅓	38½	93½	77	60½	49½	110	95⅓	77	58⅔	132	110	88	66	55
23	4	9½	80½	69	53⅔	40¼	97¾	80½	63¼	51¾	115	99⅔	80½	61⅓	138	115	92	69	57½
24	5	0	84	72	56	42	102	84	66	54	120	104	84	64	144	120	96	72	60
25	5	2½	87	75	58⅓	43¾	106¼	87	68¾	56¼	125	108⅓	87½	66⅔	150	125	100	75	62½
26	5	5	91	78	60⅔	45½	110½	91	71½	58½	130	112⅔	91	69⅓	156	130	104	78	65
27	5	7½	94½	81	63	47¼	114¾	94½	74¼	60¾	135	117	94½	72	162	135	108	81	67½
28	5	10	98	84	65⅓	49	119	98	77	63	140	121⅓	98	74⅔	168	140	112	84	70
29	6	½	101½	87	67⅔	50¾	123¼	101½	79¾	65¼	145	125⅔	101½	77⅓	174	145	116	87	72½
30	6	3	105	90	70	52⅓	127⅓	105	82⅓	67½	150	130	105	80	180	150	120	90	75

Continued on next page

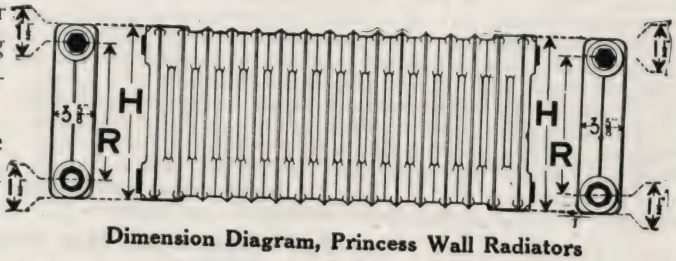
PRINCESS WALL RADIATORS FOR ALL PLACES WHERE DIRECT RADIATORS OR PIPE COILS CAN NOT BE USED

Especially desirable in locations where floor space is valuable and where wall, column or ceiling space is more available. They possess extreme flexibility of size and arrangement.

Made in two heights: 15 and 22 in. Can be furnished with heating surface from 5 sq. ft. up, in multiples of 2½ sq. ft. Corresponding lengths in 22-in. radiator are from 9 in. up, in multiples of 4 in. (1 in. allowed in over-all length for plugs and bushings). In the 15-in. radiator, corresponding lengths are from 13 in. up in multiples of 6 in.

By combinations of the two heights, these radiators can be arranged in tiers, either for horizontal runs or for column work. Hung horizontally, they make excellent ceiling radiators.

For water, Princess wall radiators have nipple connections between groups. For steam, the top connection at intervals is a plug instead of a nipple.



Dimension Diagram, Princess Wall Radiators

	15-in. radiator	22-in. radiator
H—Total height .....in.	14 9/16 in.	21 11/16 in.
R—Center to center of tapping....in.	11 9/16 in.	18 11/16 in.

Width of radiator 3⅝ in.
Radiator 15 in. high—6 in. in length = 2½ ft. surface.
Radiator 22 in. high—4 in. in length = 2½ ft. surface.
Plugs and bushings (1 in.) included in total length of radiator.

Princess Wall Radiator Tappings

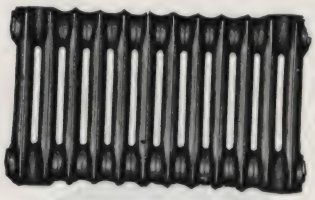
Steam, Two-pipe Work	Inches
Radiators of 50 ft. and smaller	1 x ¾
Radiators larger than 50 ft. and smaller than 120 ft.	1¼x1
Radiators of 120 ft. and larger	1½x1¼
Air valves	⅛

Steam, One-pipe Work	
Radiators of 30 ft. and smaller	1
Radiators larger than 30 ft. and smaller than 60 ft.	1¼
Radiators of 60 ft. and larger	1½
Air valve	⅛

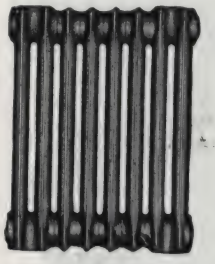
Water	
Radiators of 50 ft. and smaller	1 x1
Radiators larger than 50 ft. and smaller than 120 ft.	1¼x1¼
Radiators of 120 ft. and larger	1½x1½
Air valve	⅛ in. top plug

Special Note: Radiators will be tapped for two-pipe work unless otherwise specified.

For water, and for two-pipe steam work, radiators 2, 4, or 6 units high are tapped top and bottom same end. Radiators 3, 5, or 7 units high are tapped top and bottom opposite ends.



15-in. Princess Radiator
10 sq. ft. of radiation



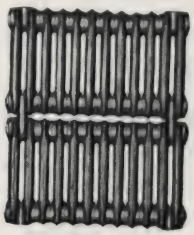
22-in. Princess Radiator
10 sq. ft. of radiation

End View

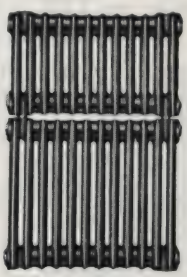
RADIATING SURFACE

15-in. radiator		22-in. radiator	
Length, ft. in.	Sq. ft. of surface	Length, ft. in.	Sq. ft. of surface
1—1	5	0—9	5
1—7	7½	1—1	7½
2—1	10	1—5	10
2—7	12½	1—9	12½
3—1	15	2—1	15
3—7	17½	2—5	17½
4—1	20	2—9	20
4—7	22½	3—1	22½
5—1	25	3—5	25
5—7	27½	3—9	27½
6—1	30	4—1	30
6—7	32½	4—5	32½
7—1	35	4—9	35
7—7	37½	5—1	37½
8—1	40	5—5	40
8—7	42½	5—9	42½
9—1	45	6—1	45
9—7	47½	6—5	47½
10—1	50	6—9	50
10—7	52½	7—1	52½
11—1	55	7—5	55
11—7	57½	7—9	57½
12—1	60	8—1	60
12—7	62½	8—5	62½
13—1	65	8—9	65
13—7	67½	9—1	67½
14—1	70, 72½	9—5	70
14—7	72½	9—9	72½
15—1	75	10—1	75

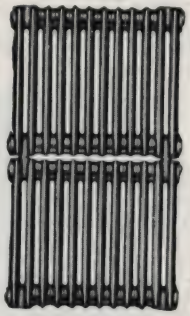
Steam radiators can not be used for water; water radiators can (but should not) be used for steam.



20-ft. Radiator
2 Tiers High

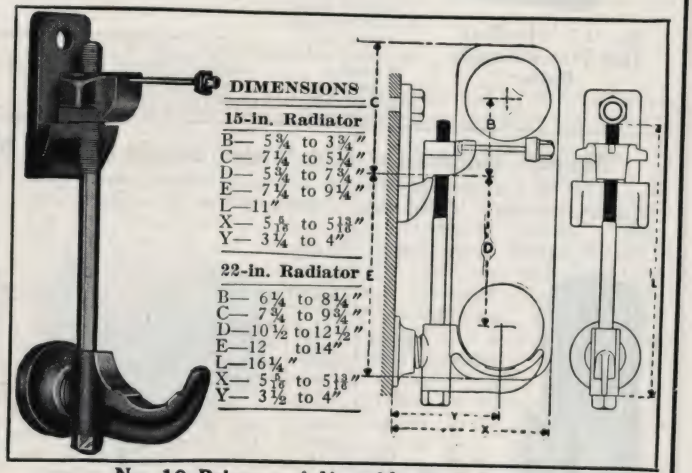


25-ft. Radiator
2 Tiers High



30-ft. Radiator
2 Tiers High

Princess Wall Radiator Combinations



No. 10 Princess Adjustable Wall Bracket

Continued on next page

DOMESTIC HOT WATER SUPPLY BOILERS

Laboratory tests coupled with a practical survey of household needs have shown that, if the temperature of water in a storage tank be raised 100° Fahrenheit above the intake temperature, the resultant water will fulfill the requirements of the most exacting user. Furthermore, it has been determined that the amount so heated should be completely replenished by an equal amount, equally heated, on any average installation not oftener than every six hours during the daytime period of greatest demand.

The H. B. Smith Company Boilers have all been tested on the above basis and are rated at the point where they exactly meet these requirements; for instance, the 110 Hy-Test, rated at 40 gal., will keep water in a 40 gal. tank constantly at a temperature 100° F. above the intake temperature when water is being continuously withdrawn at a uniform rate totaling one tank full each six hours, at the same time consuming 17 lb. of coal each 18.1 hours. The 10 sec. No. 24 Hy-Test will do precisely the same for 3000 gal. when consuming 394 lb. of coal each 8.3 hours.

As these instances and all figures in the tables are based upon the high consuming day rate, it can readily be seen, over a period of time including low consuming periods, that the coal used per hour will average less, and that the firing period will be longer than the published rate figures.

Subject only to capacity limitations the number of gallons raised 100° F. per hour is dependent directly on the coal consumption rate or firing periods. Both "Hy-Test" and "Menlo" Hot Water Supply Boilers are so rated that in each case the firing periods are of a length both suitable and convenient for the particular type of boiler under consideration.

"Hy-Test" Boilers for Hot Water Supply in Any Quantities

These hot water supply boilers are so named because they are subjected to 300 lb. hydrostatic pressure test. They are made in sizes suitable for installation in small or large homes, hotels, apartment houses and other public buildings. For small homes a special round dome type with firebrick-lined firepot is used and for the larger installations a design similar to the famous Mills Heating Boiler.

Data for "Hy-Test" Boilers for capacities up to 3000 gal. are given on this page. For capacities up to 12,000 gal. we can furnish on special order Nos. 34 and 44 Boilers (tested up to 200 lb. hydrostatic pressure). These boilers are illustrated on Plate 2.

No. 110 with Regulator
Shipped on order

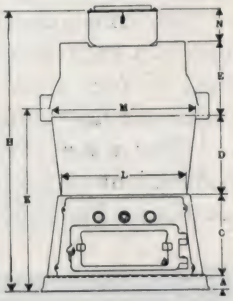
NOS. 110 AND 113 "HY-TEST" HOT WATER SUPPLY BOILERS

Rated tank cap., gal.		Grate area, sq. ft.		Tested hydrostatic pressure, lb.	
No. 110	No. 113	No. 110	No. 113	No. 110	No. 113
40	80	0.360	0.645	300	300

DIMENSIONS (inches) OF NOS. 110 AND 113 "HY-TEST" BOILERS

		No. 110	No. 113
A.	Height of floor plate	1 3/4	1 3/4
C.	Height of ashpit	8 3/4	8 3/4
D.	Height of firepot section	8 1/2	8 1/2
E.	Height of dome	6 1/4	7 7/8
N.	Height from top tapping to top of smoke bonnet	37/8	33/4
M.	Outside diam. of dome	12 5/8	15 3/8
L.	Outside diam. of firepot at base	10 1/2	13 1/2
H.	Total height	29	30 1/2
K.	Height to center of side tapping	19 3/8	19 7/8
	Diam. of ashpit at base	13 5/8	16 5/8
	Size of tappings	1	1 1/2

Size of stove pipe opening, 3x6 in.

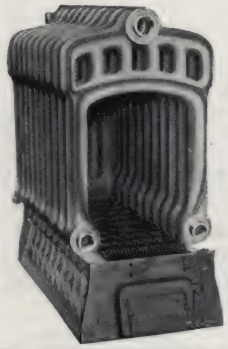


NOS. 17 AND 24 "HY-TEST" BOILER DATA

Number of sections	Size of firepot, in.	Fuel surface, sq. ft.	**Rating in gal.	*Recommended chimney sizes		Diam. smoke pipe, in.
				Diam., in.	Height, ft.	
No. 17—Commercial Rating and Chimney Recommendations						
4	18x12	1.5	450	8x 8	30	8
5	18x16	2.0	600	8x 8	30	8
6	18x20	2.5	750	8x 8	35	8
7	18x24	3.0	900	8x 8	35	8
8	18x28	3.5	1050	8x 8	40	8
9	18x32	4.0	1200	8x10	40	8
10	18x36	4.5	1350	8x10	45	8
No. 24—Commercial Ratings and Chimney Recommendations						
5	23x24	3.85	1200-1500	8x12	25	9
6	23x30	4.80	1500-1800	8x12	30	9
7	23x36	5.75	1800-2100	12x12	25	10
8	23x42	6.70	2100-2400	12x12	30	10
9	23x48	7.65	2400-2700	12x12	35	12
10	23x54	8.60	2700-3000	12x16	35	12

*For small sizes of coal or for deep beds of fuel higher chimneys are recommended.

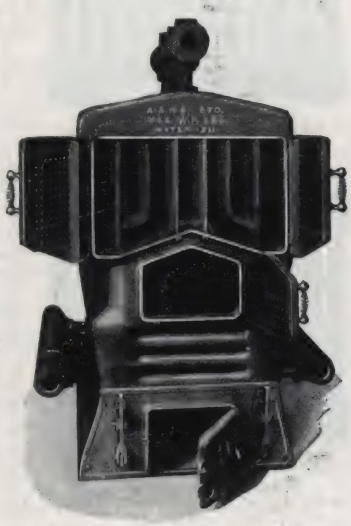
**For "Basis of Boiler Rating" see our first page.



No. 17 "Hy-Test" Hot Water Supply Boiler

PRINCIPAL DIMENSIONS OF NOS. 17 AND 24 BOILERS

	No. 17	No. 24
Width at foundation, in	23	29
Width of boiler, in	24 1/2	48
Height of boiler, in	50 1/2	66
Length of boiler:		
4 section, in	29 1/4	.....
For each additional section add, in	4	.....
5 section	.....	48
For each additional section add, in	.....	6
Floor to center of smoke pipe, in	40 1/4	38



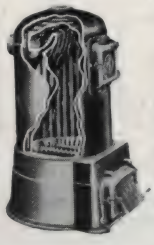
No. 24 "Hy-Test" Hot Water Supply Boiler

"Menlo" Boilers for Hot Water Supply Where Rated Tank Capacities are 125, 175 and 250 gal.

This is a reasonably priced hot water supply boiler for installation where rated tank capacities are 125, 175 or 250 gal.

Conforms to A.S.M.E. Standards for the round dome type of hot water supply boiler and satisfies all safety requirements.

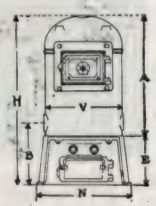
Will supply hot water within its tank capacity limits without failure and at low cost per gallon.



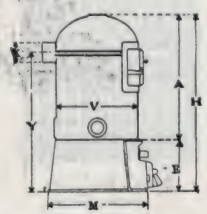
"MENLO" HOT WATER SUPPLY BOILERS

Boiler No.	Rated tank cap., gal.	Firepot and grate diam., in.	Tested hydrostatic pressure lb.	Max. working pressure lb.	*Periods of firing, hr.	Dimensions in inches							
						A	E	H	M	N	V	X	Y
10	125	10	200	80	7.4	24	9 1/2	33 1/2	18 1/4	18 1/4	15	5	26 1/4
12	175	12	175	70	7.4	25 1/2	9 1/2	35	20 3/4	20 3/4	17 1/2	5	27 1/4
14	250	14	150	60	9.1	27	12	39	25	24 3/4	20	6	31 1/8

*This figure is when using rated tank capacity. When less is used length of firing period increases proportionately.



Front Elevation



Side Elevation

ESTABLISHED 1850

THE THATCHER COMPANY

TELEPHONES
MULBERRY 4-4480 (Newark)
MURRAY HILL 4072 (New York)

39-41 St. Francis Street, NEWARK, N. J.

PLANTS
NEWARK, N. J.
GARWOOD, N. J.

SALES OFFICES
NEW YORK, N. Y., 21 W. 44th Street
PHILADELPHIA, PA., 1004 So. 15th Street
CHICAGO, ILL., 341 No. Clark Street

Products

THATCHER STEAM and HOT WATER HEATING BOILERS—Round, "Progress" Square Sectional, "Elite" Red Enamel Jacketed, and "Red Hot" Enamel Jacketed Types; Gas Fired Boilers; Self Feed Boilers.

THATCHER "GOTHIC" RADIATORS for Steam and Hot Water.

THATCHER COAL and GAS RANGES; WARM AIR FURNACES; HOT WATER SUPPLY BOILERS; GARAGE HEATING SYSTEMS; HIGH PRESSURE TANK HEATERS.

Thatcher Round Boiler (New Series)

For steam or hot water heating. Made in nineteen sizes with rated capacities from 275 to 1700 sq. ft. of steam radiation and 500 to 2950 sq. ft. of water radiation. Especially adaptable for oil burner purposes.

What the Architect May Expect from the New Thatcher Round Boiler—The extensive knowledge and wide experience accumulated during 80 years of continuous manufacture of high grade heaters has produced the New Thatcher Round Boiler. Each individual feature has been thoroughly tested separately, as well as assembled, before it was put on the market and the architect may expect a properly designed and practical boiler with:

First—Greatly increased prime heating surfaces and fire travel to produce almost instantaneous heat at remarkably low fuel expenditure.

Second—Greatly increased coal carrying capacity by employing extra depth of fire pot. This increases the time between firing periods, and conserves fuel by slowly driving off all volatile gases so that they may be completely consumed.

Third—Erection so simplified that the savings in time required to install the New Thatcher Round Boiler will reduce the initial cost to the owner.

Construction Details—The following contribute to the above features:

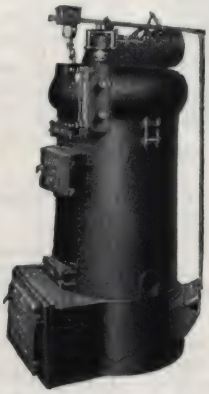
Crown Sheet—A special feature is the casting of a crown sheet, or intermediate section, in the top of the fire pot above the direct rays of the fire. This allows contact of the water over the hottest part of the fire, expediting circulation and quick heating.

Boiler Section—Design causes the flames and hot gases to "mushroom" between sections and pass over every part of each section.

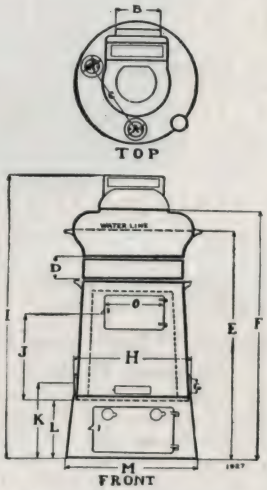
Regulator—Of the Sylphon type.

Ratings—The ratings of the new series are based on exhaustive tests under actual normal firing conditions and show unusual efficiency of operation and economy of fuel.

Fire Travel and Water Circulation



Automatic Draft Door Placed in Rear of Base



Dimension Diagram

RATINGS AND DIMENSIONS OF THATCHER ROUND BOILERS

*Boiler No.	Steam boiler rating, sq. ft.	Water boiler rating, sq. ft.	Grate area, sq. ft.	Coal cap., lb.	Dimensions covering both steam and water boilers, in.																		
					A		B	C		D	E	F		G	H	I		J	K	L	M	O
					Steam	Water		Steam	Water			Steam	Water			Steam	Water						
117	350	600	1.39	133	1–2 1/2	2–2 1/2	8	0	18 5/8	0	42 1/4	48 1/4	44 1/4	2–2 1/2	19 3/4	57 1/4	53 1/4	21	14 3/4	12	23 3/4	10
217	400	700	1.39	133	1–2 1/2	2–2 1/2	8	0	18 5/8	5	47 1/4	53 1/4	49 1/4	2–2 1/2	19 3/4	62 1/4	58 1/4	21	14 3/4	12	23 3/4	10
317	450	800	1.39	133	1–2 1/2	2–2 1/2	8	0	18 5/8	9	51 1/4	57 1/4	53 1/4	2–2 1/2	19 3/4	66 1/4	62 1/4	21	14 3/4	12	23 3/4	10
119	500	900	1.77	148	1–3	2–3	8	0	20 1/2	0	43 1/2	49 1/2	45 1/4	2–2 1/2	21 3/4	58 1/2	54 1/4	22	14 3/4	12	25	11
219	600	1000	1.77	148	1–3	2–3	8	0	20 1/2	5	48 1/2	54 1/2	50 1/4	2–2 1/2	21 3/4	63 1/2	59 1/4	22	14 3/4	12	25	11
319	650	1100	1.77	148	1–3	2–3	8	0	20 1/2	9	52 1/2	58 1/2	54 3/4	2–2 1/2	21 3/4	67 1/2	63 1/4	22	14 3/4	12	25	11
120	700	1200	2.18	190	1–3	2–3	8	0	20	0	45 1/4	51 1/4	46 1/2	2–3	23 3/4	60 1/4	55 1/2	23 1/4	14 3/4	12	28	12
220	800	1300	2.18	190	1–3	2–3	8	0	20	5	50 1/4	56 1/4	51 1/2	2–3	23 3/4	65 1/4	60 1/2	23 1/4	14 3/4	12	28	12
320	850	1400	2.18	190	1–3	2–3	8	0	20	9	54 1/4	60 1/4	55 1/2	2–3	23 3/4	69 1/4	64 1/2	23 1/4	14 3/4	12	28	12
123	950	1500	2.90	265	2–4	2–4	9	20 1/2	23	0	47 1/2	53 1/2	48 3/4	2–3	26 3/4	63	58 1/4	24 1/2	15 3/4	13	30 1/2	13
223	1050	1650	2.90	265	2–4	2–4	9	20 1/2	23	5	52 1/2	58 1/2	53 3/4	2–3	26 3/4	68	63 1/4	24 1/2	15 3/4	13	30 1/2	13
323	1100	1800	2.90	265	2–4	2–4	9	20 1/2	23	9	56 1/2	62 1/2	57 3/4	2–3	26 3/4	72	67 1/4	24 1/2	15 3/4	13	30 1/2	13
126	1200	1950	3.69	355	2–4	2–4	9	21 3/4	24 1/2	0	48	54	49 1/4	2–4	29 3/4	63 1/2	58 3/4	25	16 1/4	13	33 3/4	14 1/2
226	1300	2150	3.69	355	2–4	2–4	9	21 3/4	24 1/2	5	53	59	54 1/4	2–4	29 3/4	68 1/2	63 3/4	25	16 1/4	13	33 3/4	14 1/2
326	1400	2350	3.69	355	2–4	2–4	9	21 3/4	24 1/2	9	57	63	58 1/4	2–4	29 3/4	72 1/2	67 3/4	25	16 1/4	13	33 3/4	14 1/2
129	1500	2550	4.55	445	2–4	2–4	10	23 1/2	26 1/2	0	49 1/2	55 1/2	51	2–4	32 3/4	66	61 1/2	25 1/2	17 1/4	14	37	16
229	1600	2750	4.55	445	2–4	2–4	10	23 1/2	26 1/2	5	54 1/2	60 1/2	56	2–4	32 3/4	71	66 1/2	25 1/2	17 1/4	14	37	16
329	1700	2950	4.55	445	2–4	2–4	10	23 1/2	26 1/2	9	58 1/2	64 1/2	60	2–4	32 3/4	75	70 1/2	25 1/2	17 1/4	14	37	16

*To designate steam boiler, add—S to boiler No.; to designate water boiler, add—W to boiler No.

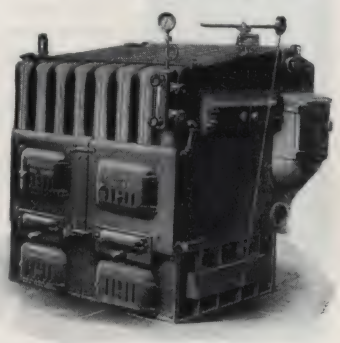
"Progress" Boilers, Single and Twin

The basic principle of triangular shaped sections, embodied in the design of all "Progress" boilers, is primarily responsible for their remarkable efficiency during their many years of manufacture. This design provides:

(1) The lowest practical water line on the market;
(2) perfect water circulation;
(3) triple fire travel.

Triple Fire Travel—The construction of the sections causes the flames and hot gases to pass three times through the entire length of the boiler, and to completely surround the water tubes, before escaping into the smoke flue.

Water Circulation—Thermo-siphon principle provides rapid, unobstructed circulation.



Single Steam Boiler

Ease of Firing and Cleaning—Side feed construction and several feed doors, insure easy firing and cleaning and economy of fuel.

Low Water Line—48 in. in the smaller and 55 in. in the larger boilers eliminate the objectionable boiler pit.

Grate—All shaker connections are in the rear outside of ash pit. Eliminate clogging and warping of grates.

Triangular Shaped Section and Triple Fire Travel

Economy of Twin Boilers—For large buildings, cost less to install than two single boilers; radiation losses are less; floor space is saved; either half may be used independently. For very large capacities, twin boilers give excellent results erected in battery or in connection with a fan or ventilating system.

Ratings—Following conditions should be maintained at the boiler: steam, 2 lb. pressure; hot water, 180°.

Continued on next page

RATINGS AND DIMENSIONS OF "PROGRESS" BOILERS (SINGLE AND TWIN)
S—Steam W—Water T—Twin

Steam Boiler No.	Steam Boiler Radiation, sq. ft.	Flows, number and size, in.	Returns, number and size, in.	Grate area, sq. ft.	Number of feed doors	Water boiler No.	Water boiler Radiation, sq. ft.
52-S	1500	2-4	2-4	6.81	1	52-W	2500
62-S	2000	2-4	2-4	8.30	2	62-W	3350
72-S	2600	2-4	2-4	9.78	2	72-W	4300
82-S	3200	2-4	2-4	11.27	2	82-W	5250
92-S	3800	2-4	2-4	12.75	2	92-W	6200
102-S	4400	2-4	2-4	14.24	2	102-W	7150
64-S	3400	2-5	2-5	11.53	2	64-W	5600
74-S	4200	2-5	2-5	13.59	2	74-W	6900
84-S	5000	2-5	2-5	15.65	2	84-W	8200
94-S	5800	2-5	2-5	17.71	2	94-W	9500
104-S	6800	2-5	2-5	19.77	2	104-W	11150
114-S	7800	2-5	2-5	21.83	3	114-W	12800
124-S	8800	2-5	2-5	23.89	4	124-W	14450
134-S	9800	2-5	2-5	25.95	4	134-W	16100
144-S	10800	2-5	2-5	28.01	4	144-W	17750
112T-S	3500	6-3 & 4	4-3 & 4	15.11	3	112T-W	5850
122T-S	4000	6-3 & 4	4-3 & 4	16.60	4	122T-W	6700
132T-S	4600	6-3 & 4	4-3 & 4	18.08	4	132T-W	7650
142T-S	5200	6-3 & 4	4-3 & 4	19.57	4	142T-W	8600
152T-S	5800	6-3 & 4	4-3 & 4	21.05	4	152T-W	9550
162T-S	6400	6-3 & 4	4-3 & 4	22.54	4	162T-W	10500
172T-S	7000	6-3 & 4	4-3 & 4	24.02	4	172T-W	11450
182T-S	7600	6-3 & 4	4-3 & 4	25.51	4	182T-W	12400
192T-S	8200	6-3 & 4	4-3 & 4	26.99	4	192T-W	13350
154T-S	9200	6-4 & 5	4-4 & 5	29.24	4	154T-W	15100
164T-S	10000	6-4 & 5	4-4 & 5	31.30	4	164T-W	16400
174T-S	10800	6-4 & 5	4-4 & 5	33.36	4	174T-W	17700
184T-S	11600	6-4 & 5	4-4 & 5	35.42	4	184T-W	19000
194T-S	12600	6-4 & 5	4-4 & 5	37.48	4	194T-W	20650
204T-S	13600	6-4 & 5	4-4 & 5	39.54	4	204T-W	22300
214T-S	14600	6-4 & 5	4-4 & 5	41.60	5	214T-W	23950
224T-S	15600	6-4 & 5	4-4 & 5	43.66	6	224T-W	25600
234T-S	16600	6-4 & 5	4-4 & 5	45.72	7	234T-W	27250
244T-S	17600	6-4 & 5	4-4 & 5	47.78	8	244T-W	28900
254T-S	18600	6-4 & 5	4-4 & 5	49.84	8	254T-W	30550
264T-S	19600	6-4 & 5	4-4 & 5	51.90	8	264T-W	32200
274T-S	20600	6-4 & 5	4-4 & 5	53.96	8	274T-W	33850
284T-S	21600	6-4 & 5	4-4 & 5	56.02	8	284T-W	35500
294T-S	22600	6-4 & 5	4-4 & 5	58.08	8	294T-W	37150

DIMENSIONS, SINGLE SERIES BOILERS*

No.	A	B	C	D	E	F	H	J	K	L	M	P	S	T	V	Z
28 Series	46	55	30	48	35	42	19¾	16	11	See Table below			7¼	12	10⅜	6¼
40 Series	64	64	42	55	35	60	19¾	16	11				7¼	18	10⅜	16¼

No.	52	62	72	82	92	102	74	84	94	104	114	124	134	144
L	54½	61¾	69	76¼	83½	90¾	73	80¼	87½	94¾	102	109¼	116½	123¾
M	30½	37¾	45	52¼	59½	66¾	15	52¼	59½	66¾	74	81¼	88½	95¾
P	36¼	43½	50⅜	58	65½	72½	50⅜	58	65¼	72½	79⅜	87	94¼	101½

*Example: Length of a No. 204T-S boiler is twice that of a No. 104-S, plus 7¼ in. for dividing wall.

Thatcher "Elite" Red Enamel Jacketed Boiler

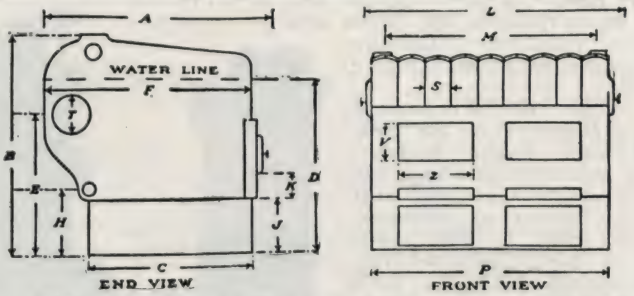
A beautiful, dustproof and moistureproof, red enamel jacket *entirely* surrounds the castings of this boiler. The jacket contributes efficiency as well as beauty. Asbestocel lining, 1¼ in. thick, reflects heat back through dead air space to castings, heating iron on *both* sides of waterways and minimizing heat losses.

Note: Nearly a century's experience has developed the famous Thatcher Staggered Fire Travel, shunting the flames and hot gases under, over and around the water heating surfaces through many passageways.

CAPACITIES OF THATCHER "ELITE" BOILERS

Boiler No.	Rating, sq. ft.	Grate area, sq. ft.	Coal cap., lb.	Height, in. To top outlet	Height, in. To water line	Openings, in. Flow	Openings, in. Return
Steam							
1-S	400	1.39	120	44	38	1–2½	2–2½
2-S	500	1.39	133	48¼	42¼	1–2½	2–2½
3-S	600	1.77	148	49½	43½	1–3	2–2½
301-S	675	1.77	148	54½	48½	1–3	2–2½
4-S	750	2.18	190	51¼	45¼	1–3	2–3
401-S	850	2.18	190	56¼	50¼	1–3	2–3
5-S	975	2.90	265	53½	47½	2–4	2–3
501-S	1075	2.90	265	58½	52½	2–4	2–3
6-S	1200	3.69	355	54	48	2–4	2–4
54	1500	6.81	.....	55	48	2–4	2–4
65	2000	8.30	.....	55	48	2–4	2–4
76	2600	9.78	.....	55	48	2–4	2–4
87	3200	11.27	.....	55	48	2–4	2–4
98	3800	12.75	.....	55	48	2–4	2–4
760	4200	13.59	.....	64	55	2–5	2–5
870	5000	15.65	.....	64	55	2–5	2–5
980	5800	17.71	.....	64	55	2–5	2–5
Water							
1-W	650	1.39	120	40	.....	2–2½	2–2½
2-W	800	1.39	133	44¼	.....	2–2½	2–2½
3-W	950	1.77	148	45¼	.....	2–3	2–2½
301-W	1050	1.77	148	50¼	.....	2–3	2–2½
4-W	1200	2.18	190	46½	.....	2–3	2–3
401-W	1350	2.18	190	51½	.....	2–3	2–3
5-W	1525	2.90	265	48¾	.....	2–4	2–3
501-W	1700	2.90	265	53¾	.....	2–4	2–3
6-W	1950	3.69	355	49¼	.....	2–4	2–4
54	2500	22.54	.....	55	.....	2–4	2–4
65	3350	24.02	.....	55	.....	2–4	2–4
76	4300	25.51	.....	55	.....	2–4	2–4
87	5250	26.99	.....	55	.....	2–4	2–4
98	6200	29.24	.....	55	.....	2–4	2–4
760	6900	31.30	.....	64	.....	2–5	2–5
870	8200	33.36	.....	64	.....	2–5	2–5
980	9500	35.42	.....	64	.....	2–5	2–5

Note: Nipples to extend from supply and return outlets through casing furnished with all boilers. Steam boilers tapped through casing for hot water heater and water boilers for hot water coil.
Additional data upon application.



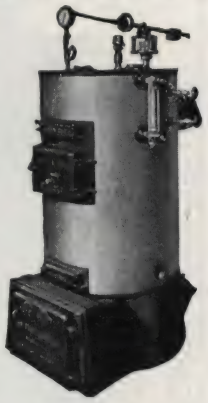
*All measurements for Twin series boilers are same except height of smoke pipe which is on back of boiler. Length can be determined by adding 7¼ in. for each additional section.

Thatcher "Red Hot" Enamel Jacketed Boiler

Perfect Insulation—Heavy asbestos lining, fastened in casing, completely surrounds boiler, making one erecting operation. Casing is easy to erect, being held in place by two small bolts.

Two-way Fire Travel—Flames and hot gases pass from front of boiler through opening in crown sheet, then to rear of boiler directly under dome.

Direct Water Circulation—From fire pot to crown sheet, thence to dome through waterways, completely surrounding the boiler.



CAPACITIES OF "RED HOT" BOILERS

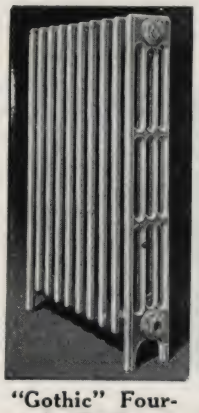
Boiler No.	Rating, sq. ft.	Grate area, sq. ft.	Coal cap., lb.	Height to water line, in.
Steam				
30-S	375	1.80	150	43
40-S	500	2.20	185	44
50-S	625	2.68	220	45
60-S	750	3.15	263	48
Water				
30-W	650	1.80	150	.....
40-W	850	2.20	185	.....
50-W	1050	2.68	220	.....
60-W	1250	3.15	263	.....

Thatcher "Gothic" Radiators—Beautiful and Efficient

Made in heights from 14 to 38 in. and can be used for any kind of hot water, steam, vapor or vacuum system.

Radiator Tapping List—All Thatcher Gothic Radiators are tapped 1½-in. both ends; may be bushed to sizes required.

All radiators have right-hand threads at both supply and return. They are connected at top and bottom with heavy malleable iron push nipples and are vented ⅛ in. for both steam and water.



"Gothic" Four-tube Radiator

Steam, 1-pipe sq. ft.	Steam, 1-pipe in.	Steam, 2-pipe (sup. and ret.) sq. ft.	Steam, 2-pipe (sup. and ret.) in.	Water (tapped for sup. and ret.) sq. ft.	Water (tapped for sup. and ret.) in.
Up to 24	1	Up to 48	1 x ¾	Up to 40	1 x 1
25 to 60	1¼	49 to 96	1¼x1	41 to 72	1¼x1¼
61 to 100	1½	Above 96	1½x1¼	Above 72	1½x1½
Above 100	2				

HEATING SURFACE PER SECTION

	Rad., sq. ft. per section						
Height, in.	38	32	26	23	20	18	14
3-tube	3½	3	2⅓	....	1¾	....	....
4-tube	4¼	3½	2¾	....	2¼	....	....
5-tube	5	4⅓	3½	3	2⅝	....	....
6-tube	6	5	4	....	3	2¾	2

Length: 2½ in. per section. Add ½ in. for each bushing.

Width of feet and width of sections: 3-tube, 4½ in.; 4-tube, 6¼ in.; 5-tube, 8 in.; 6-tube, 9¾ in.

Continued on next page

Thatcher Ranges

Combination Coal and Gas Ranges—Ranges are furnished in either a black polished finish or with full rich gray porcelain enamel finish, and ground and polished top. The enamel finish will not chip or crack. In the process of manufacture the tops are saturated with oil, so that they will not rust. May be used with bottled gas beyond gas mains.

Features—Small space requirements; easy to keep clean; combination hot water heater which operates with either coal or gas section or both, providing 30 to 40 gal. of hot water per hour and saving expense of copper coil heater; double cooking capacity on account of two large gas ovens in upper works and coal oven in body (gas and coal sections are independent in action); large gas broiler capacity; special ventilation and draft regulation; swing down broiler rack and many other features, including automatic lighter, foot opener for oven door, large low closet and ash pit, a thermometer in each door and a grate arrangement permitting instant and easy removal of grates for replacement.

No. 300
Combination Range

Types—No. 100: porcelain enameled twin fire range. No. 200: stove polish finish twin fire range—same as No. 100, except that range exterior is not enameled. No. 300: gray porcelain enameled combination range—same as No. 100, except that range has coal waterback only. No. 400: stove polish finish combination range.

DIMENSIONS FOR NOS. 100, 200, 300, 400

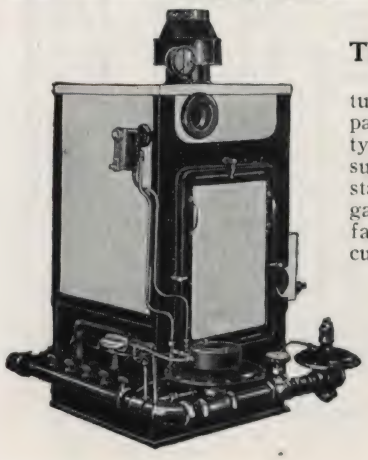
Height over all, in	67½
Height to cooking top, in	33½
Cooking top, in	40x27¾
Gas oven, in	19x16x11¼
Gas broiler, in	16¼x12½x10
Coal oven, in	18½x19x12

No. 88 Single Oven Range

Single and Double Oven Coal Ranges—Made in the finest grade of gray iron. All sheet metal parts Wellsville steel of heavy gauge; nickel trimmings are heavily plated and buffed. Waterbacks are large and effective. Triangular revolving grates have both bars fitted with shaker shanks for removing ashes. Direct draft damper is operated from outside of range. Range is fitted with sifting grate and large ash pan. Either side of the double range may be used independently.

SINGLE AND DOUBLE OVEN COAL RANGES

No.	Top, in.	Covers	Covers, in.	Ovens, in.
76	32½x23½	6	7	14½x16x10½
77	34 x25½	6	7	16 x17x10½
78	36 x25½	6	8	16 x17x10½
88	38 x26½	6	8	18½x19x13
820	40½x28¾	6	8	20 x20x13
920	40½x28¾	6	9	20 x20x13
18 (double)	50¾x27¼	8	8	13 x20x14



Thatcher Gas Fired Boiler

Patented Thatcher water tube section. Removable front panel for easy cleaning. Latest type draft diverter. Gas pressure regulator maintains constant gas pressure. Automatic gas supply valve. If gas supply fails thermostatic safety pilot cuts off all gas including pilots. High water temperature cut-off. On steam boilers low water line safety-cut-off. Aluminum alloy coated steel jacket beautifully enameled. Four cell asbestocel lining and superfire felt insulation. Eight day clock thermostat.

Thatcher Warm Air Furnaces

Three types and sufficient sizes to meet requirements. May be installed singly or in batteries. Guaranteed gastight, dustproof, durable, and free from defects in material and workmanship.

Equipment—All heaters supplied with large water pan and cover and complete damper regulator, consisting of a brass safety chain and nickelplated adjuster for upstairs damper control.

Disc Water Heater—Furnished extra. It is suspended in the furnace and will supply from 40 to 50 gal. of hot water per hour for domestic purposes.

"Thatcher Tubular" Furnace

"Thatcher New Meteor" Furnace

"THATCHER TUBULAR" FURNACE—SINGLE

No.	Castings, in.		Diam. casings, in.	Diam. smoke pipe, in.	Heating capacity, cu. ft.	Heat pipe capacity, sq. in.
	Height	Diam				
38	52	32	38	7	12,000 to 17,000	336
42	53	37	42	7	17,000 to 23,000	410
46	55	39	46	8	23,000 to 30,000	500
50	58	42	50	8	30,000 to 38,000	600
54	59	45	54	8	38,000 to 48,000	700
58	62	48	58	9	48,000 to 62,000	800
62	64	53	62	9	62,000 to 80,000	1100

"THATCHER NEW METEOR" FURNACE

No.	Diam. casing, in.	Diam. fire pot, in.	Height castings, in.	Diam. smoke pipe, in., cast iron rad.	Heating cap., cu. ft.	Heat pipe cap., sq. in.
18–36	36	18	46	8	9–11,000	295
20–40	40	20	46¾	8	11–13,000	375
22–44	44	22	47	8	13–17,000	480
24–48	48	24	47½	9	17–23,000	575
26–52	52	26	51¼	9	23–28,000	680

"THATCHER WARM FRIEND PIPELESS" FURNACE

No.	Diam. fire pot, in.	Diam. outer casing, in.	Diam. smoke pipe, in., cast iron rad.	Approximate heating capacity, cu. ft.
18–40	18	40	8	8 to 12,000
20–44	20	44	8	12 to 15,000
22–48	22	48	8	15 to 20,000
24–52	24	52	9	20 to 26,000

Hot Water Supply Boilers and Garage Heating Systems

"Geyser" High Test Hot Water Heaters—Domestic and business installations.

"GEYSER" ROUND TOP HOT WATER SUPPLY HEATER

No.	Capacity, gal. per hour	Dimensions, in.	
		Inside diam. fire pot	Smoke pipe
510	150	10	6
512	300	12	6
514	450	14	7
516	600	16	7

Garage Heater

"Thatcher" Garage Heating System—Includes heater, radiation, tank, fittings and automatic regulator.

"THATCHER" GARAGE HEATERS

No.	Size	Top	Wall rad., sq. ft.
200	1-car	Flat	28
200	2-car	Flat	56
510	3-car	Round	84
510	4-car	Round	112

SPENCER HEATER COMPANY

DIVISION OF LYCOMING MANUFACTURING COMPANY

Makers of Spencer Heaters

WILLIAMSPORT, PA.

NEW YORK, N. Y. BOSTON, MASS. | PHILADELPHIA, PA. BALTIMORE, MD. | ALBANY, N. Y. SYRACUSE, N. Y. | SCRANTON, PA. HARRISBURG, PA. | BUFFALO, N. Y. ROCHESTER, N. Y.

Product

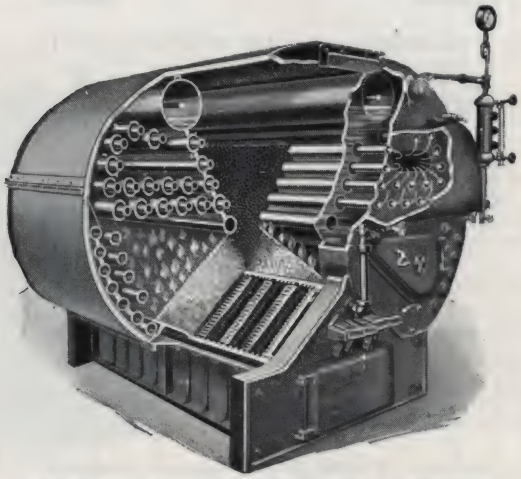
SPENCER MAGAZINE FEED HEATERS.

TRADE-MARK

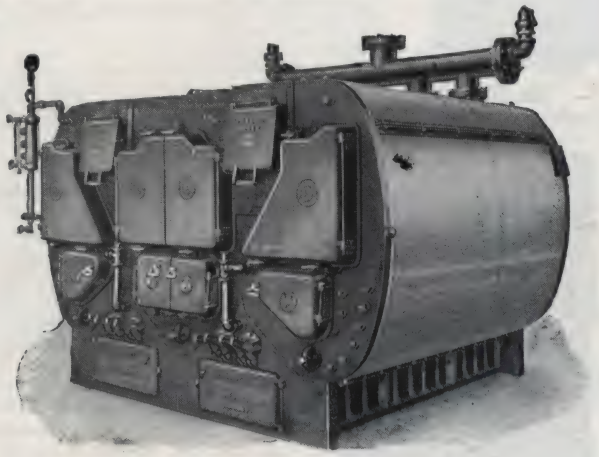
Spencer Heaters

The Spencer Heater is the original magazine feed heater with sloping grates. The water-jacketed magazine holds enough fuel for 12 to 24 hours, without attention. As fuel feeds automatically, as fast or as slow as the fire requires, the magazine supply lasts longer in milder weather.

Spencer Heaters are made in sizes to suit any building, large or small, either in steel tubular types or cast iron sectional types. Commercial ratings have been discontinued. Capacities are guaranteed when installed under normal conditions, according to the table below and on the following page, when used with any low pressure steam, vapor, or hot water system.



50 Series, Spencer Tubular Steam Heater
For large building work—an efficient magazine heater of combination water-tube and return tube construction



100 Series, Spencer Tubular Steam Heater
The largest type of Spencer Heater, a four-grate heater for use in multiple story buildings

SIZES AND GUARANTEED CAPACITIES OF SPENCER STEEL TUBULAR HEATERS

	Heater No.	Direct cast iron column radiation loads*, sq. ft.	Grate area, sq. ft.	Draft required in. H_2O	Outlets, number and size, in.	Returns, number and size, in.	Size chimney flue, in.——ft.	Smoke pipe diam., in.	Over-all dimensions, in.		
									Length	Width	Height
15-21 Series	15	1,600	12.00	.23	2–4	2–2	18x18—50	16	72½	60	63¼
	17	1,950	13.00	.24	2–4	2–2	18x18—55	16	78½	60	63¼
	19	2,300	15.00	.25	2–4	2–2	18x18—60	16	84½	60	63¼
	20	2,650	16.50	.26	2–4	2–2	18x18—65	16	90½	60	63¼
	21	3,000	18.00	.27	2–4	2–2	18x18—65	16	96½	60	63¼
50 Series	3–45	3,600	18.05	.24	2–5	2–2½	18x18—50	18	99½	81¼	71¾
	3–50	4,100	20.24	.25	2–5	2–2½	18x18—55	18	105¾	81¼	71¾
	3–55	4,600	22.56	.26	2–5	2–2½	18x18—60	18	112	81¼	71¾
	3–60	5,100	24.83	.27	2–5	2–2½	20 diam.—65	18	118¼	81¼	71¾
	3–70	5,600	27.00	.28	2–5	2–2½	20 diam.—70	18	124½	81¼	71¾
100 Series	3–80	6,500	30.35	.27	1–8	2–2½	24 diam.—65	22	98	116⅛	100
	3–90	7,600	34.70	.28	1–8	2–2½	24 diam.—65	22	104¼	116⅛	100
	3–105	8,700	39.05	.29	1–8	2–2½	30 diam.—65	22	110½	116⅛	100
	3–120	9,800	43.40	.30	1–8	2–2½	30 diam.—70	22	116¾	116⅛	100
	3–140	10,900	47.75	.32	1–8	2–2½	36 diam.—70	22	123	116⅛	100
	3–160	12,000	52.10	.34	1–8	2–2½	36 diam.—70	22	129¼	116⅛	100

*This includes ample provision for heat loss in covered mains, risers and returns, and for peak loads.
Heaters No. 3-45 to 3-160 are furnished with steel jackets and 1½-in. Rockwood asbestos covering, also pipe header.
Heaters No. 15-21 are furnished with steel jackets only.
Chimney flue sizes are based on a maximum flue temperature at boiler smoke outlet of 500° F.

Continued on next page

Special Features for Different Types of Buildings

Spencer Heaters are especially efficient in industrial buildings, greenhouses and garages where uniform heat is desirable; and in churches, theaters, schools and buildings where they give constant, even and uniform heat, without the attention of a night fireman.

For the home, the Spencer is especially convenient, as it needs attention only once or twice in 24 hours.

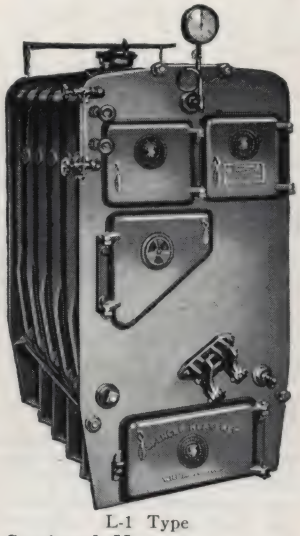
Spencer Economy for Building Owners

Though Spencer Heaters are designed to burn any non-coking graded fuel, their greatest saving is made with small sized, low cost fuels. They save as much as half the owner's annual fuel bill by using No. 1 Buckwheat anthracite, and proportionately by using by-product pea coke. Where anthracite and coke are not available, they are equally efficient when fired with smaller sizes of semi-bituminous coal, such as Pocahontas, or any non-coking graded fuel.

Automatic Magazine Feed Gives Steady Heat

Fuel is fed automatically by gravity—no blowers or mechanical apparatus is required. They are easy to install—the new Spencer Heaters are as easy to erect as any other sectional heater on the market—and there is nothing to get out of order.

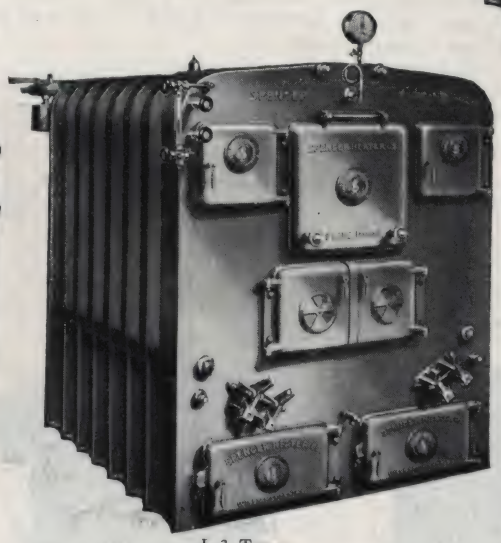
J-Type



L-1 Type

Spencer Sectional Heaters

L-2 Type



L-3 Type

Spencer Sectional Heaters

Write for complete descriptions and illustrations of all Spencer Heaters.

J-Type

A small magazine heater for steam, vapor or hot water systems for the smallest of homes.

L-1 Type

A magazine heater for steam, vapor or hot water systems in 6 to 12-room dwellings or industrial buildings of moderate size.

L-2 Type

A magazine heater for large dwellings, industrial and institutional buildings.

L-3 Type

A magazine heater for very large homes, small apartment houses and other buildings.

SIZES AND GUARANTEED CAPACITIES OF SPENCER CAST IRON SECTIONAL HEATERS

	Heater No.	Direct cast iron radiation loads, sq. ft.*		Grate area, sq. ft.	Outlets, number and size, in.	Returns, number and size, in.	Size chimney flue, in.——ft.	Smoke pipe diam. in.	Over-all dimensions, in.		
		Steam	Water						Length	Width	Height
J-Type	J-3	175	290	1.30	1–3	2–3	8x 8—35	8	28	24	45
	J-4	275	455	1.90	1–3	2–3	8x 8—35	8	35	24	45
	J-5	375	620	2.50	1–3	2–3	8x 8—35	8	42	24	45
L-1Type	L 105	390	645	2.60	1–4	2–4	8x 8—35	10	39	32	57
	L 106	510	845	3.33	2–4	2–4	8x 8—35	10	46	32	57
	L-107	630	1,045	4.07	2–4	2–4	8x12—35	10	53	32	57
	L 108	750	1,245	4.80	2–4	2–4	8x12—35	10	60	32	57
L-2Type	L-205	550	910	3.63	1–4	2–4	8x12—35	10	39	40	60
	L-206	725	1,200	4.66	2–4	2–4	8x12—35	10	46	40	60
	L-207	900	1,490	5.68	2–4	2–4	8x12—40	10	53	40	60
	L-208	1,075	1,780	6.70	2–4	2–4	12x12—40	10	60	40	60
	L-209	1,250	2,070	7.73	2–4	2–4	12x12—40	10	67	40	60
	L-210	1,425	2,360	8.75	2–4	2–4	12x12—45	10	74	40	60
L-3Type	L-306	1,500	2,475	9.33	2–4	2–4	12x12—40	14	49	56	65
	L-307	1,850	3,050	11.37	2–4	2–4	12x12—40	14	56	56	65
	L-308	2,200	3,625	13.41	2–4	2–4	12x16—45	14	63	56	65
	L-309	2,550	4,200	15.45	2–4	2–4	12x16—45	14	70	56	65
	L-310	2,900	4,775	17.49	2–4	2–4	16x16—50	14	77	56	65
	L-311	3,250	5,350	19.53	2–4	2–4	16x16—50	14	84	56	65

*This includes ample provision for heat loss in covered mains, risers and returns, and for peak loads.

THE TITUSVILLE IRON WORKS COMPANY

Boilers, Tanks and Steel Plate Work

MAIN OFFICE AND WORKS

TITUSVILLE, PA.

BRANCH OFFICES

NEW YORK, N. Y., 285 Madison Avenue
PITTSBURGH, PA., Farmers' Bank Building
WASHINGTON, D. C., 1013 Woodward Building
DETROIT, MICH., 2842 West Grand Boulevard
RICHMOND, VA., 204 No. Jefferson Street
DALLAS, TEX., 1020 Mercantile Bank Building
JACKSONVILLE, FLA., P. O. Box No. 929
BUFFALO, N. Y., 1512 Marine Trust Building
CHICAGO, ILL., 1234 McCormick Building
ST. LOUIS, MO., 401-2 Bank Commerce Building
LOS ANGELES, CALIF., 940 Maple Avenue
CHARLOTTE, N. C., 705 Realty Building
NEW ORLEANS, LA., 612 Godchaux Building
ATLANTA, GA., 397 Peachtree Street

Products

FIRETUBE STEEL BOILERS for Power and Heating.
TUBELESS STEEL WATER HEATERS.

Also manufacturers of Steel Plate Work, including Tanks, Smokestacks, etc.; Boiler Fronts and Castings, Grates, etc.

Facilities

Our shop is one of the largest and best equipped boiler manufacturing plants in the country. It is provided with the latest improved machinery, including hydraulic and pneumatic riveting machines, also best hydraulic flanging equipment. Electric overhead cranes insure careful and rapid handling of material. Our welding machines are of the most modern improved types and the operators, experts, who do nothing but welding daily. All seams of Titusville welded boilers are welded *inside* and *outside* by electric arc-machines.

A large stock of plates and tubes is carried and shipment can be made with reasonable promptness. Also a large stock of completed Tico and Acme riveted firebox boilers and a large stock of welded firebox heating boilers ready for immediate shipment.

A.S.M.E. Code

Our boilers are made in strict accordance with the latest boiler code of the American Society of Mechanical Engineers, or can be made to conform to local requirements.

Inspection and Test

All boilers are thoroughly inspected during their entire construction by a representative of the Hartford Steam Boiler Inspection and Insurance Company, who is in continual attendance at our works. Boilers are tested to required hydrostatic pressure, made absolutely tight and stamped "ASME." All workmanship and material are guaranteed first class in every respect. The insurance company's test certificate is furnished free of charge, if desired.

Working Pressures

All boilers when used for high pressure or power service are made for 100 to 150 lb. working pressure, A.S.M.E. Code, and are tested with hydrostatic pressure 50% in excess of the working pressure.

Standard heating boilers are made for 15 lb. working pressure A.S.M.E. Code and tested to 60 lb. hydrostatic pressure.

Steam Radiation Ratings

Firebox and horizontal tubular heating boilers are all rated on basis of 14 sq. ft. of radiation per square foot of fire surface.

In determining the size of a boiler, take the actual amount of cast iron radiation or equivalent, plus the piping, and add about 5 to 10% and select a boiler with the next highest rating.

Series "WS"—Welded Smokeless Boiler

Series "W"—Welded Boiler

Equipment

All our boilers are provided with complete castings as illustrated below. Stationary grates are standard equipment on all horizontal tubular boilers. Shaking grates are standard with all firebox boilers.

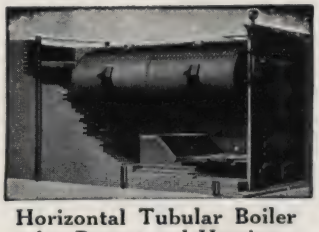
Special grates can be furnished on all types when desired.

Catalogues

New catalogues and pamphlets on welded firebox boilers and other types gladly sent on request.

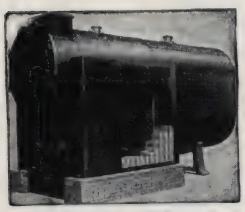
Series "RS"—Smokeless Riveted Firebox Boiler

Series "SR"—Compact Type Welded Boiler



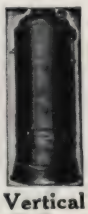
Horizontal Tubular Boiler for Power and Heating

Series "R"—Riveted Firebox Boiler

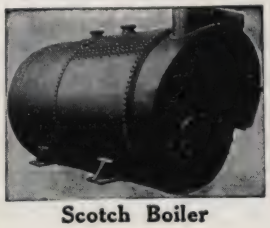


Perfection Return Tubular Portable Boiler

Perfection Smokeless Return Tubular Portable Boiler



Vertical Boiler



Scotch Boiler

Locomotive Boiler

Jacketed Tubeless Water Heater

Continued on next page

TABLE NO. 1. SPECIFICATIONS FOR TITUSVILLE "A. S. M. E." HORIZONTAL TUBULAR POWER BOILERS
Working pressures, 100 to 150 lbs. Form 2500

Boiler No.	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519
Horsepower	36	43	51	54	63	64	73	77	83	88	106	120	135	151	167	187	207	225	250
Diameter...in.	42	44	44	48	48	54	54	60	60	60	66	66	72	72	72	78	78	84	84
Length of shell...ft.	10	10	12	12	14	14	16	14	15	16	16	18	16	18	20	18	20	18	20
Heating surface...sq. ft.	360	425	508	540	628	640	730	771	825	877	1061	1192	1350	1510	1672	1870	2074	2265	2513
Area of grates...sq. ft.	12.25	12.83	14.6	16	18	20.25	22.5	22.5	25	27.5	30.25	33	33	36	39	39	42.25	42	45.5
Tubes: Number	38	46	46	48	48	36	36	44	44	44	54	54	70	70	70	88	88	108	108
Size...in.	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Diameter of stack...in.	20	22	22	24	24	26	26	28	28	28	30	30	34	34	34	40	40	44	44

TABLE NO. 2. SPECIFICATIONS FOR TITUSVILLE "A. S. M. E." SERIES "W" WELDED FIREBOX HEATING BOILERS
Working pressure, 15 lbs. Up-Draft Type Form 6000

Boiler No.	3620	3625	4230	4235	4340	4845	4850	4855	5460	5465	5475	5485	6010	6011	6012	6613	6615	7218	7220	7822	7825	8429	8433
Code	WADE	WAFT	WAIF	WAIL	WAIT	WALK	WANE	WARD	WEAL	WEAR	WEAN	WELT	WHET	WHIR	WIPE	WILT	WISP	WISE	WIRE	WOOD	WOOL	WREN	WRIT
Heating surface...sq. ft.	202	255	301	341	405	430	481	531	577	600	707	801	901	1000	1080	1155	1301	1491	1685	1821	2135	2524	2790
Grate surface...sq. ft.	7.9	9.1	9.5	11.0	12.5	12.8	14.5	16.3	18.6	20.6	20.6	22.6	25.5	25.5	27.7	30.8	33.3	36.7	39.5	40.0	43.0	46.5	49.8
Diameter of shell—D...in.	36	36	42	42	42	48	48	48	54	54	54	54	60	60	60	66	66	72	72	78	78	84	84
Length of shell—A...ft.-in.	8–5	10–5	8–0	9–0	10–6	9–1	10–1	11–1	10–9	11–3	12–9	14–3	12–4	13–4	14–4	13–11	15–5	14–0	15–6	14–8	16–8	16–8	18–2
Diameter of breeching...in.	18	18	22	22	22	26	26	26	28	28	28	28	32	32	32	34	34	36	36	40	40	44	44
Diameter of stack...in.	16	16	20	20	20	24	24	24	26	26	26	26	30	30	30	32	32	34	34	38	38	42	42

TABLE NO. 3. SPECIFICATIONS FOR TITUSVILLE "A. S. M. E." SERIES "WS" WELDED SMOKELESS FIREBOX HEATING BOILERS
Working pressure, 15 lbs. Down-Draft Type Form 6020

Boiler No.	S-4230	S-4235	S-4840	S-4845	S-5450	S-5455	S-5465	S-5475	S-6085	S-6095	S-6605	S-6612	S-7214	S-7216	S-7218	S-7820	S-7824	S-8428
Code	SACK	SAFE	SAGE	SAIL	SAKE	SALT	SAMP	SAND	SATE	SASH	SAVE	SCAN	SCUD	SEAL	SEAR	SNAG	SNAP	SURF
Heating surface...sq. ft.	297	251	415	458	496	546	641	700	778	882	962	1033	1203	1344	1485	1710	2039	2452
Upper grate surface...sq. ft.	8.6	9.9	11.6	12.5	14.3	16.3	18.3	19.3	20.6	22.8	24.1	25.4	28.0	29.3	32.0	34.9	39.4	44.3
Diameter of shell—D...in.	42	42	48	48	54	54	54	54	60	60	66	66	72	72	72	78	78	84
Length of shell—A...ft.-in.	9–10	11–4	10–10	11–10	11–6	12–6	14–6	15–6	13–1	14–7	14–2	15–8	15–3	16–9	18–3	16–10	19–4	21–0
Diameter of breeching...in.	22	22	26	26	28	28	28	28	32	32	34	34	36	36	36	40	40	44
Diameter of stack...in.	20	20	24	24	26	26	26	26	30	30	32	32	34	34	34	38	38	42

TABLE NO. 4. SPECIFICATIONS FOR SERIES "R" "A. S. M. E." PORTABLE FIREBOX RIVETED BOILERS
Working pressure, 15 lbs. Up-Draft Type Form 9000

Boiler No.	R20	R25	R30	R35	R40	R45	R50	R55	R60	R65	R75	R85	R100	R110	R120	R130	R150	R180	R200	R220	R250	R290	R330
Heating surface...sq. ft.	195	243	306	344	403	430	481	531	574	597	703	796	901	1000	1080	1155	1301	1487	1680	1802	2112	2524	2790
Grate area...sq. ft.	7.9	9.2	9.5	10.9	12.5	12.8	14.5	16.3	18.6	20.6	20.6	22.6	25.5	25.5	27.7	30.8	33.3	36.7	39.5	40.0	43.0	46.5	49.8
Diameter of shell...in.	36	36	42	42	42	48	48	48	54	54	54	54	60	60	60	66	66	72	72	78	78	84	84
Length of shell...ft.-in.	8–5	10–5	8–6	9–6	11–0	9–1	10–1	11–1	10–9	11–3	12–9	14–3	12–4	13–4	14–4	13–11	15–5	14–0	15–6	14–8	16–8	16–8	18–2
Height of water line...in.	59½	59½	66¼	66¼	66¼	67½	67½	67½	74	74	74	74	79¼	79¼	79¼	81	81	86¼	86¼	90½	90½	97¾	97¾
Diameter of breeching...in.	18	18	22	22	22	26	26	26	28	28	28	28	32	32	32	34	34	36	36	40	40	44	44

TABLE NO. 5. SPECIFICATIONS FOR "RS" "A. S. M. E." RETURN TUBULAR DOWN-DRAFT PORTABLE BOILERS
Working pressure, 15 lbs. Down-Draft Type Form 9020

Boiler No.	RS-30	RS-35	RS-40	RS-44	RS-49	RS-54	RS-64	RS-74	RS-85	RS-95	RS-105	RS-120	RS-137	RS-156	RS-178	RS-200	RS-240	RS-280
Heating surface...sq. ft.	297	351	400	438	488	535	630	686	778	882	962	1083	1164	1300	1435	1698	2023	2452
Upper grate area...sq. ft.	8.6	9.9	11.6	12.5	14.3	16.3	18.3	19.3	20.6	22.8	24.1	25.4	28.0	29.3	32.0	34.9	39.4	44.3
Diameter of shell...in.	42	42	48	48	54	54	54	54	60	60	66	66	72	72	72	78	78	84
Length of shell...ft.-in.	9–10	11–4	11–4	12–4	11–6	12–6	14–6	15–6	13–1	14–7	14–2	15–8	15–3	16–9	18–3	16–10	19–4	21–0
Height of water line...in.	67½	67½	69½	69½	74¾	74¾	74¾	74¾	83	83	86	86	90¼	90¼	90¼	96¼	96¼	99¼
Diameter of breeching...in.	22	22	26	26	28	28	28	28	32	32	34	34	36	36	36	40	40	44

TABLE NO. 6. SPECIFICATIONS FOR PERFECTION "A. S. M. E." RETURN TUBULAR PORTABLE BOILERS
Working pressures, 15 to 150 lbs. Form 2400 For power and heating

Boiler No.	P-25	P-30	P-35	P-40	P-50	P-60	P-70	P-80	P-90	P-100	P-125	P-150	P-175	P-200
Horsepower at 10 sq. ft.	25	30	35	40	50	60	70	80	90	100	125	150	175	200
Capacity direct radiation...sq. ft.	2600	3100	3700	4200	5600	7000	8300	9000	10000	12000	14000	17000	20000	24000
Heating surface...sq. ft.	278	340	390	448	539	671	763	872	963	1103	1325	1644	1875	2162
Area of grates...sq. ft.	10½	10½	14	14	16	20	22½	22½	25	27½	30	35¾	38½	39
Diameter of shell...in.	36	36	42	42	48	48	54	54	60	60	60	66	66	72
Length over all...in.	132	147	144	156	142	160	155	167	163	183	207	210	228	228
Width casing...in.	60	60	66	66	72	72	79	79	85	85	85	91	91	97
Diameter of stack...in.	20	20	24	24	28	28	32	32	34	34	34	38	38	42

TABLE NO. 7. SPECIFICATIONS FOR TITUSVILLE "A. S. M. E." VERTICAL BOILERS WITH FULL LENGTH TUBES
Working pressure, 100 lbs. Form 3000

Boiler No.	V4	V5	V6	V8	V10	V12	V15	V18	V20	V25	V30	V35	V40	V45	V50	V60	V70	V80	V90	V100	V125
Horsepower	4	5	6	8	10	12	15	18	20	25	30	35	40	45	50	60	70	80	90	100	125
Diameter...in.	24	24	24	30	30	30	36	36	36	42	42	42	48	48	48	54	54	60	60	66	66
Height of shell...ft.	4	5	6	5	6	7	6½	7	8	7¼	8¼	9¼	8½	9	10	9	10	10	11	10½	12
Height over all...in.	67	79	91	82	94	106	103	109	121	115	127	139	132	138	150	142	154	157	169	166	184

TABLE NO. 8. SPECIFICATIONS FOR TITUSVILLE SERIES "SRA" "A. S. M. E." COMPACT TYPE WELDED BOILERS
Working pressure, 15 lbs. Steel plate construction Form 6070

Boiler No.	23A	29A	36A	42A	46A	54A	59A	65A	71A	77A	90A	97A	110A	121A	133A	145A	164A	187A	209A	225A	256A	294A	331A	376A
Capacity radiation...sq. ft.	2310	2950	3640	4200	4670	5440	5950	6510	7150	7700	9000	9700	11040	12110	13340	14500	16420	18700	20900	22510	25620	29400	33100	37600
Heating surface...sq. ft.	194	230	260	300	334	389	425	465	511	550	643	693	789	865	953	1036	1173	1336	1493	1608	1830	2100	2365	2686
Grate area...sq. ft.	9.1	10.4	11.6	12.5	14.0	15.5	18.1	19.8	19.8	20.6	22.6	24.7	25.5	27.7	27.7	28.2	30.8	34.0	36.7	37.0	40.0	43.0	46.5	49.7
Diameter of shell...in.	36	36	36	42	42	42	48	48	48	54	54	54	60	60	60	66	66	72	72	78	78	78	84	84
Length of shell...in.	57	66	74	70	78	89	77	83	91	79	92	98	85	93	102	108	122	115	128	127	144	165	130	147
Height of water line...in.	68	68	68	70½	70½	70½	81	81	81	85	85	85	94	94	94	93½	93½	98½	98½	100	100	100	114	114
Diameter of breeching...in.	22	22	22	24	24	24	26	26	26	28	28	28	32	32	32	34	34	36	36	40	40	40	42	42

Standard equipment includes shaking grates. Stationary or dumping grates can be furnished at additional cost.
For further information on any of the above boilers or heaters, send for our complete new Catalogue.

ESTABLISHED IN 1856

THE WICKES BOILER CO.

HEATING BOILER DIVISION

SAGINAW, MICH.

REPRESENTATIVES IN PRINCIPAL CITIES

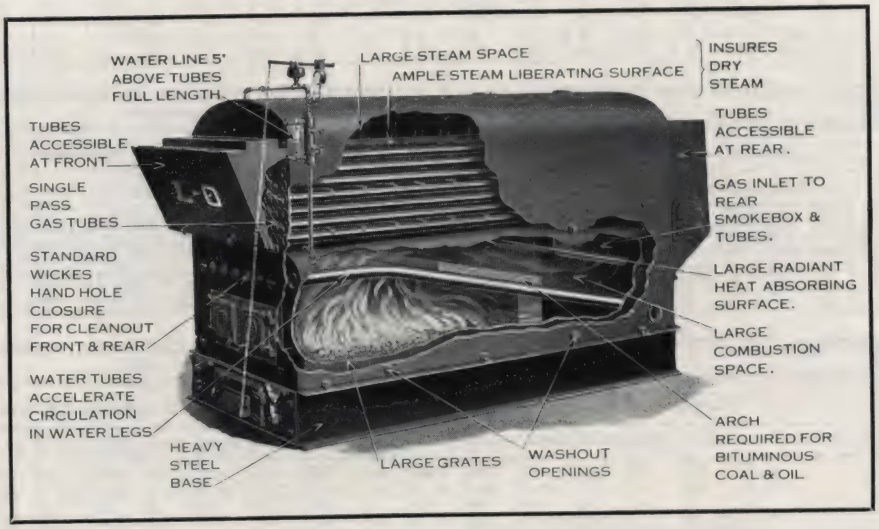
Products

WICKES L-O STEEL HEATING BOILERS for steam or water.

Also Wickes Water Tube Boilers and Wickes Horizontal Tubular Boilers.

Facilities

THE WICKES BOILER CO.'s shops are furnished with the most modern equipment for economical boiler making.



Performance

Careful tests of Wickes L-O Boilers in operation demonstrate their unsurpassed characteristics.

Experience

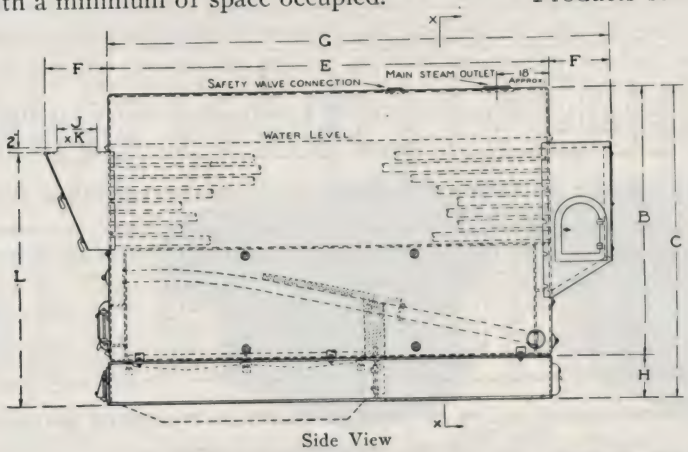
The reputation of THE WICKES BOILER CO., gained during the past 73 years in building boilers of the highest grade, guarantees perfect workmanship.

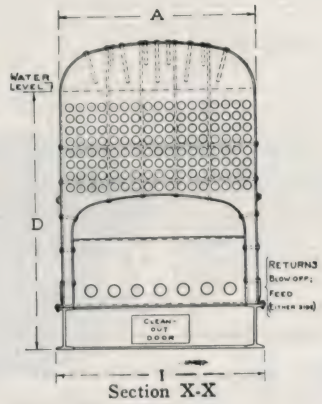
Design

Wickes L-O Boilers provide a maximum evaporative power with a minimum of space occupied.

Bulletins

Bulletins giving detailed information of Wickes Products sent on request.





SIZES OF WICKES STANDARD "L-O" BOILERS FOR STEAM HEATING
(For Hot Water Radiation Multiply Steam Capacity by 1.60)

Boiler No.	S.H.B.I. Nominal radiation capacity, sq. ft.		General proportions					Boiler dimensions							Standard base, in.		Pipe openings, in.		Lagging (approx.), sq. ft.	Weight, boiler, steel base, grates, fire brick, etc. (approx.), lb.	Flue connection, in.			Stack recommended				
									Height, in.			Length												Diameter, in.		Height, ft.		
																								Coal or Oil fuel		Coal		Oil fuel
	Coal, hand fired	Oil, gas, or stoker fired	Grate area, sq. ft.	Furnace volume, cu. ft.	Heating surface, total sq. ft.	Steam space, cu. ft.	Water content, cu. ft.	Boiler shell width, in.	Boiler shell	Boiler and std. base	Water line	Boiler shell, ft.	Smoke boxes, in.	Boiler and rear box, ft.	Height (steel or brick)	Width (steel external)	Steam outlet	Return (each side)			Depth (external)	Width across (external)	Height above floor	One boiler	Two boilers	One boiler	Two boilers	One or two boilers
								A	B	C	D	E	F	G	H	I					J	K	L					
LO-55	3192	3876	12.7	35	228	14	48	44	59	74	62	6	15	7 1/4	15	48	6	3	80	5995	7	44 3/8	60	18	22	50	50	50
LO-56	3668	4454	12.7	42	262	16	56	44	59	74	62	7	15	8 1/4	15	48	6	3	95	6705	7	44 3/8	60	18	22	50	50	50
LO-57	4256	5168	14.8	49	304	23	57	50	60	75	62	7	15	8 1/4	15	54	6	3	100	8035	7	50 3/8	59	20	24	50	55	50
LO-58	5208	6324	17.5	49	372	23	61	50	64	79	66	7	15	8 1/4	15	54	6	4	105	8650	7	50 3/8	63	20	26	50	55	50
LO-59	5922	7191	17.5	57	423	26	66	50	64	79	66	8	15	9 1/4	15	54	6	4	120	8980	8	50 3/8	63	22	28	50	60	50
LO-510	7140	8670	20.0	76	510	33	77	56	71	86	73	8	18	9 1/2	15	60	6	4	130	10180	8	56 3/8	70	22	28	50	60	50
LO-511	7994	9707	20.0	87	571	37	85	56	71	86	73	9	18	10 1/2	15	60	6	4	150	11855	8	56 3/8	70	24	30	55	65	50
LO-512	8834	10727	23.0	98	631	41	94	56	71	86	73	10	18	11 1/2	15	60	8	4	170	12035	8	56 3/8	70	26	32	60	70	50
LO-513	10514	12767	25.9	110	751	46	89	62	76	91	76	9	18	10 1/2	15	66	8	5	180	14500	10	62 3/8	74	28	34	65	75	50
LO-514	11634	14127	25.9	122	831	51	99	62	76	91	76	10	18	11 1/2	15	66	8	5	185	14905	10	62 3/8	74	30	34	65	75	50
LO-515	12768	15504	25.9	134	912	56	110	62	76	91	76	11	18	12 1/2	15	66	8	5	200	15875	10	62 3/8	74	32	36	70	80	50
LO-516	14042	17051	28.9	133	1003	63	148	68	79	94	78	11	21	12 3/4	15	72	8	5	210	17655	10	68 3/8	75	32	38	70	80	50
LO-517	17416	21148	32.5	142	1244	68	172	68	82	97	81	12	21	13 3/4	15	72	8	5	235	19760	12	68 3/8	79	34	40	70	80	50
LO-518	19404	23562	36.3	175	1386	68	164	68	88	103	87	12	21	13 3/4	15	72	8	6	250	21350	14	68 3/8	85	34	42	70	80	50
LO-519	23058	27999	35.8	183	1647	84	237	74	90	105	88	13	24	15	15	78	8	6	280	23700	14	74 3/8	85	36	42	80	90	50
LO-520	27636	33558	39.9	222	1974	91	266	74	95	110	93	14	24	16	15	*78	8	6	310	26030	15	74 3/8	91	38	44	80	90	50
LO-521	29554	35887	44.0	235	2111	98	274	74	95	110	93	15	24	17	15	78	10	7	340	28495	16	74 3/8	91	40	44	80	90	50
LO-522	32578	39559	43.5	238	2327	104	283	80	101	116	98	14	24	16	15	84	10	7	330	30890	16	80 3/8	96	40	46	90	100	50

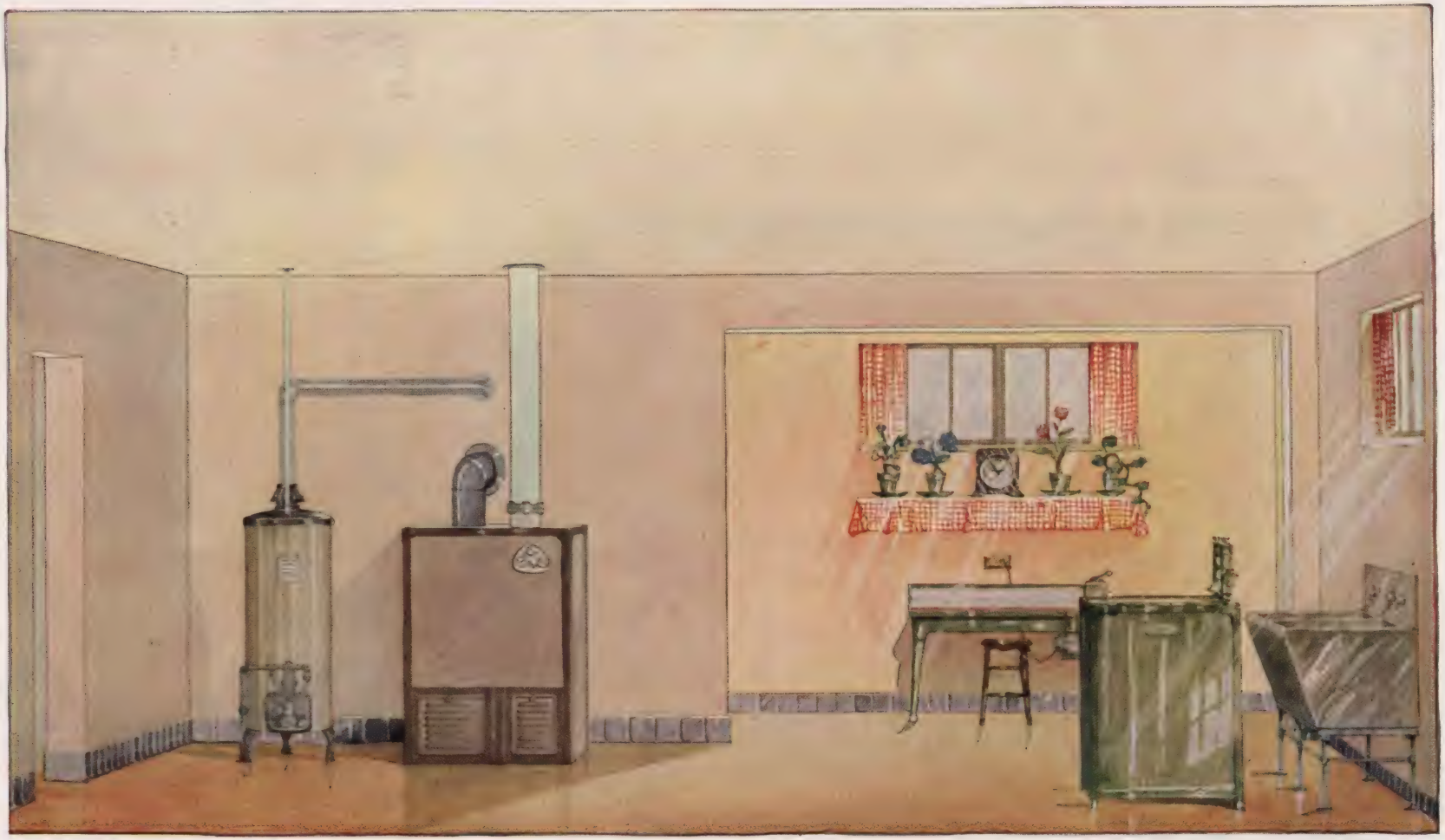
THE PUP IS THE FURNACE MAN

Handbook *on* Heating Buildings

with

BRYANT GAS BOILERS

This Handbook on Heating Buildings contains a detailed description of all models of Bryant Gas Boilers and Controls as well as technical information of value to the Architect and Heating Engineer

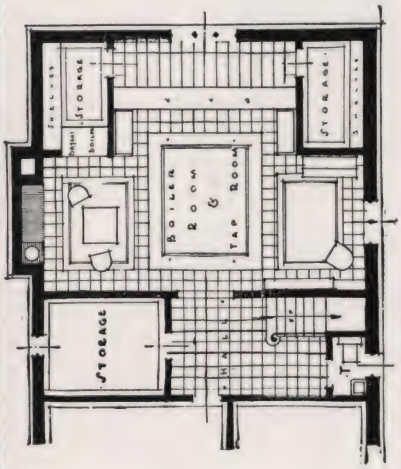


The cost of this combination laundry and heater room is that of a normal basement for a house with approximately 750 square feet of water radiation. The floor plan suggestion is that of an inexpensive six or seven-room house. With the Model 45 Bryant Boiler, this practical, clean home laundry room is possible. You will note that the floor plan includes a recreation room, which can be decorated and equipped for any one of the various uses shown on Page 2.

Continued on next page

THE MASCULINE PARADISE

More elaborate possibilities of basement space are suggested in this masculine paradise with its early American ingle, lounge and taproom, making a haven which would probably prove equally alluring to the fair sex. To add such a room on the ground floor would materially increase the cubical content of a residence. Here, in the basement, it occupies space which would otherwise be of little use. ¶ The inspiration of this room is the "Hall of Capen House" in the American wing of the Metropolitan Museum. Beams and posts are adzed, walls and ceiling of antique plaster and floor of stone. ¶ The bar seat is movable to give access to the boiler controls. The floor plan and character of the heating plant indicate a house with approximately 900 feet of steam radiation.



Scale: $\frac{1}{4}'' = 3''$

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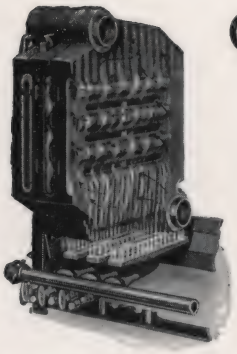
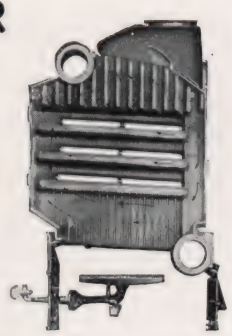
CUTAWAY VIEW BRYANT TUBULAR BOILER



BATTERY OF SECTIONS

1. **CAST IRON SECTIONS** of the water tube type present a large area of heat absorbing surface.
2. **PITCH OF WATER TUBES** promotes a definite, rapid circulation throughout the height of a Bryant Section preventing air bubbles from insulating the walls and assuring maximum heat transference.
3. **LARGE LOWER TUBES RIBBED** to present a high percentage of heating surface within the zone of the hottest gases.



BRYANT TUBULAR SECTION

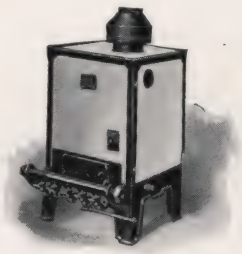
4. **STAGGERED GAS TRAVEL** contributes to maximum efficiency. The hot gases from each burner are so baffled back and forth, constantly rubbing heating surfaces, that only sufficient warmth is left in the gases to promote the necessary draft.
5. **LARGE STEAM LIBERATING AREA AND AMPLE STEAM CHAMBER** with baffle insures a steady water line and rapid steaming.
6. **INTEGRAL DRAFT HOOD** saves much headroom. (See lower right illustration.)
7. **GAUGE PANEL** centers at a single point the few gauges that ever call for passing inspection.
8. **MANIFOLD AND CONTROLS** enclosed, symbolic of their attentionless reliability.
9. **ENDURING CRYSTALLINE FINISH** adds to the handsome appearance of Bryant Boilers.

Continued on next page

COMPLETE BRYANT LINE

BRYANT GAS BOILERS cover the entire range of building-heating requirements. No building is so large or so small that the advantages of Bryant Automatic Gas Heating may not be enjoyed. To accomplish this in the most economical and efficient manner, three lines of boilers have been developed: Model 2 Boilers; Models 43 and 45 Boilers; and Model 63 Boilers. The ratings of the boilers in these three lines will be found on page 5.

BRYANT MODEL 2 BOILERS



A MODEL 2 BOILER

These boilers are particularly well suited for the small home, or for the large home completely insulated. They are made in five sizes and are trimmed for either steam or hot water.

Model 2 Boilers are made up of batteries of cast-iron tubular sections pitched to facilitate rapid circulation of the water.

Staggered gas travel and large area of heating surfaces are also incorporated in this boiler, insuring an economy of operation comparable to the larger sizes of Bryants.

BRYANT MODELS 43 AND 45 BOILERS

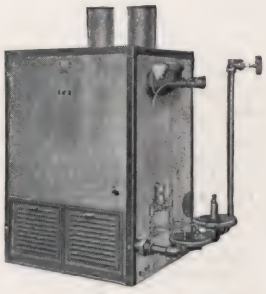
A MODEL 45 BOILER

These models cover the heating requirements for the average and large home. They are made up of batteries of cast-iron tubular sections, in eleven sizes and trimmed for either steam or hot water.

These boilers incorporate all of the many features for which Bryant Boilers have become renowned such as, Bryant Tubular construction, rapid circulation of the water, staggered gas travel, large lower tubes, large steam liberating area, integral down-draft divertor, and an enduring crystalline finished metal jacketed cover.

On Model 45 Boilers all controls are enclosed and out of sight, symbolic of their attentionless reliability. This control cabinet also mounts the handsome instrument panel which centers at a single point the few gauges that ever call for passing inspection. These features make the Model 45 Bryant the most practical boiler for use in the modern "dressed-up basement."

Model 43 Boilers have the same ratings as corresponding sizes of Model 45 Boilers but do not have the control cabinet and gauge panel.



A MODEL 43 BOILER

BRYANT MODEL 63 BOILERS

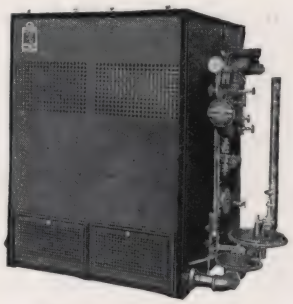
They are particularly capable of handling large scale heating requirements and were designed with the peculiar requirements of large unit heating constantly in mind. They are made up of cast-iron tubular sections in thirteen sizes and are trimmed for either steam or hot water.

The manifold and angle cocks are completely enclosed by the metal jacketed cover which is finished in a handsome enduring crystalline enamel.

The compact design of Model 63 Boilers gives economy of floor space while the improved style of built-in draft hood conserves much headroom as well as adding to the appearance of the heating plant.

A 3-in. return tapping a few inches below the water line allows perfect equalization in steam heating systems.

The heating surfaces are easily cleaned from either the front or rear of the boiler.



A MODEL 63 BOILER

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Applications of Bryant Tubular Gas Boilers

Bryant Boilers can be used with any type of steam, vapor or hot water heating system, or for the generation of low pressure steam for industrial work. They are classified as explained below according to the type of service to which they are adapted.

Type "S" Boilers

Steam boilers, automatically controlled to maintain any desired steam pressure from a few ounces up to 15 lb. per sq. in. They can also be operated under room temperature control either by the magnetic valve which is standard equipment on Type "S" Boilers, or by the motor of a room temperature control system. Type "S" Boilers are for use with steam, vapor or vacuum heating systems, or for generating steam for cooking or other industrial purposes.

AGA rating, sq. ft.	Boiler No.	Approximate shipping weight, lb.	AGA rating, sq. ft.	Boiler No.	Approximate shipping weight, lb.	AGA rating, sq. ft.	Boiler No.	Approximate shipping weight, lb.
220	3-S-2	495	1300	7-S-45	2070	4440	12-S-63	5760
290	4-S-2	565	1480	8-S-45	2315	5180	14-S-63	6335
370	5-S-2	655	1670	9-S-45	2545	5920	16-S-63	7330
440	6-S-2	720	1850	10-S-45	2800	6660	18-S-63	8120
510	7-S-2	795	2040	11-S-45	2980	7400	20-S-63	8910
			2220	12-S-45	3230	8140	22-S-63	9700
560	3-S-45	1235	2410	13-S-45	3480	8880	24-S-63	10490
740	4-S-45	1445				9620	26-S-63	11280
930	5-S-45	1660	2220	6-S-63	3405	10360	28-S-63	12070
1110	6-S-45	1860	2960	8-S-63	4150	11100	30-S-63	12860
			3700	10-S-63	4965			

Model 43 boilers have the same ratings as Model 45 boilers; weight—140 lb. less.

Trimmings Furnished

No. 1100 Boiler Control (combined steam pressure governor and low water cut-off)
Thermostatic Pilots
Solenoid Valve
Diaphragm Snap Valve
Escapement Burner
Pop Safety Valve (set 15 lb.)
Gas Pressure Regulator
Labeled Shut-off Valve
Compound Pressure and Vacuum Gauge and Siphon
Water Level Gauge
Gas Pressure Gauge and Gauge Panel (Model 45 boilers only)
Metal Jacketed Cover
Draft Hood (built into Models 43, 45 and 63 boilers)
Drain Cocks

Type "W" Boilers

Boilers equipped for use with hot water heating systems where dual control of the heating system is desired; that is, automatic room temperature and water temperature control. The room temperature control element on this boiler is a magnetic valve for connection to the room temperature thermostat (motor is not required).

AGA rating, sq. ft.	Boiler No.	Approximate shipping weight, lb.	AGA rating, sq. ft.	Boiler No.	Approximate shipping weight, lb.	AGA rating, sq. ft.	Boiler No.	Approximate shipping weight, lb.
350	3-W-2	455	2070	7-W-45	2030	7100	12-W-63	5730
470	4-W-2	530	2370	8-W-45	2275	8290	14-W-63	6305
590	5-W-2	610	2660	9-W-45	2505	9470	16-W-63	7300
700	6-W-2	685	2960	10-W-45	2760	10660	18-W-63	8090
820	7-W-2	760	3260	11-W-45	2940	11840	20-W-63	8880
			3550	12-W-45	3190	13020	22-W-63	9670
890	3-W-45	1195	3850	13-W-45	3440	14210	24-W-63	10460
1190	4-W-45	1405				15390	26-W-63	11250
1480	5-W-45	1620	3550	6-W-63	3375	16580	28-W-63	12040
1780	6-W-45	1820	4740	8-W-63	4120	17760	30-W-63	12830
			5920	10-W-63	4935			

Model 43 boilers have the same ratings as Model 45 boilers; weight—140 lb. less.

Trimmings Furnished

Robertshaw Reverse Action Thermostat
Thermostatic Pilots
Solenoid Valve*
Diaphragm Snap Valve
Escapement Burner
Gas Pressure Regulator
Labeled Shut-off Valve
Altitude Gauge
Thermometer
Metal Jacketed Cover
Gas Pressure Gauge and Gauge Panel (Model 45 boilers only)
Draft Hood (built into Models 43, 45 and 63 boilers)
Drain Cocks

*A lever-actuated gas valve (Snap Action Valve) which can be operated by the motor of a room temperature control system will be supplied on special request, in place of the Solenoid Valve.

Type "C" Boilers

Boilers equipped for use with hot water heating systems. They are provided with a Bryant Quick Action Valve which may be operated by the motor of a room temperature control system.

Type "A" Boilers

Water Boilers, completely automatic, equipped for use on direct hot water storage systems.

Type "SA" Boilers

Steam Boilers, completely automatic, equipped for use on indirect hot water storage systems.

Continued on next page

To Select the Appropriate Boiler

AGA Rating

Gas boilers are most commonly selected from their AGA rating, which is the boiler output measured in terms of square feet of direct cast-iron radiation. The average heat emission of direct cast-iron radiation is 240 B.t.u. per hour per sq. ft. for steam, and 150 B.t.u. per hour for water. The AGA rating is therefore secured by dividing the available heat units per hour by 240 for steam boilers and by 150 for water boilers.

Horsepower

The available heat expressed in B.t.u. per hour, the boiler horsepower (1 BHP = 33,500 B.t.u. per hour), and the heating surfaces are also given at the bottom of this page.

Starting and Piping Allowance

To determine the size of the boiler required for direct radiation, add to the installed radiation, expressed as equivalent direct radiation, an allowance for piping and for starting up a cold system. The combined starting and piping allowance runs from 67 per cent on small installations down to 33 per cent on installations of 3500 sq. ft. and over. The determination of the proper factor rests on the judgment of the Engineer or Contractor. After adding the proper percentage to the installed radiation, the boiler having the nearest AGA rating is selected.

Indirect Radiation

Indirect radiation (such as a central fan job or unit heater installation), should be converted to equivalent direct radiation by using the manufacturer's rating tables. No rule for estimating piping load can be laid down. In an installation composed entirely of a central fan system, with all heating surface concentrated in one jacket near the boiler, the piping load will be quite small. The proper allowance must be determined by the Engineer or Contractor. The starting load will vary from about 25 per cent of the total condensing load, in the case of a unit heater installation using all re-circulated air, down to practically nothing in a central fan blast installation where the heaters are proportioned for all outside air.

Ratings, Heating Surfaces, Water Capacity

Boiler No.	Available B.t.u. per hour (output)	BHP	AGA rating sq. ft.		Sq. ft. of heating surface	Gas consumption cu. ft. per hour		Water capacity to water line, gal.	Size flow and return tappings, in.
			Steam	Water		1000 B.t.u. gas	500 B.t.u. gas		
Model 2 Boilers									
3	52,800	1.60	220	350	16.5	66	132	2.1	2
4	70,400	2.10	290	470	22.0	88	176	2.8	2
5	88,000	2.60	370	590	27.5	110	220	3.5	2
6	105,600	3.10	440	700	33.0	132	264	4.2	2
7	123,200	3.60	510	820	38.5	154	308	4.9	2
Models 43 and 45 Boilers									
3	133,200	4.00	560	890	41.7	167	334	17.8	4
4	177,600	5.30	740	1190	55.1	222	444	22.2	4
5	222,000	6.60	930	1480	68.5	278	556	26.2	4
6	266,400	8.00	1110	1780	81.9	333	666	31.0	4
7	310,800	9.30	1300	2070	95.3	389	778	35.4	4
8	355,200	10.60	1480	2370	108.7	444	888	39.8	4
9	399,600	11.90	1670	2660	122.1	500	1000	44.2	4
10	444,000	13.20	1850	2960	135.5	555	1110	48.6	4
11	488,400	14.60	2040	3260	148.9	611	1222	53.0	4
12	532,800	15.90	2220	3550	162.3	666	1332	57.4	4
13	577,200	17.20	2410	3850	175.7	722	1444	61.8	4
Model 63 Boilers									
6	532,800	15.90	2220	3550	149.0	666	1332	77.7	6
8	710,400	21.20	2960	4740	197.0	888	1776	99.9	6
10	888,000	26.50	3700	5920	246.0	1110	2220	122.1	6
12	1,065,600	31.80	4440	7100	294.0	1332	2664	144.3	6
14	1,243,200	37.10	5180	8290	343.0	1554	3108	166.5	6
16	1,420,800	42.40	5920	9470	391.0	1776	3552	188.7	6
18	1,598,400	47.70	6660	10660	440.0	1998	3996	210.9	6
20	1,776,000	53.00	7400	11840	488.0	2220	4440	233.1	6
22	1,953,600	58.30	8140	13020	537.0	2442	4884	255.3	6
24	2,131,000	63.60	8880	14210	585.0	2664	5328	277.5	6
26	2,308,800	68.90	9620	15390	634.0	2886	5772	299.7	6
28	2,486,400	74.20	10360	16580	682.0	3108	6216	321.9	6
30	2,664,000	79.50	11100	17760	731.0	3330	6660	344.1	6

Continued on next page

Specifications for Bryant Heating Equipment

Steam or Vapor

Boiler

Contractor shall furnish complete, and set up in basement in accordance with instructions furnished by the manufacturer, one No.....Bryant Tubular Steam Boiler, AGA rating.....square feet, as manufactured by THE BRYANT HEATER & MFG. COMPANY, Cleveland, Ohio. Boiler to be complete with gas pressure regulator, draft hood, No. 1100 boiler control, diaphragm snap valve, solenoid valve, labeled gas shut-off valve, compound retard gauge and siphon, pop safety valve, thermostatic pilot control, and drain cocks.

Water Connection

Furnish and properly connect feed cock of proper size for boiler.

Bryant Gas Pressure Regulator

The vent opening shall be connected to the outside of the building foundation with galvanized pipe; union placed at regulator end, and elbow faced down on outdoor end of vent line.

Flue Pipe

Connect flue outlets on boiler with a.....inch header, made from.....gauge (specify a corrosion resisting metal) and connect same to chimney with (size in column 7, page 8).....inch.....gauge (specify a corrosion resisting metal) pipe.

Gas Supply Line

Furnish (size larger than column 12, page 8)..... inch gas line direct from meter to labeled gas shut-off valve on boiler.

Metal Jacketed Cover

Contractor shall furnish and install metal jacketed covering designed for boiler by the manufacturer.

Hot Water (Dual Control)

Boiler

Contractor shall furnish complete and set up in basement, in accordance with instructions furnished by the manufacturer, one No.....Bryant Tubular Hot Water Boiler, AGA rating.....square feet, as manufactured by THE BRYANT HEATER & MFG. COMPANY, Cleveland, Ohio. Boiler to be complete with gas pressure regulator, draft hood, Robertshaw thermostatic control with solenoid valve and snap valve (or Robertshaw thermostatic control with snap action gas valve), labeled gas shut-off valve, altitude gauge, thermometer, thermostatic pilot control, and drain cocks.

Water Connection

Furnish and properly connect feed cock of proper size for boiler.

Bryant Gas Pressure Regulator

The vent opening shall be connected to the outside of the building foundation with galvanized pipe; union placed at regulator end, and elbow faced down on outdoor end of vent line.

Flue Pipe

Connect flue outlets on boiler with a.....inch header, made from.....gauge (specify a corrosion resisting metal) and connect same to chimney with (size in column 7, page 8).....inch.....gauge (specify a corrosion resisting metal) pipe.

Gas Supply Line

Furnish (size larger than column 12, page 8)..... inch gas line direct from meter to labeled gas shut-off valve on boiler.

Metal Jacketed Cover

Contractor shall furnish and install metal jacketed covering designed for boiler by the manufacturer.

Hot Water (Type "C" Control)

Use same form as for "Hot Water (Dual Control)," except change first paragraph to read:

Boiler

Contractor shall furnish complete and set up in basement, in accordance with instructions furnished by the manufacturer, one No.....Bryant Tubular Hot Water Boiler, AGA rating.....square feet, as manufactured by THE BRYANT HEATER & MFG. COMPANY, Cleveland, Ohio. Boiler to be complete with gas pressure regulator, draft hood, quick action valve, labeled gas shut-off valve, altitude gauge, thermometer, and drain cocks.

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Bryant Tubular Gas Boilers

General Dimensions

(For Natural or Manufactured Gas)

Boiler No.	Number of flows and returns	Size of flows and returns, in.	Width between flow tappings, in.	Number of boiler flue openings	Size of boiler flue openings, in.	Size of flue to chimney, in.	Height boiler only, in.	Gas pressure regulator, in.	Pop valve, in.	Gas manifold, in.	Labeled shut-off valve, in.	Number of Pilot lights	Diaphragm snap valve, in.	Type "C" only, quick action gas valve, in.	Capacity of meter for 500 B.t.u. m'f'd gas, cu. ft.	Capacity of meter for 1000 B.t.u. natural gas, cu. ft.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Model 2 Boilers																
3	2	2	9 5/16	1	5	5	31 1/2	1	1	1 1/4	1	1	1	1	132	66
4	2	2	12 1/2	1	5	5	31 1/2	1	1	1 1/4	1	1	1	1	176	88
5	2	2	15 11/16	1	5	5	31 1/2	1	1	1 1/4	1	1	1	1	220	110
6	2	2	18 7/8	1	5	5	31 1/2	1	1	1 1/4	1	1	1	1	264	132
7	2	2	22 1/16	1	6	6	31 1/2	1	1	1 1/4	1	1	1	1		
Models 43 and 45 Boilers																
3	2	4	14 7/8	1	7	7	48	1	1	1 1/4	1	1	1	1	334	167
4	2	4	18 1/2	1	7	7	48	1	1	1 1/4	1	1	1	1	444	222
5	2	4	22 1/8	1	8	8	48	1 1/4	1 1/4	1 1/4	1 1/4	2	1 1/4	1 1/4	556	278
6	2	4	25 3/4	1	8	8	48	1 1/4	1 1/4	1 1/4	1 1/4	2	1 1/4	1 1/4	666	333
7	2	4	29 3/8	2	7	9	48	1 1/4	1 1/4	1 1/4	1 1/4	3	1 1/4	1 1/4	778	389
8	2	4	33	2	7	9	48	1 1/2	1 1/2	1 1/2	1 1/2	4	1 1/2	1 1/2	888	444
9	2	4	36 5/8	2	8	10	48	1 1/2	1 1/2	1 1/2	1 1/2	4	1 1/2	1 1/2	1000	500
10	2	4	40 1/4	2	8	10	48	1 1/2	1 1/2	1 1/2	1 1/2	4	1 1/2	1 1/2	1100	555
11	2	4	43 7/8	2	8	10	48	2	2	2	2	4	2	2	1222	611
12	2	4	47 1/2	2	8	11	48	2	2	2	2	4	2	2	1332	666
13	2	4	51 1/8	3	8	12	48	2	2	2	2	5	2	2	1444	722
Model 63 Boilers																
6	2	6	26 1/4	1	12	12	66	2	2	2	2	2	2	2	1332	666
8	2	6	33 1/2	1	14	14	66	2	2	2	2	2	2	2	1776	888
10	2	6	40 3/4	2	12	16	66	2	2	2	2	3	2	2	2220	1110
12	2	6	48	2	12	16	66	2 1/2	2 1/2	2 1/2	2 1/2	4	2 1/2		2664	1332
14	2	6	55 1/4	2	14	18	66	2 1/2	2 1/2	2 1/2	2 1/2	4	2 1/2		3108	1554
16	2	6	62 1/2	2	14	20	66	2 1/2	2 1/2	2 1/2	2 1/2	5	2 1/2		3552	1776
18	2	6	69 3/4	3	12	20	66	2 1/2	3	2 1/2	2 1/2	6	2 1/2		3996	1998
20	2	6	77	3	14	20	66	2 1/2	3	2 1/2	2 1/2	6	2 1/2		4440	2220
22	2	6	84 1/4	3	14	20	66	3	3	3	3	7	3		4884	2442
24	2	6	91 1/2	3	14	22	66	3	3	3	3	7	3		5328	2664
26	2	6	98 3/4	4	14	24	66	3	3 1/2	3	3	8	3		5772	2886
28	2	6	106	4	14	24	66	3	3 1/2	3	3	9	3		6216	3108
30	2	6	113 1/4	4	14	26	66	3	3 1/2	3	3	9	3		6660	3330

Note: 6-in. boilers have two additional return tappings for 3-in. pipe, located 6 in. below the water line.

Recommended Minimum Chimney Sizes

(Outside Dimensions of Standard Rectangular Tile)

Height, ft.	Gas consumption in thousands of B.t.u. per hour									
	100	200	300	400	500	750	1000	1250	1500	2000
20	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x13	8 1/2x13	13x13	13x13	13x18	13x18	18x18
40	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x8 1/2	8 1/2x13	13x13	13x13	13x18	13x18	18x18
60	7 1/2x7 1/2	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x13	13x13	13x13	13x13	13x18	18x18
80	7 1/2x7 1/2	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x13	8 1/2x13	13x13	13x13	13x18	13x18
100	7 1/2x7 1/2	7 1/2x7 1/2	7 1/2x7 1/2	8 1/2x8 1/2	8 1/2x8 1/2	8 1/2x13	13x13	13x13	13x18	13x18

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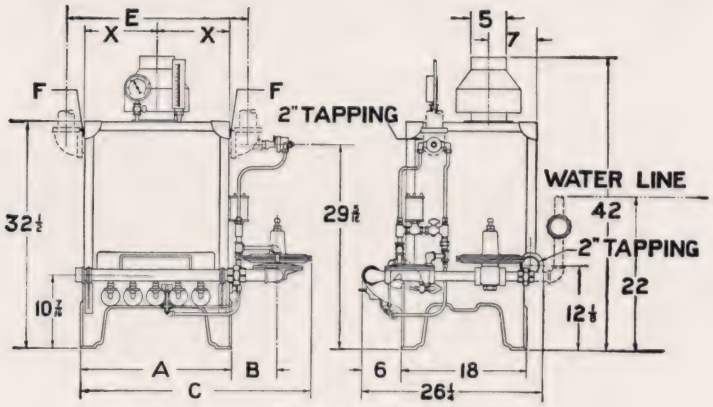
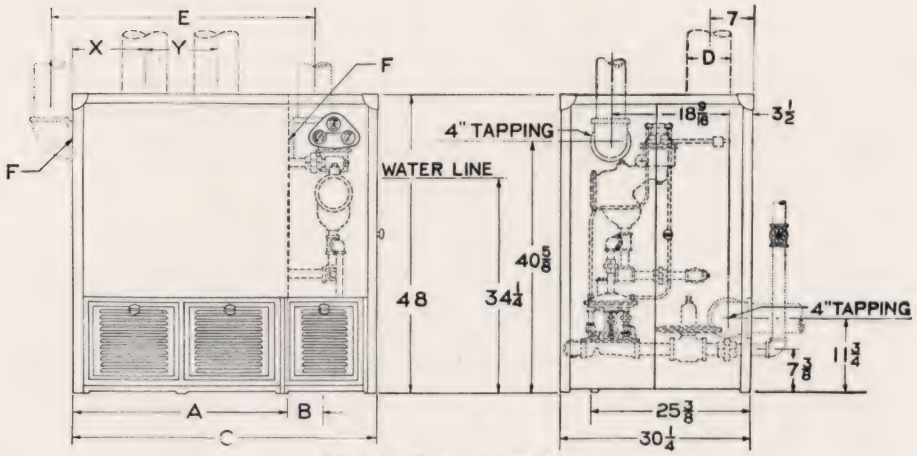
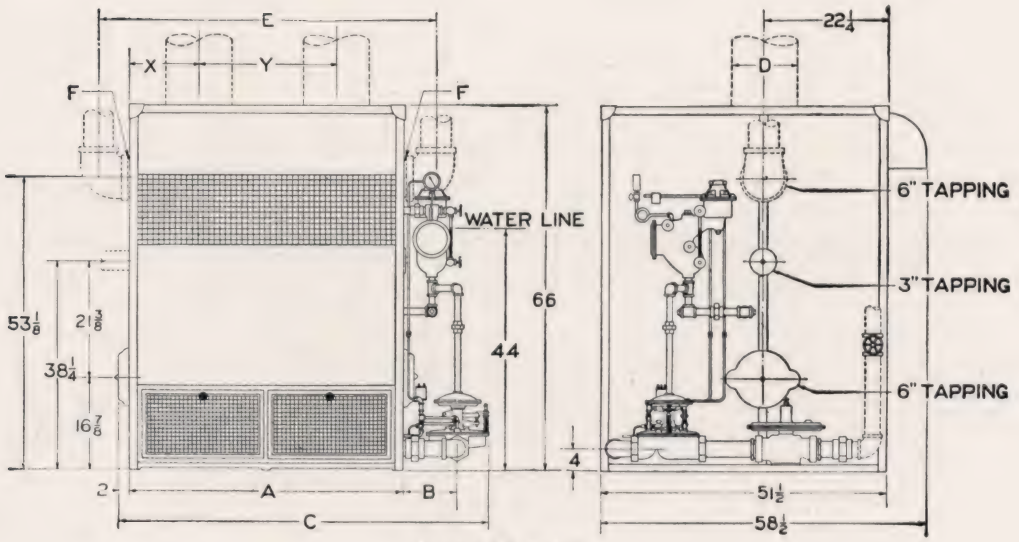
Dimensional Drawings



Model 2 Boilers



Models 43 and 45 Boilers



Model 63 Boilers

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Principal Dimensions of Bryant Boilers

(Dimensions in Inches)

Boiler No.	A	B	C	D	E	F Flow nipple	X	Y	Steam header proportions		Water header proportions flows and returns
									Flows	Header drip	
Model 2 Boilers											
3	15 3/16	5 5/8	25 11/16	1–5	19 3/16	2x4	7 19/32	....	2	1	2
4	18 3/8	5 5/8	28 7/8	1–5	22 1/2	2x4	9 3/16	....	2	1	2
5	21 9/16	5 5/8	32 1/16	1–5	25 11/16	2x4	10 25/32	....	2	1	2
6	24 3/4	5 5/8	35 1/4	1–5	28 7/8	2x4	12 3/8	....	2	1	2
7	27 15/16	5 5/8	38 7/16	1–6	32 1/16	2x4	13 31/32	....	2	1	2
Models 43 and 45 Boilers											
3	16 1/4	7 1/4	30 3/8	1–7	23 3/4	4 close	8 1/8	....	3	2	2 1/2
4	19 7/8	7 1/4	34	1–7	27 3/8	4 close	9 13/16	....	3	2	2 1/2
5	23 1/2	7 1/4	37 5/8	1–8	31	4 close	11 3/4	....	3	2	3
6	27 1/8	7 1/4	41 1/4	1–8	34 5/8	4 close	13 9/16	....	3	2	3
7	30 3/4	7 1/4	44 7/8	2–7	38 1/4	4 close	9 5/8	11 1/2	3	2	3
8	34 3/8	8 1/4	48 1/2	2–7	41 7/8	4 close	11 7/16	11 1/2	3	2	3
9	38	8 1/4	52 1/8	2–8	45 1/2	4 close	11 3/4	14 1/2	4	2	4
10	41 5/8	8 1/4	55 3/4	2–8	49 1/8	4 close	11 3/4	18 7/8	4	2	4
11	45 1/4	7 1/8	59 3/8	2–8	52 3/4	4 close	11 3/4	21 3/4	4	2	4
12	48 7/8	7 1/8	63	2–8	56 3/8	4 close	11 3/4	25 3/8	4	2	4
13	52 1/2	7 1/8	66 5/8	3–8	60	4 close	11 3/4	14 1/2	4	2	4
Model 63 Boilers											
6	27 3/4	11	46 1/8	1–12	38 1/2	6 close	13 7/8	....	4	1 1/2	5
8	35	11	53 3/8	1–14	45 3/4	6 close	17 1/2	....	4	1 1/2	5
10	42 1/4	11	60 5/8	2–12	53	6 close	10 5/8	21	5	1 1/2	5
12	49 1/2	10 3/8	68 7/8	2–12	60 1/4	6 close	12 7/16	24 5/8	5	2	6
14	56 3/4	10 3/8	76 1/8	2–14	67 1/2	6 close	14 1/4	28 1/4	5	2	6
16	64	10 3/8	83 3/8	2–14	74 3/4	6 close	14 1/4	35 1/2	6	2	6
18	71 1/4	10 3/8	90 5/8	3–12	82	6 close	12 7/16	23 3/16	6	2 1/2	6
20	78 1/2	10 3/8	97 7/8	3–14	89 1/4	6 close	14 1/4	25	6	2 1/2	6
22	85 3/4	10 1/4	105	3–14	96 1/2	6 close	14 1/4	28 5/8	6	2 1/2	6
24	93	10 1/4	112 1/4	3–14	103 3/4	6 close	14 1/4	32 1/4	6	2 1/2	6
26	100 1/4	10 1/4	119 1/2	4–14	111	6 close	14 1/4	25	6	3	6
28	107 1/2	10 1/4	126 3/4	4–14	118 1/4	6 close	14 1/4	25	6	3	6
30	114 3/4	10 1/4	134	4–14	125 1/2	6 close	14 1/4	32 1/4	6	3	6

Two center flue outlets on No. 26 boiler are 21¾ in. apart; No. 28 boiler, 29 in. apart; No. 30 boiler, 21¾ in. apart.
Do not bush flow tappings; use reducing elbows if necessary.

Pipe Coils on Walls

Equivalent Direct Radiation per Lineal Foot of Coil

(Not Lineal Foot of Pipe)

Coils Vertical, Pipes Horizontal

Size of pipe	215° Steam			180° Water		
	1 in.	1¼ in.	1½ in.	1 in.	1¼ in.	1½ in.
Single pipe	0.58	0.71	0.81	0.63	0.81	0.91
Two pipes high	1.11	1.36	1.52	1.22	1.53	1.70
Four pipes high	1.93	2.39	2.69	2.17	2.66	3.01
Six pipes high	2.48	3.07	3.47	2.81	3.44	3.88
Eight pipes high	2.85	3.51	3.96	3.21	3.94	4.44
Ten pipes high	3.07	3.96	4.45	3.59	4.44	5.00
Twelve pipes high	3.55	4.30	4.95	3.98	4.83	5.55

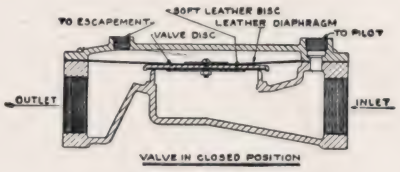
In the tables above and in the boiler rating tables, a square foot of equivalent direct steam radiation is assumed to have a heat transmission capacity of 240 B.t.u. per hour; and a square foot of equivalent direct water radiation is assumed to have a heat transmission capacity of 150 B.t.u. per hour. These constants are based upon radiators filled with 215° steam or 180° water and set in a 70° atmosphere.

Continued on next page

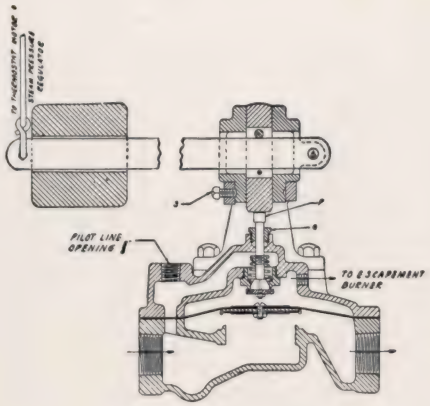
Bryant Gas Boiler Controls

The standard type of control system for Bryant Gas Boilers, when used for house heating, is the simple and troubleproof diaphragm valve system.

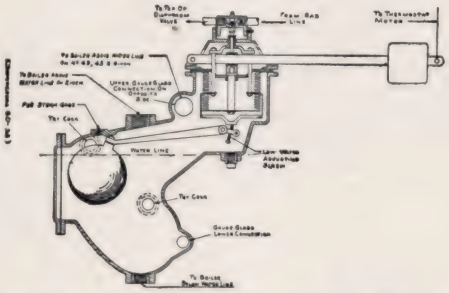
On most gas heating systems, the various controls act directly upon the main fuel supply. If they fail to function, the boiler continues to operate. In direct contrast, every single control of the Bryant system must be operating correctly before any gas can pass to burners.



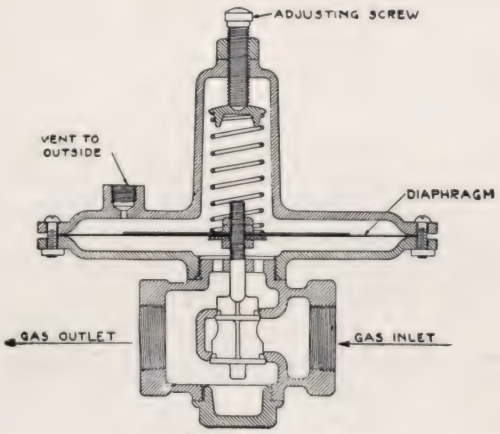
Snap Valve



Snap Action Valve



Steam Pressure and Low Water Control



Gas Pressure Regulator

Bryant Snap Valve

The Bryant Diaphragm Snap Valve is the master control. When the boiler is in operation, the pressure of the gas supply holds the soft leather diaphragm off the valve seat (see sectional view). All the controls, such as steam pressure control, water temperature regulator, low water control and pilot light control, operate this main, master valve. When any control is called upon to operate, it admits gas to the upper chamber of the snap valve, equalizing the gas pressure on both sides of the diaphragm, and the unfailing force of gravity shuts the gas off instantly and completely with a snap action. No springs are utilized.

A very slight movement of the leather disc opens the valve to full area.

Pilot and control line tappings are in top of the valve to prevent line trapping, and to facilitate installation.

The use of this diaphragm snap valve, which has helped to make Bryant Gas Heating one of the most popular of all gas-designed house heating plants, is thoroughly protected by patents.

The Bryant Snap Action Valve is used where a motor thermostat is desired.

Steam Pressure and Low Water Control

The No. 1100 Bryant Boiler Control is a combined steam pressure control and low water cut-off. Fine adjustment and watchlike precision provide sensitive and positive operation.

When the pre-determined steam pressure is developed, a metal bellows is compressed, opening a small valve which admits gas to the upper chamber of the snap valve, thus shutting off the main gas supply to the burners.

Likewise, this control is designed to operate in the same manner when the water level drops, and to turn the main gas supply into the burners when the water line returns to normal. The low water control is easily adjusted for any water level.

A lever is also provided for using the control in connection with a room temperature regulator of the motor type.

There is not a single stuffing box on the entire assembly.

Gas Pressure Regulator

The Bryant Gas Pressure Regulator is standard equipment on all models and types of Bryant Boilers.

This regulator maintains a constant pressure of 1½ oz. at the burners, at which the Bryant Boiler is designed to develop its rated capacity. This low pressure is maintained at all times, assuring an evenness of gas flow to the burners, regardless of outside fluctuations occasioned during peak demand periods.

The large diaphragm insures a sensitiveness of operation and an instantaneous response to the slightest variations in pressure.

The durable construction of the Bryant Gas Pressure Regulator contributes to the years of care-free service of Bryant equipment.

Continued on next page

Bryant Gas Boiler Controls

Quick Action Valve

The Bryant Quick Action Gas Valve constitutes the main gas control of Type "C" boilers.

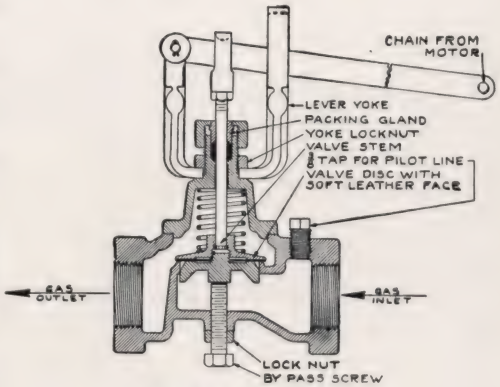
It is lever operating, actuated by room temperature regulators of the motor type.

Valve opens to full area on a very slight movement of the lever. The soft leather disc provides positive cut-off and yet this disc is prevented from becoming cut by an exclusive Bryant patented feature. The valve is spring closing.

The lever is adjustable to any angle to the gas line and can be locked securely in position by means of a hexagon nut.

A ⅜-in. tapping is provided on the top of the inlet side of the valve for pilot line; or, if preferred, the valve can be by-passed by means of a throttling screw in the bottom.

The extreme simplicity and durability of construction of the Bryant Quick Action Valve makes it a thoroughly dependable means of gas control for use where dual control is not desired.



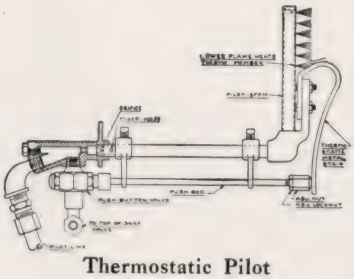
Quick Action Valve

Bryant Thermostatic Pilot

A pilot burner controlled by thermostatic element, which, when cold, opens a small valve, admitting gas to the upper chamber of the master control—the diaphragm snap valve.

On boilers where two or more pilots are provided, each works independently of the others, providing complete control of all burners.

Continued exposure to heat does not affect the pilot's adjustment. No flexible tubing or wires to require replacement. All pilot burners are easily accessible for inspection.

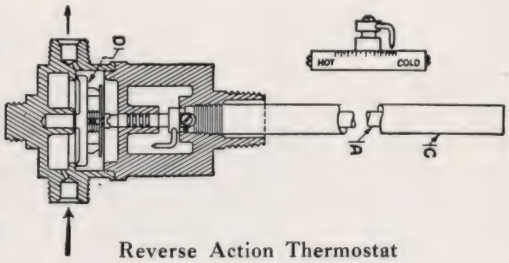

Thermostatic Pilot

Water Temperature Control for Hot Water Boilers

A Robertshaw Reverse Action Thermostat provides protection against excessive water temperatures on all Type "W" Bryant boilers.

When this control is called upon to operate, it opens a small gas valve, admitting gas to the upper chamber of the snap valve, shutting off the gas supply to the burners.

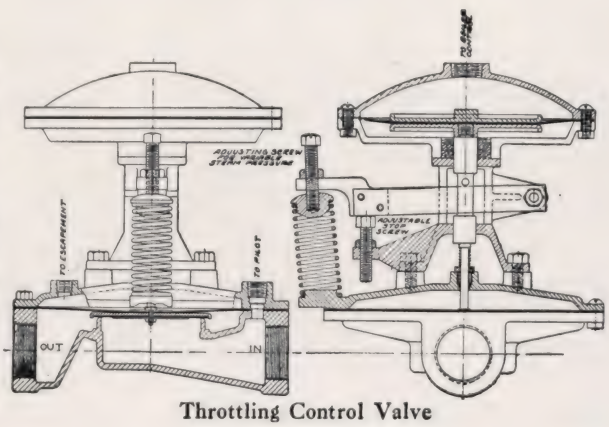
This thermostat is of rugged, all-metal construction, yet very sensitive. Designed to operate the snap valve at variations as small as 6° to 10° F. water temperature.



Reverse Action Thermostat

Bryant Throttling Control Valve

The throttling control valve embodies the same principles of operation as the diaphragm snap valve with an additional throttling control feature to throttle the gas flow to the main burners as the steam pressure builds up. The boiler steam pressure exerts a force on top of the diaphragm against the tension of a spring under the end of the lever arm. As the steam pressure increases, the valve stem is gradually moved downward against the spring tension, pushing the leather diaphragm in the snap valve toward its closed position, reducing the total open area of the gas valve and thus reducing the flow of gas to the main burners.



Throttling Control Valve

The Bryant national organization of gas heating engineers is thoroughly experienced in all phases of automatic gas heating practice.

It is a major part of this organization's business to give you whole-hearted co-operation on problems relating to the application of automatic gas heating.

BRYANT GAS HEATING

THE BRYANT HEATER & MFG. COMPANY

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Basmor Gas Fired Boilers for Water, Steam or Vapor

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For Branch Offices, see our Plumbing Section
For our pages on Water Heaters, Water Softeners, Water Systems, and Plumbing Fixtures, see Manufacturers' Index

Consider the Basmor Gas Fired Boiler as a Two-way Proposition

BASMOR GAS FIRED BOILER

As a fuel for house heating, apartment heating, for heating even larger structures, gas—both natural and artificial—has arrived. Natural gas is being piped into more and more communities. Rates for artificial gas are being reduced in more and more communities. And the BASMOR Gas Fired BOILER, by Bastian-Morley Co., designed, engineered and built for the completely efficient use of gas, offers a size and a type of boiler suited to hot water, steam, or vapor heating and to practically all sizes and classes of buildings.

BASMOR Gas Fired BOILERS, for steam, hot water, or vapor heating, in sizes ranging from the two-section boiler up to sizes suitable for the largest apartments and buildings, are engineered and built to deliver, in full, all the warmth, cleanliness and convenience which gas makes possible and to do it automatically, with positive safety and at the lowest possible cost.

Assembled in sizes of two or more sections, BASMOR Gas Fired BOILERS are beautiful in appearance, compact and small in their over-all dimensions, take up very little space and so permit the employment of basements for uses more pleasant, more worth while than mere housing of heating plants, fuel bins and ash receptacles.

Check These Features

(1) Efficiency gained through exclusive design, causing staggered heat travel entirely unlike any other boiler built.

(2) Heating chamber and flue ways are well sealed by removable plates, between sections.

(3) No additional equipment, such as motors, etc., are required. BASMOR Gas Fired BOILERS are completely equipped with full automatic boiler controls except water feed and room thermostat, assuring comfort and complete safety, maintaining an even room temperature as desired.

(4) Entire boiler is easily assembled. Housing has no screws or bolts. Interior of boiler easily accessible for cleaning.

(5) Insulation consists of dead air space entirely surrounded by heavy air cell asbestos. Outer casing is of especially treated rust-resisting sheet steel (toncan metal) beautifully enameled.

(6) Burners may be removed for cleaning without disturbing any fittings.

(7) BASMOR Gas Fired BOILERS are approved by the American Gas Association Testing Laboratory.

Quickly and Economically Installed

Simplicity of construction has reduced to a minimum the number of parts in BASMOR Gas Fired BOILERS. Furthermore, before they are shipped from the factory every boiler is completely tested and rigidly inspected for efficiency and perfection in construction. Packing is done carefully and complete instructions for assembling accompany each boiler.

When the boiler is delivered all parts are included, every part fits quickly and perfectly into its appointed place and assembling is a matter of the shortest possible time, the smallest possible labor and expense.

For Heavy Duty Water Heating

BASMOR Gas Fired BOILERS, automatically controlled, provide instant hot water at distinct savings over either the coal fired water heater or the coal or oil fired regular heating boiler. The need for high priced labor is done away with. Neither engineer nor fireman is required. Removal of ashes is eliminated. Wheelbarrows, shovels and bins become a thing of the past. Dirt and dust are no longer known. For further description, see other pages in this issue of SWEET'S CATALOGUES.

ESTABLISHED 1857

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Gas-Fired Steam and Hot Water Boilers

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Products

GAS-ERA GAS-FIRED STEAM and HOT WATER BOILERS, all-cast.

For Mueller Gas-Fired Warm Air Furnaces, Air Conditioning Systems, Registers, Grilles and Ventilators, see Manufacturers' Index.

Mueller Gas-Era Gas-Fired Boiler

Uses—For heating every type of residence, apartment, church, school or public building. For direct or indirect water heating. For supplying low pressure steam for industrial uses, and operating air conditioning and drying apparatus.

No. 25-W Gas-Era Water Boiler

Capacities—In steam from 420 to 12,600 sq. ft. In water from 670 to 20,100 sq. ft.

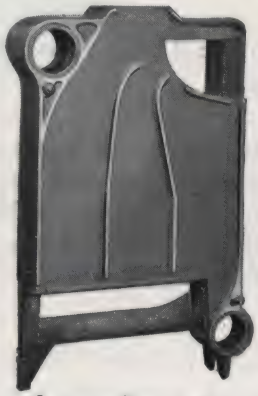
Operation—Entirely automatic. All devices operate in conjunction with room control.

Uniform results are secured, regardless of normal fluctuations in gas pressure.

Gas-Era Boilers are compact, sturdy and attractive. The casing, in contrasting colors, is finished by the same process as high grade automobile bodies. The shield conceals manifold, cocks and mixers.

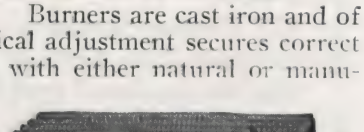
Construction—All interior surfaces are vertical and present a smooth surface which does not collect incrustation, and are accessible for cleaning, without removal of jacket. Flues are narrow, presenting extensive surface; no lugs to corrode. All exterior surface is water-backed. No loose base, end or top plates to leak air and lose heat. Heat absorbing tubes between burners secure individual and controlled secondary air supply to each burner.

Condensation is entirely eliminated within the boiler while maintaining high efficiency. Design of sections insures maximum heat absorption over every square inch of the unusually large area of prime surface. The extended surface of the sections is accurately ground and forms iron-to-iron contact; the flues are permanently gas-tight. Due to the small volumetric content and individual flues, damage by explosion is impossible. Liberal water holding capacity and ample steam space is provided in the sections. Steam boilers maintain a steady water line. Water boilers have free and positive circulation which cannot be reversed.



Intermediate and Burner Sections

Burners are cast iron and of stream line design. Vertical adjustment secures correct overhead for combustion with either natural or manufactured gas. Gas-Era Boilers are furnished with all equipment necessary for complete automatic operation.



Cast Iron Stream Line Burner

SIZES, CAPACITIES AND REQUIRED FLOOR SPACE FOR GAS-ERA HEATING BOILERS
Basement headroom for all sizes, 5 ft. Flues should not be less than total area of all vents

Boiler No.		A. G. A. ratings, sq. ft.		Floor space, in.	Vents		Size gas conn. required, in.		Boiler No.		A. G. A. ratings, sq. ft.		Floor space, in.	Vents		Size gas conn. required, in.	
Steam or vapor	Hot water	Steam or vapor	Hot water		Number	Diam., in.	Mfd. gas	Nat. gas	Steam or vapor	Hot water	Steam or vapor	Hot water		Number	Diam., in.	Mfd. gas	Nat. gas
13-S	13-W	420	670	31¼x46½	1	4	1¼	1	1225-S	1225-W	5,040	8,040	120½x 53⅝	3	10	2½	2
25-S	25-W	840	1,340	39 x47⅞	1	7	1½	1¼	1327-S	1327-W	5,460	8,710	128¼x 54¾	3	11	2½	2
37-S	37-W	1,260	2,010	46¾x51⅞	1	9	1½	1¼	1429-S	1429-W	5,880	9,380	136 x 54¾	3	11	2½	2
49-S	49-W	1,680	2,680	54½x53⅝	1	10	2	1¼	1531-S	1531-W	6,300	10,050	143¾x 54¾	3	11	2½	2
511-S	511-W	2,100	3,350	62¼x54¾	1	11	2	1½	1634-S	1634-W	6,720	10,720	87½x107¼	2	14	2½	2
613-S	613-W	2,520	4,020	70 x51⅝	2	9	2	1½	1838-S	1838-W	7,560	12,060	95¼x109½	2	16	3	2½
715-S	715-W	2,940	4,690	79¾x53⅝	2	10	2	1½	2042-S	2042-W	8,400	13,400	103 x109½	2	16	3	2½
817-S	817-W	3,360	5,360	87½x53⅝	2	10	2	2	2246-S	2246-W	9,240	14,740	110¾x112¼	2	17	3	2½
919-S	919-W	3,780	6,030	95¼x54¾	2	11	2	2	2450-S	2450-W	10,080	16,080	120½x107¼	3	14	3½	3
1021-S	1021-W	4,200	6,700	103 x54¾	2	11	2	2	2654-S	2654-W	10,920	17,420	128¼x109½	3	16	3½	3
1123-S	1123-W	4,620	7,370	110¾x56⅛	2	12	2	2	2858-S	2858-W	11,760	18,760	136 x109½	3	16	3½	3
									3062-S	3062-W	12,600	20,100	143¾x109½	3	16	3½	3

THE PEERLESS HEATER COMPANY

Manufacturers of Peerless Super-Section Gas Fired Boilers for Steam, Hot Water, Vapor Heating and Hot Water Supply Systems

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New Peerless Super Section Gas Boilers

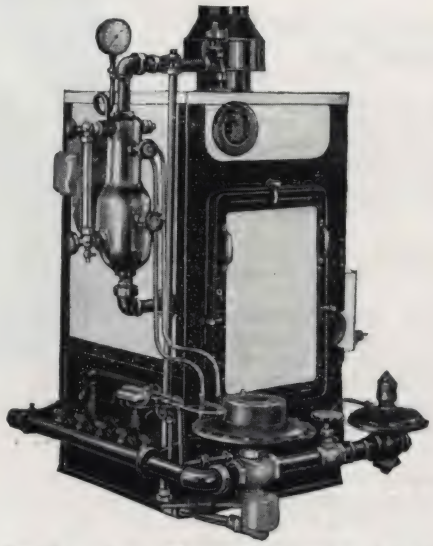
Products of nearly twenty years experience in the development of gas heating equipment, these new Peerless Super Section Gas Boilers for water and steam are thoroughly modern and efficient. Built in two section sizes, 3 and 5 in., they meet every practical heating requirement, from smallest home to the largest public building.

These boilers have been tested and approved in accordance with the codes of the American Gas Association and the American Society of Heating and Ventilating Engineers.

Exclusive Peerless features are: Peerless patented water tube super section, a most efficient type of boiler construction; the Peerless clean-out doors, providing easy access to flues from both ends of the boiler.

Peerless Burners are of advanced design, raised port, center tapped type. Venturi mixing tubes and patent demixers produce efficient bunsen flame with absolute quiet shut-off.

Further information and prices will be sent on request.



New Peerless Super Section Gas Boiler for Steam, A.G.A. Approved

A. G. A. Ratings				Dimensions								
Water		Steam									Capacity of meter cu. ft. per hour	
Boiler No.	Rating, sq. ft.	Boiler No.	Rating, sq. ft.	Number of sections	Flow and return tapping	Length between tappings	Location int. tap sections from right	Vent. hoods Number Size	Gas valve and reg.	Safety valve	Nat. gas	Mfd. gas
3-in. Super Section Gas Boilers												
3-W-3	540	3-S-3	330	3	2-3″	11 15/16″	.....	1-6″	1″	¾″	100	200
4-W-3	800	4-S-3	500	4	2-3″	15⅝″	.....	1-8″	1″	¾″	150	300
5-W-3	1010	5-S-3	630	5	2-3″	19 5/16″	.....	1-8″	1¼″	1″	190	380
6-W-3	1220	6-S-3	760	6	2-3″	23 1/16″	.....	1-8″	1¼″	1″	230	460
7-W-3	1310	7-S-3	820	7	2-3″	27 7/16″	.....	2-6″	1¼″	1″	270	535
8-W-3	1490	8-S-3	930	8	2-3″	31⅜″	.....	2-6″	1¼″	1¼″	305	610
9-W-3	1680	9-S-3	1050	9	2-3″	35 5/16″	.....	2-6″	1½″	1¼″	345	685
10-W-3	1870	10-S-3	1170	10	2-3″	39¼″	.....	2-6″	1½″	1¼″	380	760
11-W-3	2050	11-S-3	1290	11	2-3″	43 3/16″	.....	2-6″	1½″	1¼″	420	835
12-W-3	2240	12-S-3	1400	12	2-3″	47⅛″	.....	3-6″	2″	1¼″	460	915
13-W-3	2430	13-S-3	1530	13	3-3″	51 1/16″	7th	3-6″	2″	1½″	495	990
14-W-3	2610	14-S-3	1630	14	3-3″	55″	7th	3-6″	2″	1½″	535	1065
15-W-3	2800	15-S-3	1750	15	3-3″	58 15/16″	7th	3-6″	2″	1½″	570	1140
16-W-3	2990	16-S-3	1870	16	3-3″	62⅞″	7th	3-6″	2″	1½″	610	1215
17-W-3	3170	17-S-3	1980	17	4-3″	66 13/16″	7th-13th	4-6″	2″	1½″	650	1295
18-W-3	3360	18-S-3	2100	18	4-3″	70¾″	7th-13th	4-6″	2″	2″	685	1370
19-W-3	3550	19-S-3	2220	19	4-3″	74 11/16″	7th-13th	4-6″	2″	2″	725	1445
20-W-3	3730	20-S-3	2330	20	4-3″	78⅝″	7th-13th	4-6″	2″	2″	760	1520
5-in. Super Section Gas Boilers												
5-W-5	2770	5-S-5	1730	5	2-5″	26″	.....	1-10″	2″	1½″	520	1040
6-W-5	3330	6-S-5	2080	6	2-5″	31¼″	.....	1-12″	2″	2″	625	1250
7-W-5	3880	7-S-5	2430	7	2-5″	36½″	.....	1-12″	2″	2″	730	1460
8-W-5	4440	8-S-5	2775	8	2-5″	41¾″	.....	1-14″	2½″	2″	835	1665
9-W-5	4990	9-S-5	3120	9	2-5″	47″	.....	1-14″	2½″	2″	935	1870
10-W-5	5550	10-S-5	3470	10	2-5″	52¼″	.....	1-14″	2½″	2″	1040	2080
11-W-5	6100	11-S-5	3815	11	2-5″	57½″	.....	1-16″	2½″	2½″	1145	2290
12-W-5	6650	12-S-5	4160	12	2-5″	62¾″	.....	2-12″	2½″	2½″	1250	2495
13-W-5	7200	13-S-5	4505	13	2-5 & 1-3″	68″	7th	2-12″	2½″	2½″	1350	2705
14-W-5	7770	14-S-5	4855	14	2-5 & 1-3″	73¼″	7th	2-12″	2½″	2½″	1455	2910
15-W-5	8320	15-S-5	5200	15	2-5 & 1-3″	78½″	7th	1-12″ 1-14″	2½″	2½″	1560	3120
16-W-5	8870	16-S-5	5550	16	2-5 & 1-3″	83¾″	7th	2-14″	3″	2½″	1665	3330
17-W-5	9430	17-S-5	5895	17	2-5 & 2-3″	89″	7th-13th	2-14″	3″	3″	1770	3535
18-W-5	9980	18-S-5	6240	18	2-5 & 2-3″	94¼″	7th-13th	2-14″	3″	3″	1875	3745
19-W-3	10540	19-S-5	6585	19	2-5 & 2-3″	99½″	7th-13th	2-14″	3″	3″	1980	3955
20-W-5	11090	20-S-5	6935	20	2-5 & 2-3″	104¾″	7th-13th	2-14″	3″	3″	2080	4160
21-W-5	11650	21-S-5	7280	21	2-5 & 2-3″	110″	7th-15th	1-14″ 1-16″	3″	3″	2185	4370
22-W-5	12200	22-S-5	7625	22	2-5 & 2-3″	115¼″	7th-15th	2-16″	3″	3″	2290	4575

All Peerless *Super Section* Boilers, Completely Fitted with Following Accessories—

Metal Insulated Jacket (Choice of six colors); Automatic Gas Valve with Electric Control Valve; Transformer; Automatic Safety Pilot; Regular Pilots and Pilot Cock (necessary piping and copper tubing for both); Labeled Shut-Off Valve; Gas Pressure Regulator; Drain Cock; Draft Hoods; Clean-Out Brush.

Peerless *Super Section* Water Boilers for Steam or Vapor Heating Systems—

Automatic Steam Pressure Control; Throttling Valve; Low Water Safety Cut-Off; Pressure Relief Valve; Steam Gauge and Syphon; Water Column with Gauge and Tri-Cocks.

Peerless *Super Section* Water Boilers for Hot Water Heating Systems—

Automatic Water Temperature Control; Combination Altitude Gauge and Thermometer.

GAR WOOD ENGINEERING COMPANY

Manufacturers of the Gar-Wood Balanced Heating Unit

4196 Bellevue Avenue
DETROIT, MICH.

Gar-Wood Balanced Heating Unit

The unit consists of Boiler, Burner Assembly, Automatic Controls, special pipes, valves and electrical connections.

Advantages of the Gar-Wood Heating Plant

Automatic Heat — Controlled heat without manual operation.

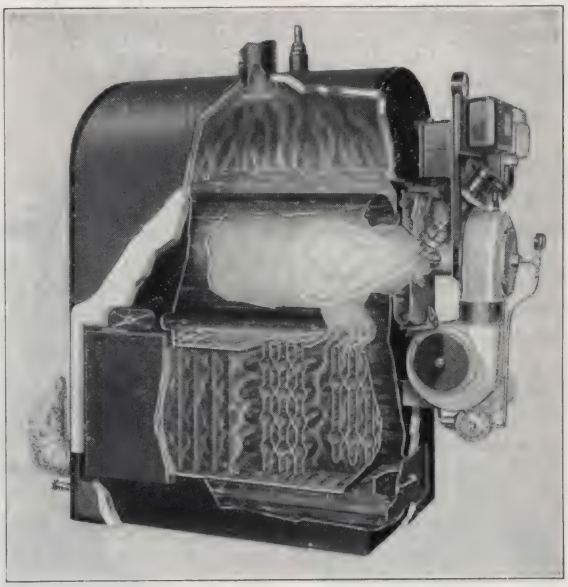
Low Installation Cost—The system is a complete unit shipped ready for pipe connections, etc.

Low Heating Costs — Efficiency is high for a home heating unit.

Safety—Full automatic controls of approved design provide for any contingency.

Domestic Hot Water — The system can be provided with a heat interchanger to provide hot water.

Oil or Gas—A quick, minor change in piping adapts the Gar-Wood to either fuel.



The Burner

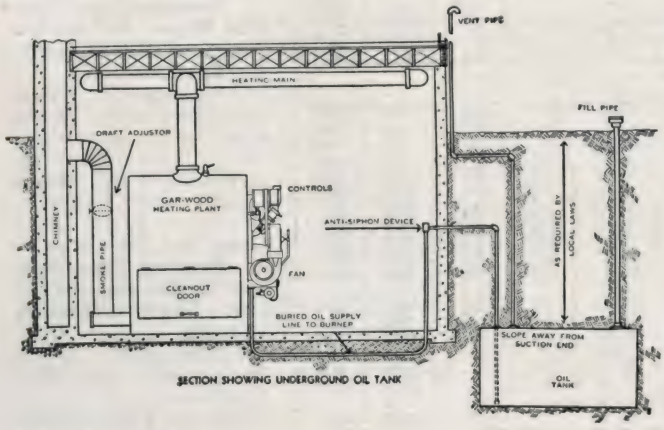
The Gar-Wood Burner (mechanical draft, atomizer type) is engineered to fit the Gar-Wood Boiler. The oil fuel is delivered through a reservoir which acts as a preheater in that its mounting on front of the boiler keeps the oil at boiler-temperature. Leaving the reservoir, the oil is delivered by pump to the fuel nozzle. A centrifugal fan drives air to a chamber shaped like a huge air-washer nozzle where it assumes a whirling motion. Thus nearly perfect combustion is accomplished—for a finely atomized spray of oil is properly mixed with a definite and controlled volume of air and the fuel is burned in suspension without refractory linings.

The Boiler

The Gar-Wood Boiler is actuated by the same principles which make the Junkers Calorimeter a standard of combustion efficiency, the principle of "contrary flow."

Fuel burns in the cylindrical combustion chamber (upper part); gases travel downward between water tubes (middle section), then to the collecting flue (lowest part of the boiler). Conventional practice is literally reversed.

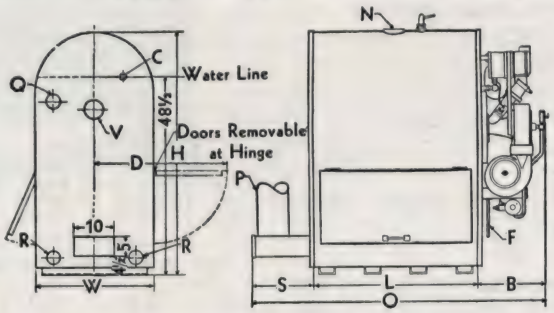
During the "warming up" period, water surrounding the Gar-Wood combustion chamber heats to the boiling point, while water lower in the boiler gradually becomes warm. Quick steaming is the result. The Gar-Wood Boiler is available in three sizes, having these net capacities of steam radiation: 800 sq. ft., 1200 sq. ft., 1600 sq. ft. These take care of small, medium or large homes—while for the very large home, hotel, etc., adequate heat is provided by a battery installation.



SECTION SHOWING UNDERGROUND OIL TANK

Automatic Controls

The Gar-Wood balanced heating unit employs only recognized, time-tried automatic controls. It utilizes the Minneapolis-Honeywell Protectorelay, a master control through which the room thermostat, boiler limit control, protectostat, etc., are interconnected. The room thermostat employed permits adjustment through a variation of 40°. It may be set at any time to give any temperature desired between 50° and 90° F. Water level controls applied to the boiler automatically shut off the flame in the burner when the water reaches a dangerously low level. An aquastat is used with domestic hot water installations to maintain the water at any desired temperature.



DIMENSIONS AND PIPE SIZES

		No. 800	No. 1200	No. 1600
L	Length without insulation ... in.	28¾	39¼	49¾
	(Length with insulation) ... in.	30¾	41¼	51¾
W	Width without insulation ... in.	27	27	27
	(Width with insulation) ... in.	29	29	29
H	Height without insulation ... in.	58½	58½	58½
	(Height with insulation) ... in.	59½	59½	59½
O	Over-all length ... in.	63¼	73¾	84¼
D	*Door clearance from boiler center ... in.	30	30	30
N	Size of steam outlet ... in.	4	4	(two) 4
F	Oil line (copper tubing) ... in.	½	½	½
P	Stack diameter ... in.	9	9	9
V	Rear vent (connect only for gas firing) ... in.	4	4	4
C	Water heater adapter opening ... in.	2½	2½	2½
R	Water return ... in.	(two) 2½	(two) 2½	(two) 2½

*Indicates dimension plus thickness of insulation.

CAPACITIES, WEIGHTS AND RATINGS

	No. 800	No. 1200	No. 1600
Total capacity (steam) normal oil firing ... sq. ft.	1,080	1,620	2,160
Net radiation load (steam) ... sq. ft.	800	1,200	1,600
Net radiation load (hot water) ... sq. ft.	1,280	1,920	2,560
Water capacity ... gal.	80	104	128
Weight (boiler only) ... lb.	1,366	1,832	2,175
Weight, burner ... lb.	275	275	275
Weight, boiler jacket ... lb.	175	200	225
Heating surface ... sq. ft.	105	152	199
Output per hour at nozzle ... B.t.u.	260,000	390,000	520,000

AUBURN STOKER CORPORATION

AUBURN, IND.

REPRESENTATIVES IN PRINCIPAL CITIES

"Underfeed Type" Hydraulic Stokers

Sizes—Auburn Hydraulic Stokers are built in 9 sizes, to handle from 3000 sq. ft. radiation to 250 hp., low or high pressure. The size of stoker required is determined by the size of the boiler and load conditions.

Principle—Thirty-five years' experience in the design and construction of high grade stoking apparatus is behind the Auburn Hydraulic Stoker today. Years of scientific research and development have led Auburn Stoker engineers to adopt the Hydraulic principle as offering dependability, positive operation, and simplicity of construction. All materials are guaranteed for one year against defective parts or workmanship.

Operation—The main coal ram, directly connected to the piston rod of the hydraulic motor, moves back and forth below the bottom of the coal hopper, charging from 4 to 6 lb. of coal at each stroke. The movement is slow and positive, and the pressure in the cylinder builds up just sufficient to overcome the resistance of the coal and the fire bed. Under normal operating conditions, the pressure on the oil line is between 50 and 100 lb. per sq. in., but all stokers are tested at 300 lb. to the sq. in. before leaving the factory.

Assembly—The Auburn Stoker consists of two units—the *power unit* consisting of the fan, motor, and oil pressure pump; the *stoker unit* consisting of the hydraulic motor, stoker throat, and the retort and tuyere assembly.

The power unit is entirely independent of the stoker unit, and can be placed at any convenient location, at either side or behind the boiler, in an adjacent room, or if necessary on top of the boiler. This flexibility leaves the front of the boiler clear for easy accessibility to the fire, or to the boiler.

The stoker unit also conserves space through compact construction, and due to this compactness, the hydraulic motor with its straight line motion, variable speed over a wide range, and increasing quietness with use insures positive operation.

Salient Features—(1) The oil pump is a high speed type to handle a small volume of oil at high pressure, and is a rotary gear type, operating at standard motor speeds. Ball bearings and seal ring type of packing are standard. The complete pump and bearings are self-lubricating.

(2) Forced draft capable of regulation over a wide range of loads.

(3) The introduction of green coal from the bottom by means of the reciprocating ram moving at variable speeds, back and forth.

(4) Uniform distribution of coal the full length of the retort, by means of secondary pushers or distributors, that are adjustable for physical characteristics of different coals.

(5) Specially designed tuyeres, or air orifices in the firebox to permit entrance of air at the proper place without subjecting the tuyere itself to the action of the fire.

(6) Sufficient deliverance between adjacent sections of tuyeres to allow for expansion from heat, thus eliminating injury or breakage.

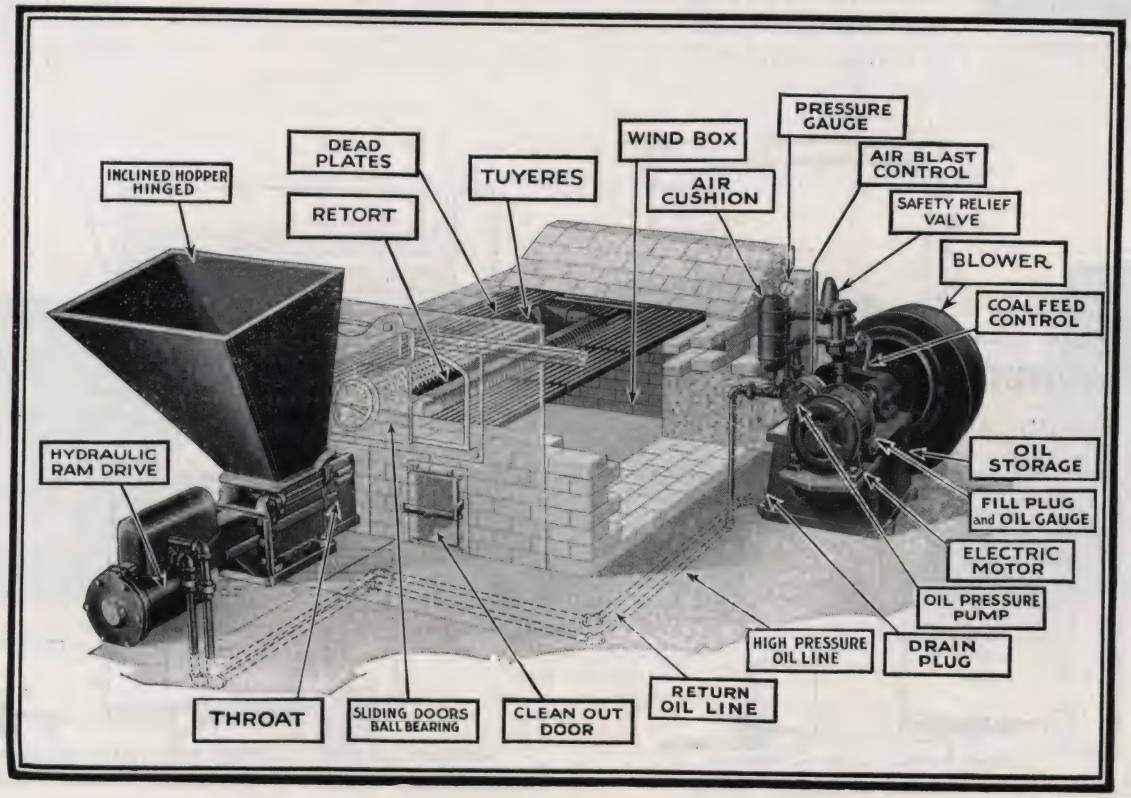
(7) The introduction of the air from the sides of comparatively narrow retorts so that the air from each side will permeate the fuel mass to the center, and thoroughly mix with the volatile gases being driven off the green coal at the base of the fire. This permits the air to completely burn the smoke or gas in the presence of incandescent carbon.

(8) The patented Auburn speed control has wide variation. Will operate feed from maximum stoker capacity down to 30 lb. coal per hour, by means of a simple throttle control lever.

(9) Automatic controls start and stop the Auburn Hydraulic Stoker. They are made for every type of plant—proper units are supplied with each installation. Three types of pressure controls are standard; one for steam boilers of any pressure, one for low pressure, and one for vacuum systems. A hot water control is used for hot water boilers.

Wide Range of Application—Today the Auburn Hydraulic Stoker is being used for heat or power in practically every type of commercial and industrial building. Typical examples are factories of every description, office buildings, churches, country clubs, schools, laundries, hotels, apartments, dairies, greenhouses, bakeries, foundry core ovens, heat treating ovens, smelting and roasting furnaces.

Users—A file of letters and a list of users will be gladly sent upon request.



COMBUSTIONEER, INC.

Combustioneer Automatic Coal Burners

GOSHEN, INDIANA, U. S. A.

FACTORY BRANCHES: CHICAGO, ILL., AND DETROIT, MICH.

Product

COMBUSTIONEER AUTOMATIC COAL BURNERS, for furnaces and boilers, high or low pressure, old or new; in all types of buildings where heat or power is used.

THE COMBUSTIONEER
AUTOMATIC COAL BURNERS

Features

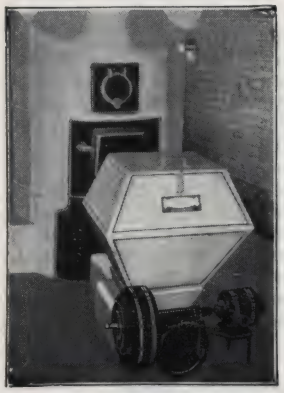
Sectional retorts
Cast iron hopper bases
Copper bearing sheet metal hoppers and air ducts
Overrunning intermittent drive
Direct connected motor
Heavy fan housing
Air controlled at intake
Sirocco fans
Even fuel distribution
Properly agitated fuel bed
Splash oil system
No shearing pins to change
Multiple coal feeds
Cut gears, precision built
Shearing plate

Approval

The Combustioneer is approved by the Investigating Committee of Architects and Engineers, and by thousands of users.

Capacities

The Combustioneer is built in eight different sizes. Adaptable to boilers and furnaces requiring as little as 15 lb. coal per hour up to those requiring 1200 lb. per hour.



The Furnastoker

Warm air capacity maximum of 1700 sq. in. of area of outlet pipes

The Furnastoker

Here is a small edition of forced-draft underfeed stoker, for homes and small apartment buildings. It handles easily 1100 ft. of steam radiation. Burns bituminous mine screenings without smoke or soot.

The Furnastender

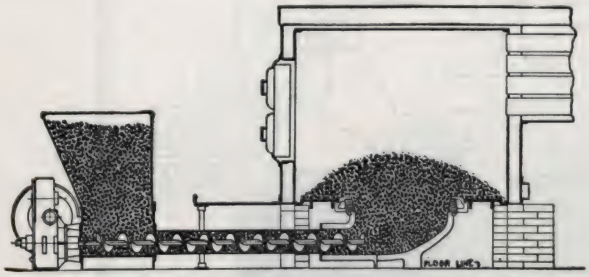
This splendidly made device automatically feeds coal and forced draft to the domestic warm air furnace.

It handles either small size bituminous or anthracite, small nut or pea coal.

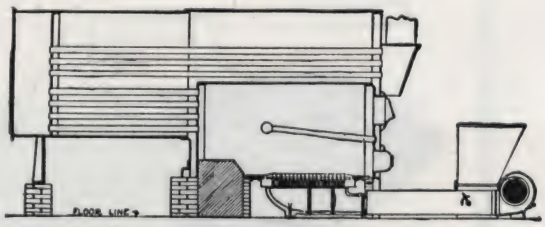
It is completely controlled by electric thermostats.

The Furnastender

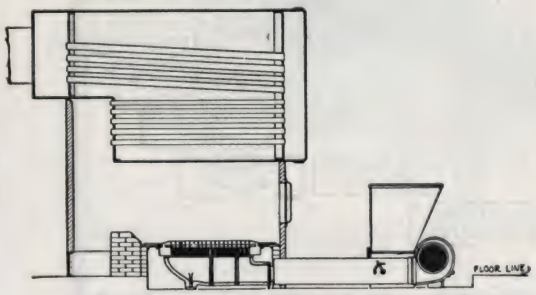
Warm air capacity maximum of 850 sq. in. of area of outlet pipes



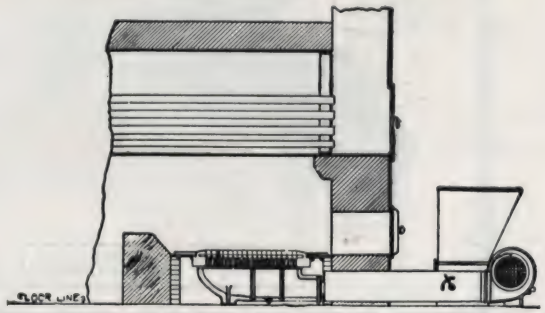
Combustioneer Applied to Direct-draft Boiler



Combustioneer Applied to Down-draft Boiler



Combustioneer Applied to Firebox Boiler



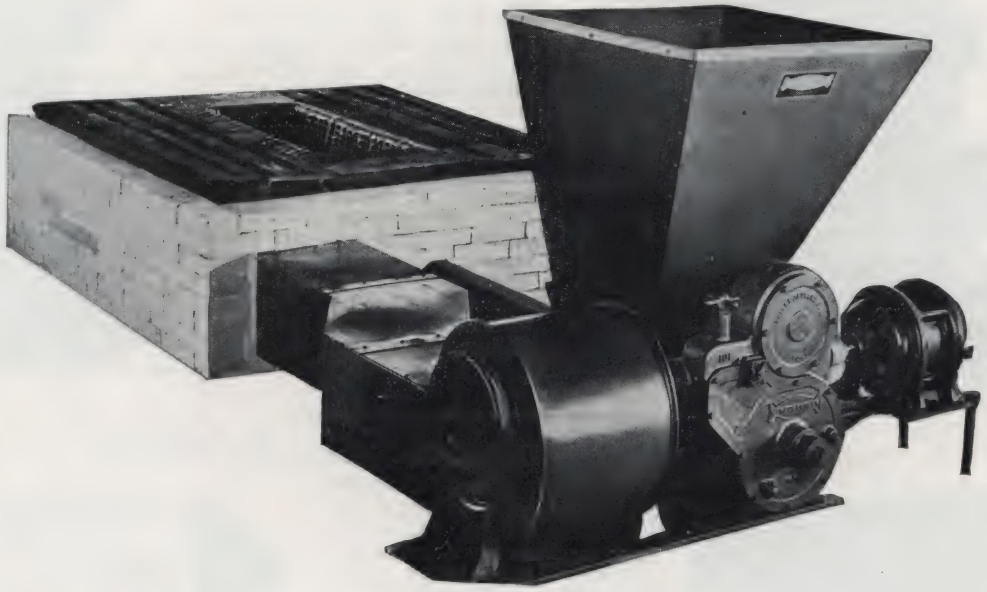
Combustioneer Applied to Horizontal Return Tubular Boiler

Continued on next page

COMBUSTIONEER CAPACITY RATINGS

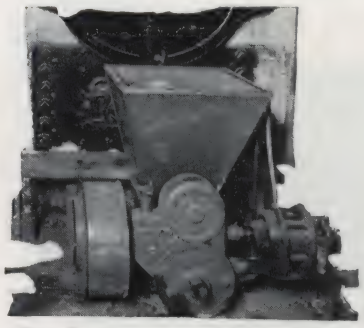
Based on 11,500 B.t.u. coal—motor speed 1750 r.p.m.

Model	Coal burning capacity		Motor hp.	Boiler hp.	Capacity steam radiation, sq. ft.	Capacity hot water radiation, sq. ft.
	Per hr., max.	Per hr., min.				
Furnastender	25	25	1/6	5	550	880
Furnastoker	50	25	1/4	10	1,100	1,760
No. 11	110	15	1/2	22	2,420	3,872
No. 20	200	45	1	40	4,400	7,040
No. 35	350	45	1 1/2	70	7,700	12,320
No. 50	500	100	2	100	11,000	17,600
No. 80	800	100	3	160	17,600	28,160
No. 120	1200	100	5	240	26,400	42,240

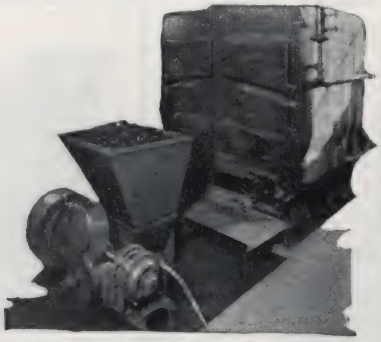


COMBUSTIONEER MODEL 120

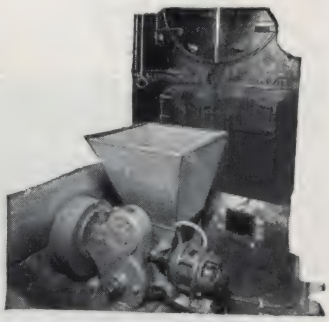
The model pictured above is the leader of the Combustioneer line, a big, sturdy machine built of the finest materials obtainable and to the high standard of precision manufacture adhered to by COMBUSTIONEER, INC. All of the points of Combustioneer superiority are to be found in this machine, providing unsurpassed service under heavy duty. This model has a maximum burning capacity of 1200 lb. of coal per hour, and is powered with a 5 hp. electric motor. Any type of automatic control desired may be used.



Combustioneer Installed on a Firebox Type Heating Boiler



Typical Installation of Combustioneer on a Cast Iron Sectional Boiler



Combustioneer Attached to a Horizontal Return Tubular Boiler—Pit Installation

DETROIT STOKER COMPANY

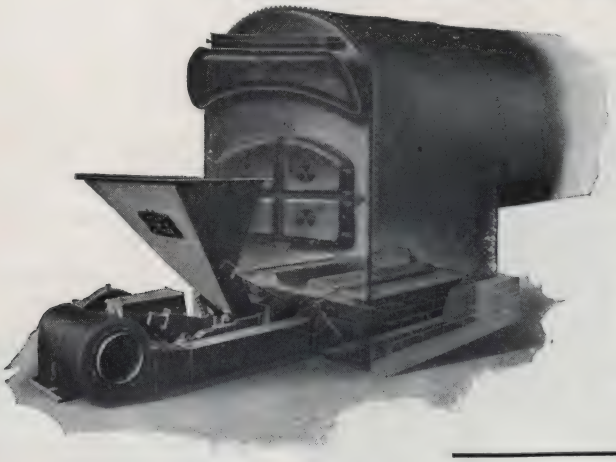
SALES AND ENGINEERING OFFICES
Third Floor General Motors Building
DETROIT, MICH.

MAIN OFFICE AND WORKS AT MONROE, MICH.
IN CANADA: Detroit Stoker Company of Canada Limited, WINDSOR, ONTARIO
Detroit Stokers are built in Canada for the Canadian Trade

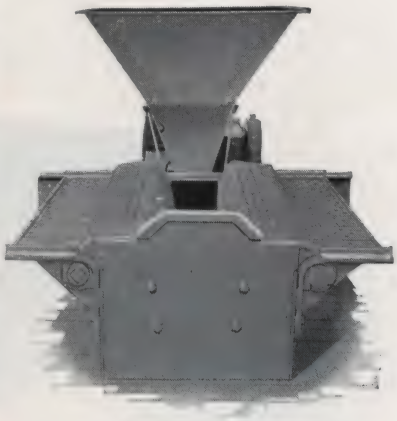
For Every Service—A Detroit Stoker

Detroit Stokers are built to serve all types and sizes of boilers. Outstanding features of design and construction representing experience of over thirty years in this business exclusively are described in catalogs which will be mailed upon request. Proper design and application by experienced builders produce best results.

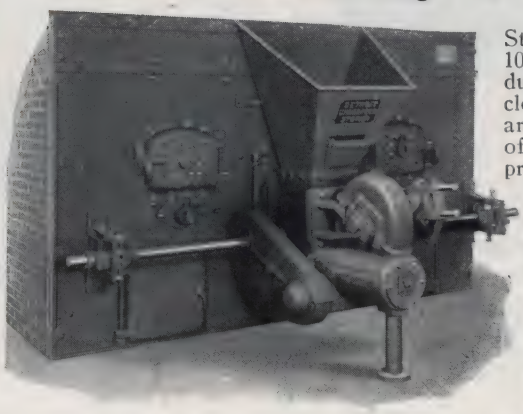
Detroit Junior Stoker—For Automatic Heat at Low Cost (Side Cleaning)



Built in twenty-one sizes this stoker furnished to exactly fit the boiler and provide large grate area to suit load. Small motor, blower and Stoker Drive combined into one compact unit. Plunger coal feed employed is positive and dependable. Stoker automatically controlled by steam pressure or room temperature. Ash dumps provided. Ashes dropped into pits are removed through doors at front. Boiler room kept free from dirt and dust. Stoker is of simple design but substantially built. Bulletin No. 358.



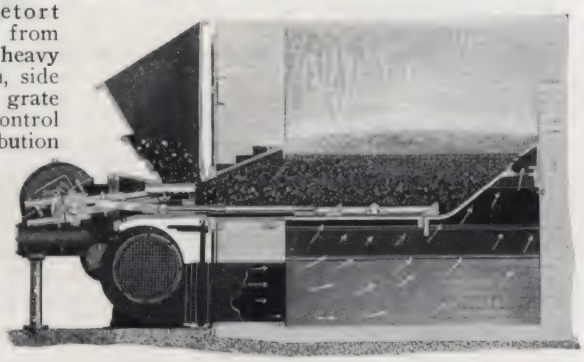
Detroit Single Retort and Detroit UniStoker (Side Cleaning)



Detroit Single Retort Stokers to serve boilers from 100 hp. to 300 hp. are heavy duty, mechanically driven, side cleaning. Large active grate area with independent control of fuel feed and distribution provided. Bulletin 258.

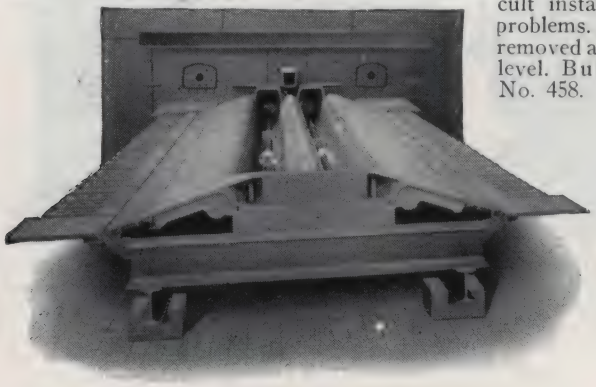
At left: Single Retort Stoker with line shaft. Stoker and blower driven by steam engine, turbine or electric motor automatically controlled.

At right: UniStoker design of Single Retort Stoker in which motor or turbine driven blower and stoker drive are combined into compact unit at stoker front.

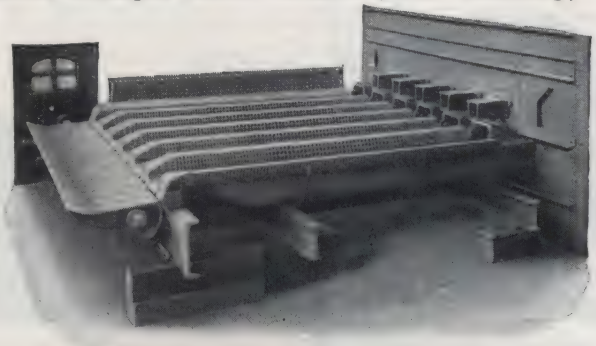


Detroit Double and Triple Retort Stokers (Side Cleaning)

Built with two or three retorts. Side cleaning Multiple Retort Stokers. For heavy service. Designed to meet difficult installation problems. Ashes removed at floor level. Bulletin No. 458.



Detroit Multiple Retort Stoker (Rear Cleaning)



For large boilers. A highly efficient, heavy duty stoker. Features include level fuel bed, independent control of fuel feed and distribution for each retort. Large retort area permits high combustion rate with low air pressure. Bulletin No. 158.

WHITING CORPORATION

JOSEPH HARRINGTON COMPANY, SUBSIDIARY

Engineers and Manufacturers of Whiting Stokers and Industrial Equipment

15611 Lathrop Avenue
HARVEY, ILL.
(Suburb of Chicago)

Product

WHITING AUTOMATIC MECHANICAL STOKERS.

Description

The Whiting Stoker is a completely automatic mechanical stoker of small size, ranging from 18 to 56 sq. ft. of effective grate surface, and suited to boilers of 25 to 250 hp. There are two models, the regular or Model-A and the Model-C (low-set). They differ only in the grates, which are horizontal in the Model-C, (enabling installation under low-set boilers), and tilted to about 10 degrees in the Model-A, sloping to the rear of the boiler.

Scope

The Whiting Stoker is adapted to the full range of bituminous and lignite fuels (screenings) and will burn, smokelessly, up to 50 lbs. or more coal per sq. ft. of grate surface per hour.

It is adapted to all industries having boiler units of less than 250 hp. and is particularly suited for buildings, apartments, schools, etc., as well as laundries and the smaller industrial establishments.

Construction

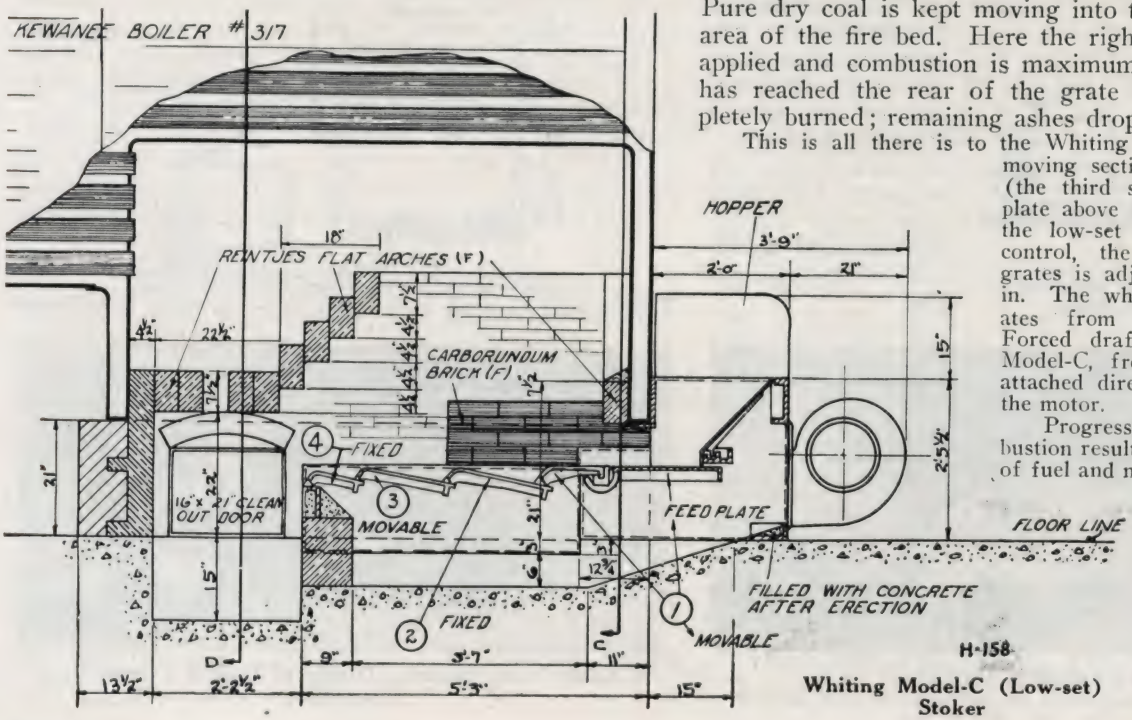
Both models of the Whiting Stoker are essentially the same, differing in the front height and the scope of the grates, as already explained. The Whiting Stoker is a front overfeed, stepped grate mechanism, having two stationary and two movable grate sections. The feed hopper and the feed plate are indicated in the accompanying line drawings by the numeral "1." This feed plate is a combination section, forming the bottom of the coal hopper as well as the first of the four grate sections. The rear end of this grate section rests and slides upon the stationary grate "2." In turn, the second grate section rests upon grate "3." The third grate section, being movable, rests and slides upon "4," at the same time sliding back and forth under grate "2." Grate "4" is stationary.

The movable steps, or grates, have a reciprocating action which causes the coal in the hopper to move along to the ash plate, or pit. The backward and forward motion of grates "1" and "3" provides a uniform feed at all times, keeps the fuel bed even and provides a certain disturbance for the coal (as it drops from step to step and is shoved along by pressure from behind), which makes caking and clinkers impossible. The bed is thoroughly aerated and all combustible elements are consumed.

"Progressive Combustion" is used to describe the progress of fuel through the fire bed of the Whiting Stoker. On account of the regularity of events in the combustion of coal, it has been possible to design this stoker with fuel bed, conditioning, air supply, etc., exactly in harmony with these events—in harmony with combustion efficiency requirements. In the Whiting Stoker the coal heats as it enters the front of the fire bed and the volatiles escape. Combustible volatiles are burned as they pass over the fire bed and hot bricks. Pure dry coal is kept moving into the whitest, hottest area of the fire bed. Here the right amount of air is applied and combustion is maximum. Before the fuel has reached the rear of the grate surface it is completely burned; remaining ashes drop into the pit.

This is all there is to the Whiting Stoker. Only three moving sections in the Model-A (the third section being an ash plate above the pit), and two in the low-set model. To provide control, the movement of the grates is adjustable from 1 to 4 in. The whole mechanism operates from a ½ hp. motor. Forced draft is used with the Model-C, from an enclosed fan attached directly to the shaft of the motor.

Progressive, thorough combustion results in greater economy of fuel and more heat. The Whiting Stoker is known for its economies: cheaper fuel (screenings), less fuel, less labor, less cleaning (smokeless), less ash disposal, less loss in production because of unsteady heating.



Whiting Model-C (Low-set) Stoker

IRON FIREMAN MANUFACTURING CO.

Automatic Coal Burners

PORTLAND, ORE.

BRANCH OFFICES

CLEVELAND, OHIO · MILWAUKEE, WIS. · CHICAGO, ILL. · ST. LOUIS, MO. · NEW YORK, N. Y.

Representatives in More Than 300 American Cities

Product

IRON FIREMAN AUTOMATIC COAL BURNERS for industrial power and heating plants, and for homes.

"Forced Underfiring" Principle

Iron Fireman "Forced Underfiring" is based on the scientific principle of feeding fuel to the fire from below, under forced draft.

From the feed worm, coal enters the firebox under the fire and is gradually forced upward into the flame. As the coal approaches the fire, it is gradually heated to the proper temperature for complete combustion. The volatile gases are distilled off in the presence of an excess of oxygen and as they pass upward through the incandescent firebed they are completely consumed. The ash is fused into clinkers which are easily lifted out.

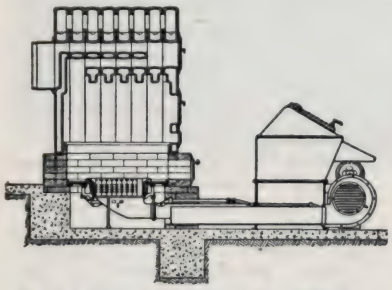
Iron Fireman "Forced Underfiring" produces a firebox temperature 500° to 1000° hotter than hand firing, as actual tests from many installations show.

Installation and Sizes

The Iron Fireman is made in a range of sizes for home boilers and furnaces and for commercial heating and power plants. It can be installed quickly in practically any solid fuel boiler or furnace, old or new.

If necessary, the installation can be made with practically no interruption of the service from the boiler.

Machines are shipped complete from the factory. All parts are standard and interchangeable.

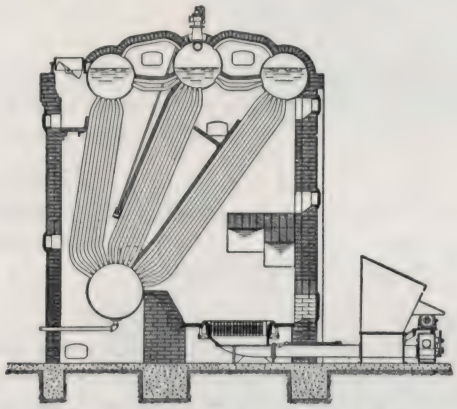


Typical Iron Fireman Installation Under Cast Iron Boiler

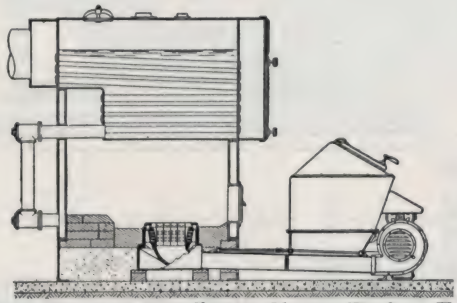
Features of Design

Operation of the Iron Fireman is characterized by simplicity throughout.

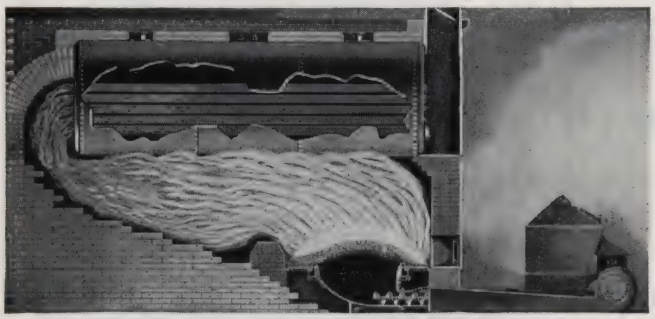
Iris shutter air intake control governs application of forced draft. Cast iron sectional dead plates and tuyere blocks are air cooled. The machine itself is protected by a soft steel shear pin of the proper size and material. The motor is thoroughly protected by an electric overload device.



Typical Iron Fireman Installation Under Four-drum Water Tube Boiler

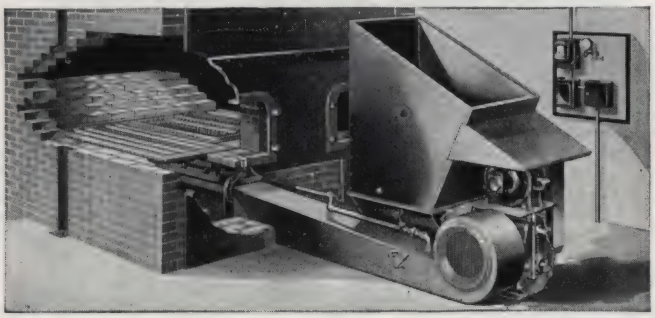


Typical Iron Fireman Installation Under Firebox Type Boiler



Iron Fireman in Operation

Installed under horizontal return tubular boiler. Low bridge wall. Hot "blast furnace" fire



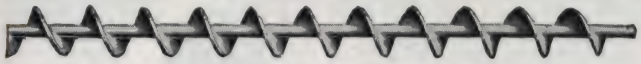
Cutaway View, Showing Details of Typical Iron Fireman Installation

Continued on next page

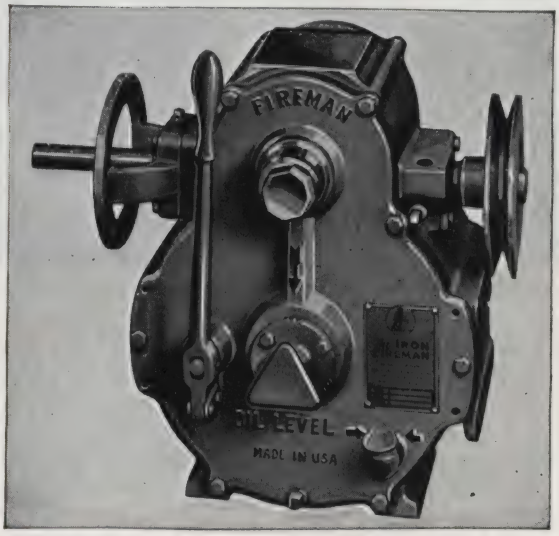
Continuous Feed Principle

The Iron Fireman transmission, which drives the feed worm, has three distinct speed ratios, each one continuous. No plungers or ratchets are used.

The continuous feed gradually and evenly conveys the coal into the retort, making ideal distribution of coal in the firebox and producing a fire with the minimum of agitation. The coal and all volatile gases are thus burned, so that a maximum of heat is obtained without smoke.



Iron Fireman Feed Worm



Iron Fireman Transmission (Gear Case)

All gears in the reduction gear transmission are made from the highest grade materials, the proper materials being selected for the requirements of each gear.

The best quality of bronze is used on all worm gears. Alloy steel is used on all other gears, most of which are drop forgings.

A high degree of accuracy is maintained in the manufacture of these reduction gear transmissions, exclusive of the commercial parts, such as ball bearings, etc. (and all of these are manufactured to very close limits). Each transmission has the following precision requirements of measurement:

Nine dimensions are machined to a tolerance of .0005 in.; fourteen to .001 in.; sixteen to .002 in.; twenty-one to .005 in.; twelve to .010 in.—making a total of 72 dimensions under .010 in. These precision standards result in noiseless operation and long life.

Automatic Controls

Automatic controls start and stop the Iron Fireman. They are made for every type of plant—proper units are supplied with each installation.

Two types of pressure regulators are standard; one for steam boilers of any pressure and one for low pressure and vacuum systems. A hot water control is used for hot water boilers. The clock or plain thermostat controls the temperature of residence or building. The furnace control provides for desired maximum temperature of firebox.

Constructed for Heavy Duty

The Iron Fireman is of durable construction—made for long, continuous, heavy duty service.

Today the Iron Fireman is being used for heat or power in practically every type of building or industry. Typical examples are factories of every description, office buildings, residences, churches, country clubs, schools, laundries, hotels, apartments, dairies and greenhouses.

Important Factor in Plant Economy

The Iron Fireman brings fuel economy by burning lower priced, slack coal and less of it. Labor is reduced to a minimum—the only duty of the fireman is to fill the hopper occasionally and remove clinkers when necessary.

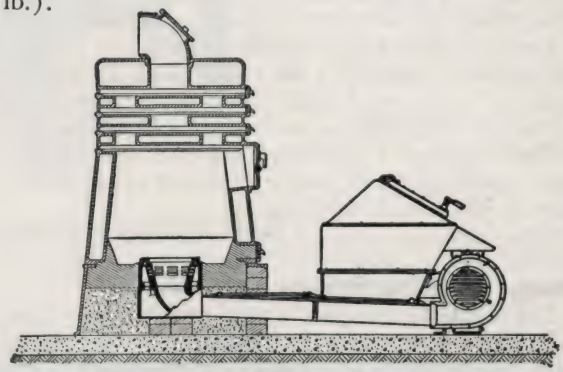
Iron Fireman users report savings of from 15% to 50% on fuel costs alone.

In a recent investigation of 342 users, fuel savings alone averaged an earning of 39.44% a year on the total cost of their installations.

Iron Fireman for Homes

The Iron Fireman "De Luxe" model for homes can be installed quickly in practically any kind of a home furnace.

Employs "Forced Underfiring" principle the same as larger machines, with simplified operation. The enclosed hopper accommodates sufficient small-size coal for an ordinary day's consumption (approximately 300 lb.).



Iron Fireman Installed in a Domestic Boiler

The Iron Fireman clock thermostat automatically regulates the room temperature, bringing it up to the desired day temperature in the morning and lowering it to the night level. Furnace controls govern desired temperatures of firebox and thereby safeguard the furnace.

The Iron Fireman "De Luxe" burner can be recommended for any steam, hot water, vacuum or warm air steel furnace.

Engineering Service

The Iron Fireman organization is nation-wide. Trained men—backed by one of the largest manufacturing organizations in the field—are at your service to help you with the experience and practical heating information gained through servicing thousands of boiler rooms and heating plants in all parts of the country.

Any Iron Fireman engineer will gladly call on you and submit any additional information requested.

Catalogue and Information

Catalogue No. 31 gives full information about the Iron Fireman. Descriptive folders give special data about installation in particular types of industries and in homes.

Secure them by addressing the factory or any Iron Fireman representative.

THE ANTHONY COMPANY

Liquid Fuel Engineers

136 West Avenue, LONG ISLAND CITY, N. Y.

Products

ANTHONY NEBULYTE OIL BURNING and GAS BURNING SYSTEMS for steam boilers, hot water heaters, hot air furnaces, cooking ranges, etc.

ANTHONY NEBULYTE SYSTEM for Heavy Gravity Oil.

ANTHONY SINGLE and DUPLEX STRAINERS.

ANTHONY STEAM and ELECTRIC FUEL OIL HEATERS.

TANK SUCTION UNITS.

Engineering Service

Anthony engineers are prepared to discuss all heating problems and design special oil, tar or gas fired apparatus for specific needs.

Having designed a great variety of successful industrial heat treating systems, they have wide experience in this field to place at a client's disposal.

THE ANTHONY COMPANY since its organization has dealt with every application as an individual combustion problem, appreciating, as no others have, its many sensitive and variable conditions and accurately meeting these by correctly utilizing essential principles.

They are pioneers in the development of mechanical nebulization as applied to the combustion of liquid fuel, as well as in the application of those combustion principles which effect the accurate control of heat quality.

Employment of their services leads to conservation of fuel, speeding up of heat cycles and better quality of results as 5000 clients will testify.

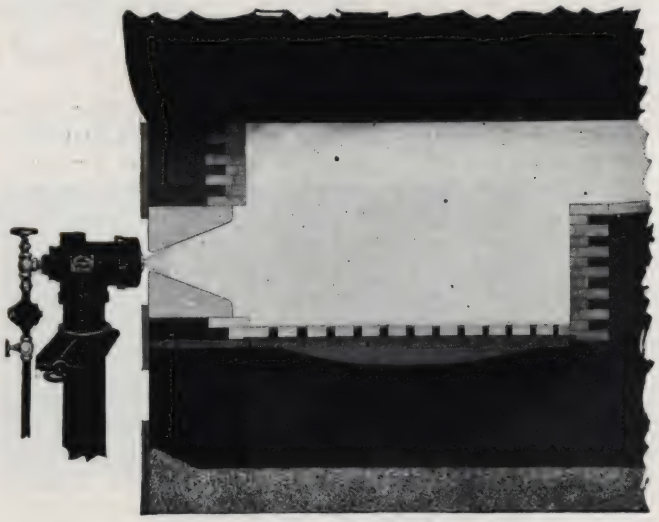
More than 23 years of record-smashing success.

Anthony Nebulyte System for Boilers

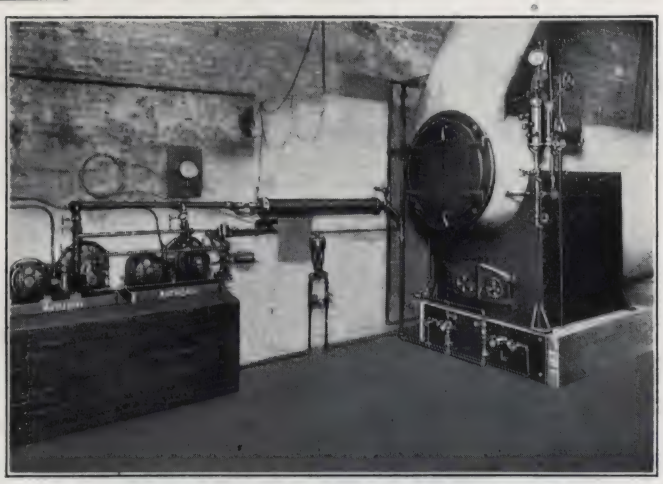
The Anthony is a mechanical nebulizing system for liquid fuel, which actually attains the perfection of radiant gas firing and normally produces 80% to 86% evaporating efficiency.

In this highly developed system of gas firing with oil fuel, an instantaneous conversion of liquid to gas is effected by correct combination of essential elements.

Performance—Every item of Anthony equipment has been selected and developed to meet exacting requirements, and is fully guaranteed to be free from defects in materials and workmanship. In spite of the severest operating conditions, the annual maintenance costs have averaged no more than 2% over a period of 10 years. A completely installed Anthony Nebulyte system is 100% assurance of successful operation.



Gas Firing with Oil Fuel



Typical Installation of an Anthony Mechanical System
(Units in duplicate)

Equipment—This includes storage tanks and fittings, suction and discharge strainers, heaters, pumps, blowers, burner sets, valves, piping, gauges and thermometers, together with firing chambers and attachments.

Anthony oil heaters, for use with heavy gravity oils, are supplied to give the required temperature to the particular grade of oil specified. Complete with safety relief valve, thermometer and, where desired, with automatic temperature control. Either steam or electric.

Anthony strainers are made in both single and duplex patterns. In the duplex strainers, either side can be cut out of service by a single lever movement. They need never be taken apart for cleaning. They are easily applied to any pipe line. The cleaning operation is made so simple that there is no excuse for strainers ever becoming foul.

Control—Usually by hand, but automatic controls of proven reliability can be furnished, where specified, to maintain definite boiler pressure, water temperature, or both.

Application—The Anthony Nebulyte system is adapted for burning oil or gas under heating and power boilers in apartment houses, hotels, clubs, public buildings, etc. The combination oil and gas system offers special advantages in many instances.

Anthony Nebulyte System for Heavy Gravity Oil

Heavy gravity asphaltum base oils cause many troubles and often condemn an oil burning system that is not installed to provide for all the necessary conditions. Yet the use of such oils at their lower prices is necessary in order to show satisfactory operation figures in comparison with coal. The Anthony system can be so installed as to handle such oils equally as well as those of the lighter gravity.

Changing Present Systems for Heavier Oils—The overcoming of existing troubles and improvement in the present operating conditions of other systems already installed, comprises a major portion of the work of THE ANTHONY COMPANY. Send us full details.

AUTOMATIC BURNER CORPORATION

Manufacturers of the ABC Automatic Oil Burners

1823 Carroll Avenue, CHICAGO, ILL.

BRANCHES AND DEALERS IN IMPORTANT CITIES

Products

AUTOMATIC OIL BURNERS for residences, theatres, apartment houses, and AUTOMATIC INDUSTRIAL INSTALLATIONS for warm air furnaces, steam, hot water and vapor boilers, square, rectangular and round.

ABC Automatic Oil Burner

The Home's Most Faithful Servant

Models

Type H—600 ft. steam radiation, 1000 ft. hot water.
Type E-3—1500 ft. steam, 2400 ft. hot water.
Type E-4—3000 ft. steam, 4800 ft. hot water.

Motors

Type H—1/20 hp. split phase, 70 watts, for 110 volts, 60 cycles a-c. or d-c.

Type E—1/20 hp. universal, 70 watts, either a-c. or d-c., 110 volts.

Type E-4—1/10 hp. universal, 100 watts, either a-c. or d-c., 110 volts.

Controls

Either Absolute Contactor or Minneapolis-Honeywell controls furnished as standard equipment.

Installation

Totally enclosed in ashpit of boiler or furnace. Refractory hearth is supported by burner frame at grate level.

ABC Advantages

(1) The heat is applied evenly all around the boiler. This makes for quicker, more economical heat. Starting at the lower section of the boiler, or water legs, the heat rises evenly under natural drafts.

(2) **Atomizer**—The whirling of the atomizer cup automatically breaks up the oil and mixes it with the proper amount of air. It is thrown horizontally into the boiler, quietly, as an instantly inflammable vapor.

(3) Oil burned in suspension. The circular flame heats from the grate, the only way a boiler was designed to receive heat. The heat is not blown through the boiler and out of the chimney—rising slowly the heat is maximumly absorbed by the boiler.

(4) **Magnetic Gas Pilot**—Very economical. Also furnished with combination gas and electric ignitor and straight electric ignitor.

(5) **Motor**—Made by the foremost manufacturers of high-speed electric motors. It never gets too warm to touch with a bare hand. Air currents cool it.

(6) **Three-Ball Check Valve**—Prevents oil leakage.

(7) **Spring Suspension**—The motor rests on three springs, assuring correct alignment, absence of vibration, and quiet operation.

(8) **Oil Reservoir**—Holding 1 pt. of oil.

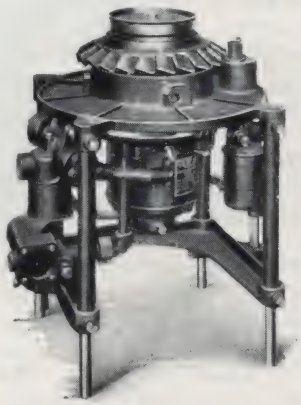
(9) **Trip Bucket**—An additional safety feature. One cup of oil in the bucket will instantly stop the burner. An oil flood is unknown to ABC.

Oil Storage

Basement tank or underground tank with automatic wall pump.

Listed

Listed by Underwriters' Laboratories, Inc., for No. 3, 28-30 gravity oil.



Since 1920

In 1920 the AUTOMATIC BURNER CORPORATION developed ABC, the first home rotary oil burner. 29,000 are now installed.

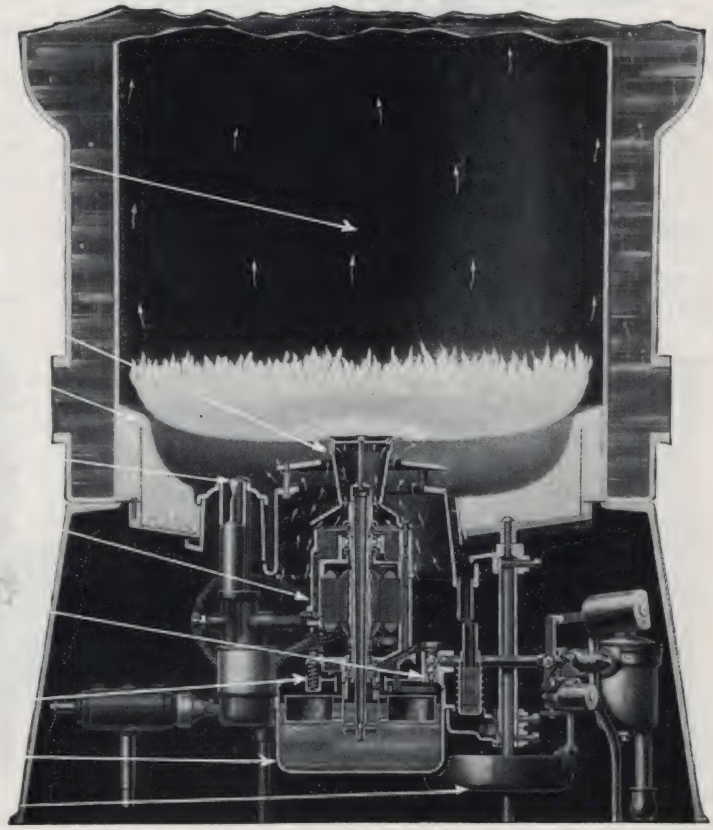
Type H—ABC Burner

A burner for small homes and bungalows. Simple, compact and strongly built.

Fully automatic. Installed at a price the small home can afford.

Detailed Specification Book

A special book for architects, giving detailed specifications and data on oil burning, will be sent on request.



CRYSTAL OIL BURNER CORPORATION

NEW YORK, N. Y.

FACTORY: 679 So. 15th Street, NEWARK, N. J.

DEALERS IN ALL PRINCIPAL CITIES

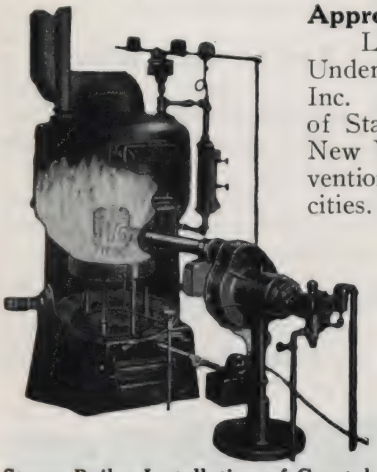
Product

CRYSTAL BLUE FLAME OIL BURNER for installation and automatic operation in any type heating plant of residence, school, church or small public building.

Crystal Blue Flame Oil Burner

The Crystal Blue Flame Oil Burner has been manufactured, and in successful operation for the past ten years.

It is fully automatic; thoroughly efficient; clean and perfect combustion; and is made in four sizes covering a range of from 350 to 5000 ft. of steam radiation.



Steam Boiler Installation of Crystal Oil Burner

Approvals

Listed and labeled by the Underwriters' Laboratories, Inc. Approved by the Board of Standards and Appeals of New York City, and fire prevention bureaus of principal cities. Member of Oil Heat Institute and The American Oil Burner Association.

Fuel Burning Feature

The outstanding feature of the Crystal Blue Flame Oil Burner is the method of burning the oil. The blue flame which is produced by the Crystal is accountable for Crystal efficiency. This blue flame is the result of converting the oil into a gas and then burning the gas. This is accomplished by carrying the air and oil through the carburetor with a fan and passing the mixture of air and oil through the cracking chamber to the burner. Passing through the chamber the mixture turns to a thin vapor. Upon reaching burner it has become a gas.

Contact and Safety Switch

The flame of the Crystal Blue Flame Oil Burner gives immediate and direct heat contact with the entire surface to be heated.

The gas is ignited by a still gas pilot direct from city gas lines.

The pilot uses .6 cu. ft. gas per hour.

Safety switch controls the burner, automatically shutting off current and burner in case of overflow or failure of pilot.

Throttle Control

The Crystal automatic control gives positive control of the flame, thus assuring that the burner will carry the predetermined load without needless use of fuel.

Without any change in fuel adjustments a range of 50% in capacity can be attained by automatic control alone.

Construction

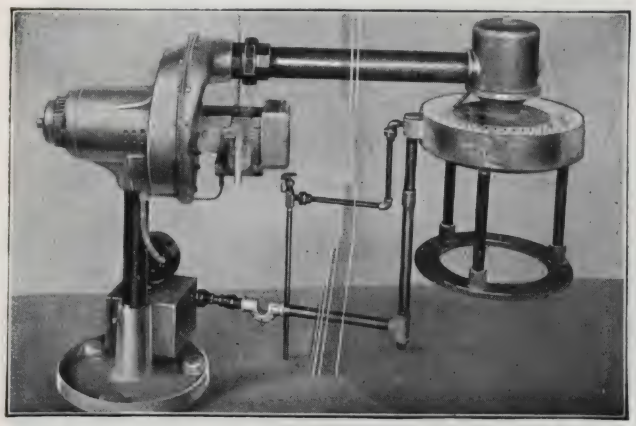
Rugged construction, simple in operation, no moving parts inside furnace. The only mechanical operating part in the entire burner is the motor and fan mounted on one shaft which is located outside the furnace.

Quickly installed in any type heating plant without removal of grates, alteration or change of any part of furnace or flues.

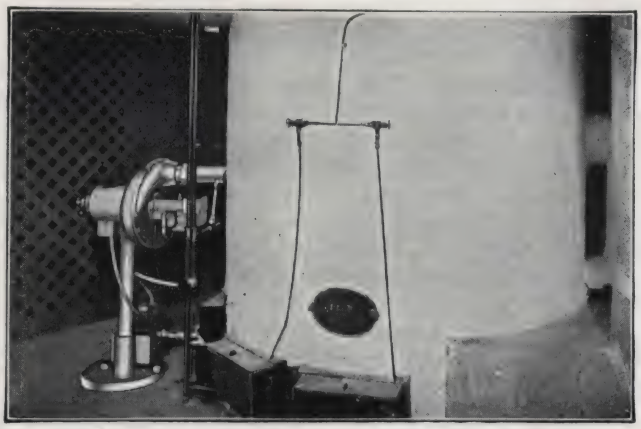
CAPACITIES, HORSEPOWER AND OIL CONSUMPTION OF CRYSTAL BLUE FLAME OIL BURNERS

Model	Steam radiation capacity, ft.	Motor hp.	*Oil consumption per hour, gal.	
			Minimum	Maximum
A	350	1/6	3/4	1 1/2
B	1000	1/4	1 1/2	3 1/2
C	3000	1/4	3 1/2	7
D	5000	1/4	7	11

*Controlled by Crystal Automatic Throttle Control.



Crystal Blue Flame Oil Burner Complete Ready for Installation



Crystal Blue Flame Oil Burner Installed in Warm Air Furnace

ENTERPRISE OIL BURNER COMPANY

Manufacturers of Enterprise Rotary Fuel Oil Burners

2902 Nineteenth Street, SAN FRANCISCO, CAL.

DISTRIBUTERS IN PRINCIPAL CITIES

Products

ENTERPRISE FULL AUTOMATIC FUEL OIL BURNERS for Domestic Use, known as Type "A" as listed by Underwriters to burn 18°-20° Baumé oil.

ENTERPRISE ROTARY FUEL OIL BURNERS for all Industrial Purposes, such as heating boilers, furnaces, bake ovens, ranges, etc., known as Type "E" as listed by Underwriters.

Also Steam and Air Atomizing Oil Burners; Oil Burner Governors; Boiler Feed Water Regulators; Reducing Valves; Thermostats; Oil Pumps, electric or steam driven.

Experience

The ENTERPRISE Oil Burner is the product of engineers with 23 years of combustion experience, is durable in construction and its simplicity of design guarantees long, satisfactory operation with the minimum amount of attention.

Engineering

Engineering service and data on any oil burning problem is furnished by the factory Engineering Department upon request.

Insurance Approval

ENTERPRISE Oil Burners are approved by the National Board of Fire Underwriters, Chicago Laboratories, New York Board of Standards and Appeals and the Commonwealth of Massachusetts Department of Public Safety.

Type "A" Automatic Burner

Use

ENTERPRISE Oil Burners are adaptable for most any problem where heat is required. They have proven their performance on ranges as well as on big power boilers, small home heating furnaces or big rotary kilns.

Description and Operation

Made in *two types*—pump and non-pump (gravity) for the industrial (Type "E"), as well as the automatic (Type "A") burners. Operated by an electric motor, mounted on same shaft with fan, one single, compact unit, producing necessary air for atomizing and burning oil. Hinged either on a furnace plate or on a refractory tile lined door, giving easy access to furnace at any time.

Fuel oil is supplied from an outside storage tank and brought in through the burner hinges, either fed by gravity or drawn in by a small oil pump, driven by a worm and gear off the burner shaft. The oil enters at rear into the shaft and later into atomizing cup, where it is thrown off in a fine mist by centrifugal force of 3500 r.p.m., and forced into the firebox by air blast from the burner fan, producing a very hot, soft, and smokeless flame.

Motor is entirely enclosed, dustproof and cooled by the suction air from the burner fan. Air and oil supply regulated manually or automatically from boiler controls, giving high efficiency and close regulation for any boiler load.

There is only *one place to lubricate and this has a large oil well to obviate frequent oiling.*

Types and Sizes

Type "A" Automatic Burner—Made in sizes AA to H. Ideal for heating small homes as well as large apartment houses, schools, offices, churches, etc. Built and installed according to standards and rules of the Fire Underwriters. Controlled by a thermostat for heat or an aquastat for hot water. Burns the cheapest grade of fuel without smoke or carbon. Installation is simple and can be made in a few hours regardless of the type of boiler, heater or furnace. Automatic burners are furnished with gas ignition.

Type "E" Industrial Burner—Made in all sizes. Suitable for any type of heating problem, furnished either in the pump or pressure type, burns any oil which can be pumped, regulated either manually or automatically on low and high pressure boilers. Can be installed either singly or in batteries, made either right or left-hand swing, easy to operate, flexible in load variations, giving highest efficiency and requiring very little attention. Burner is equipped with Westinghouse alternating-current 60-cycle motors in single or polyphase, also burners with direct-current motors furnished on request.

Sizes—Made in thirteen different sizes, the smallest with a capacity to heat a five or six-room home and the largest to develop 600 b-hp.

"Pump" type burners are marked "P" and made in sizes AA to H. "Gravity" (non-pump) type burners are marked "G" and made in all sizes.

Burners No. A, B and C are furnished in single phase; polyphase motors furnished for an additional charge.

Burners No. D, E, F and G furnished in single or polyphase motors.

Burners No. H, J, K, L and M furnished in polyphase only.

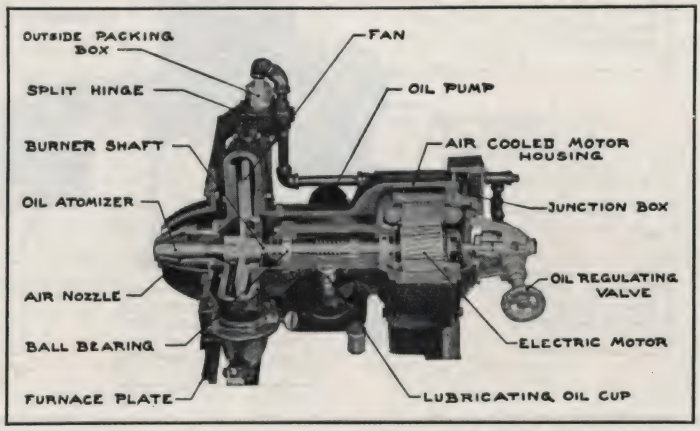
RATINGS OF ENTERPRISE ROTARY FUEL OIL BURNERS

Burner size	Gals. per hr.	Max. boiler hp.	Max. steam radiation, approx., sq.ft.	Max. water radiation, approx., sq.ft.	Motor hp.
AA	½–3	8	1000	1700	¼
A	1–5	15	2000	3200	¼
B	2–8	20	2700	4400	⅓
C	2–10	25	3500	5500	⅓
D	3–15	35	5000	7300	½
E	4–20	55	7500	12000	½
F	6–30	75	10400	16000	1
G	8–35	100	13900	22000	1
H	45	125	17500	27000	1½
J	70	200	27000	43000	2
K	100	300	40000	60000	3
L	135	400	55000	85000	5
M	200	600	80000	130000	7½

Capacities

ENTERPRISE Rotary Oil Burners are rated conservatively, oil consumptions are approximate and based on normal draft and furnace conditions.

Burner capacities are based on 60-cycle current; when using 50-cycle current, the next size larger burner should be used.



Sectional View of Enterprise Rotary Fuel Oil Burner

Guarantee

ENTERPRISE Rotary Oil Burners are manufactured by the finest precision methods and guaranteed to be free from defects in material and workmanship for a period of one year.

Catalogues

Catalogues and operating instructions, containing the necessary information for installing ENTERPRISE Oil Burning Equipment, will be furnished upon request.

ELECTROL INCORPORATED

MEMBER OF THE OIL HEATING INSTITUTE

Manufacturers of Electrol Quiet, All-Electric Oil Burner

MAIN OFFICE
227 East 45th Street, NEW YORK, N. Y.

FACTORY
170 Dorcas Street, ST. LOUIS, MO.

BRANCHES
SEATTLE, WASH. CHICAGO, ILL. BOSTON, MASS. MINNEAPOLIS, MINN.

The Company

ELECTROL INCORPORATED has been established for thirteen years and is a pioneer in domestic oil burner manufacturing. During this time it has developed, perfected, manufactured and installed many thousands of automatic oil burners, through a nation-wide distributing system. The company is alert in adopting the latest methods of manufacturing and produces a quality burner which is quiet, all electric and automatic. The company's only product is automatic oil burners. It is well financed and possesses ample capital to carry out its undertakings.

ELECTROL
The OIL BURNER *with The Master Control*

Guaranty

ELECTROL INCORPORATED warrants each new Electrol Oil Burner, manufactured by it, to be free from defective material and workmanship under normal use and service, and will make good at its factory any part or parts which shall, within the first year after installation, be returned to its factory with transportation charges prepaid, and which its examination shall disclose to have been defective; this warranty being expressly in lieu of all other warranties, and all other obligations or liabilities on its part.

Distribution

The Electrol Oil Burner is sold and installed through branch offices at New York, St. Louis, Boston, Chicago, Minneapolis and Seattle, and through hundreds of qualified dealers located in almost every state in the Union.

Each branch office is a distributing point for the adjacent area, and is provided with full stocks of burners, parts and accessories.

Engineering information can be had from each branch office and from all dealers.

Service

ELECTROL INCORPORATED maintains skilled engineers and mechanics at its factory and branches, available for consultation at all times.

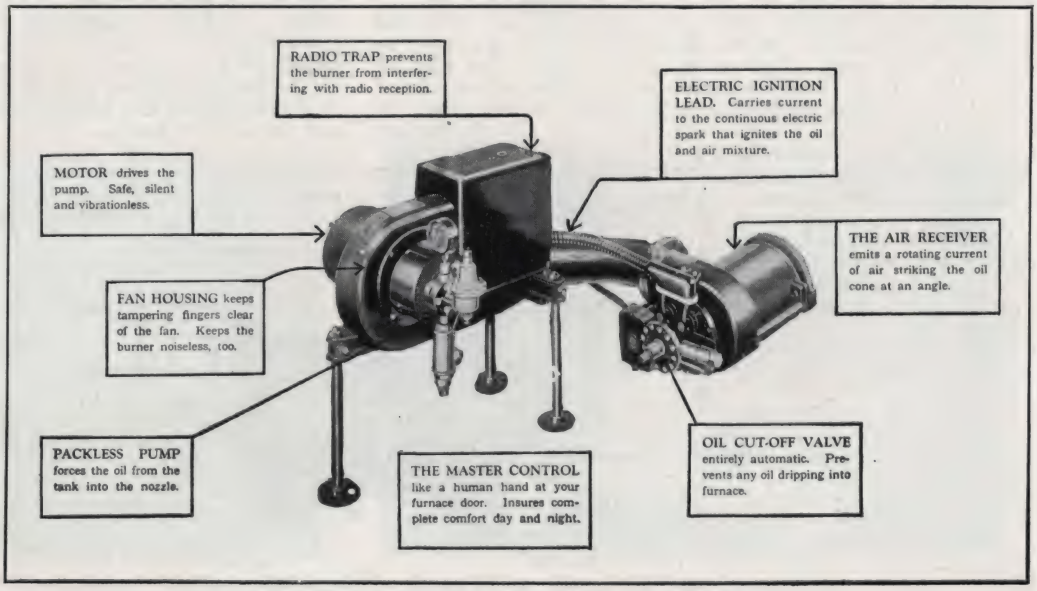
Electrol service and installation men are factory-trained through the medium of a well-equipped mechanical school maintained in St. Louis, regional schools which are conducted from time to time, and Electrol engineers who are stationed at the various branch offices and who travel through the territory as their services are needed by dealers or customers.

Listed by Underwriters' Laboratories, Inc.

The Electrol Burner was the first automatic oil burner having electric ignition to be listed as standard by the Underwriters' Laboratories, Inc.

Each Electrol Oil Burner has also been approved by the Board of Standards and Appeals of the City of New York; the Commonwealth of Massachusetts, Department of Public Safety; and the Department of State Police, Connecticut.

It has also been approved by practically all municipalities which require special listing.



Model TU—Electrol Quiet, All-electric Oil Burner

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THE ELECTROL OIL BURNER

The Electrol automatic burner is of the mechanical atomizing type, employing a motor directly connected to a fan and pump and obtaining atomization on the mechanical principle by ejecting oil under pressure through a stationary nozzle. Ignition is electric, of the arc type, with the electrical flame blown into the oil spray so that the electrodes are free from oil contact. The control and safety systems are integral with the burner.

In general, the outstanding characteristics are sturdy construction and finished design resulting from years of continuous development, complete accessibility, interchangeability of parts permitting late improvements to be applied on older models and a high degree of combustion efficiency.

There are four principal functions in the modern automatic oil burner. The oil handling and atomizing system, the air system, the ignition and the control and safety system. The latter is described on the second page following. The first three are illustrated on this page.

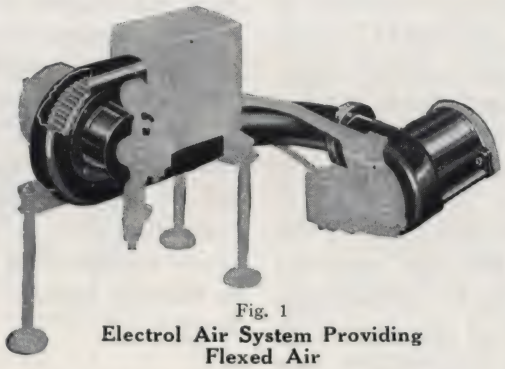

Fig. 1
Electrol Air System Providing Flexed Air

tank to the burner. Any excess oil is returned to the storage tank, so that only a very small amount is contained in the burner at any time. Operating pressures are adjusted and controlled by a pressure-regulating valve and a shut-off valve, both described on the following page, as is the atomizing nozzle.

Ignition System—Fig. 3

Electric ignition for oil burners has proved to be the most practical means yet discovered for the purpose. Electricity is more widely distributed than gas, and as applied in the Electrol, is more dependable and less costly. Electrol was the first burner with electric ignition approved by the Underwriters' Laboratories, Inc.

Reference to the illustration will show the simple design and rugged construction employed in the Electrol ignition system. The transformer is enclosed in a stout steel box, from which the high tension cables are conducted through a flexible steel tube to an outlet box. (Extra heavy porcelain insulators shield the leads passing through the combustion head.) The wires leading from the outlet box to the electrodes are so spaced as to prevent any possibility of the current shorting. The electrodes are of monel metal and are welded to the leads. They terminate above and behind the oil spray, so that the arc between the points is blown deeply into the oil spray without the points coming into contact with it. Thus they are kept clean and cool, with no possibility of carbonization.

Electrol ignition is constant while the burner is in operation.

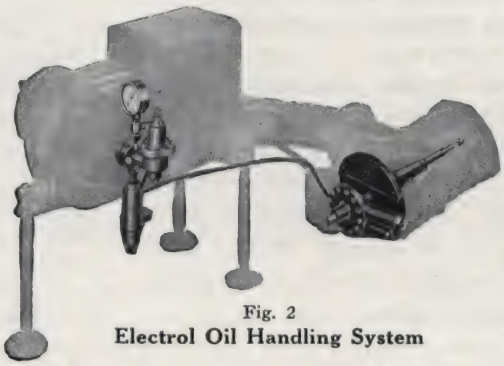

Fig. 2
Electrol Oil Handling System

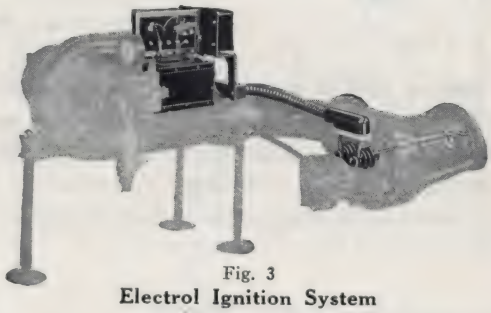

Fig. 3
Electrol Ignition System

Electrol Air System—Fig. 1

It will be noted that the air leaving the blower housing passes through a curved duct and tangentially into an air receiver, thus being forced to rotate. It is emitted from the receiver through deflectors which turn it into and across the oil spray at an angle. The combination of rotation and deflection produces a turbulence that insures the intimate mixture of finely atomized oil and air, necessary for complete combustion. Moreover, the manner in which the mixture is accomplished also results in the ball-like flame, which is an outstanding feature of the Electrol burner.

The flame actually rotates in the combustion chamber, so that each particle of oil is forced to whirl in the flame until it is entirely consumed before leaving the hot combustion space. Ask an Electrol representative about the balloon test, which clearly illustrates the unusual air handling method used in the Electrol burner.

The amount of air needed for a particular load is accurately adjusted at the fan intake.

Oil Handling System—Fig. 2

The Electrol oil handling and atomizing system is distinguished by its simplicity. A single pump directly connected to the motor serves to provide the pressure for atomizing and also to bring the oil from the storage

Fits All Boilers

Electrol design permits easy and efficient application of the burner to practically any make or type of heating plant. The combustion chamber, which is applied to the ash pit section of the boiler or furnace, is designed to suit the particular plant in which it is installed, thus assuring the best possible results in each case. This combustion chamber construction also gives the additional cubic capacity which oil firing requires over that needed for coal.

It should also be noted that the burner is entirely out of the boiler, with no wearing part exposed to the heat.

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PRINCIPAL PARTS OF THE ELECTROL OIL BURNER

Blower Unit—Fig. 1

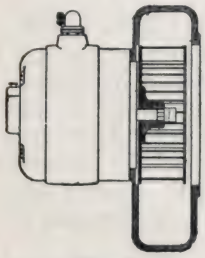


Fig. 1

The motor is of special design, embodying characteristics particularly adapted to automatic oil burner service. It operates at slow speed and is directly connected to a Sirocco fan. The blower housing is so designed as to permit ready removal of either motor or fan for examination or replacement.

Pump—Fig. 2

The pump, probably the most vital part of the burner, is an Electrol design and has been perfected through nearly ten years of continuous development. It is of the gear type, with steel and iron helical gears placed in a close-grained bronze housing. It is self-oiling, being lubricated by the fuel it pumps, and is provided with a self-sealing feature that eliminates packing, with its troubles and friction losses. The pump is directly connected to the motor shaft through a fibre coupling, no belts or pulleys being required. All pumps are factory-tested at 200 lb. pressure.

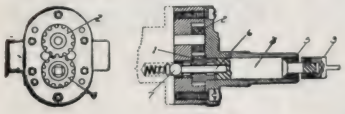


Fig. 2

Pressure-regulating Valve—Fig. 3

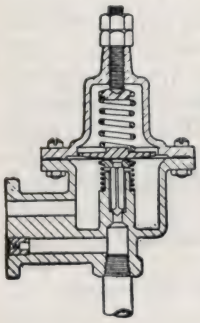


Fig. 3

The pressure-regulating valve is a bronze-bodied diaphragm-operated regulating valve, with an adjustment screw on the top which permits a very accurate setting of the required pressure of oil for atomization. This valve permits the return of unused oil back to the tank, and in conjunction with varied nozzle sizes is the means of adjustment to the quantity of oil required to carry a given load.

Shut-off Valve and Nozzle Assembly—Fig. 4

This assembly consists of an adjustable spring-loaded monel metal needle valve seating on tobin bronze, a monel metal strainer, a bronze diaphragm housing and a brass tube fitted with a seat, into which the nozzle is screwed.

The valve is normally set to open when the pump has built pressure exceeding thirty pounds, thus assuring fair atomization at the instant oil reaches the combustion chamber. Conversely, as the burner shuts down, the shut-off valve will close tightly as the oil pressure drops, insuring a sharp cut-off of the oil supply, and preventing after drip or dribbling in the furnace. The entire assembly can be readily removed for inspection or cleaning without dismantling any other parts of the burner.

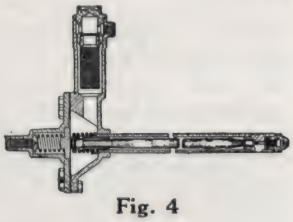


Fig. 4

Suction Line Strainer—Fig. 5

This strainer is constructed from non-corrosive metal. It is so designed that the strainer elements can be cleaned by the movement of an external handle, without dismantling any part of the oil line or strainer. There is ample sediment collection space which may be drained once or twice a year by the removal of a conveniently located plug.

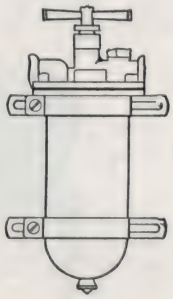


Fig. 5

Atomizing Nozzle—Fig. 6

The Electrol nozzle was developed from designs employed in the U. S. Navy and other large users of oil-fired boilers. It is constructed with accurately formed slots, permitting oil to pass, under pressure, tangentially into a cylindrical chamber, where it whirls at high speed and is emitted through an orifice in a finely divided fog-like mist.

There are no moving parts in the Electrol nozzle.

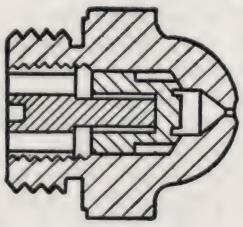


Fig. 6

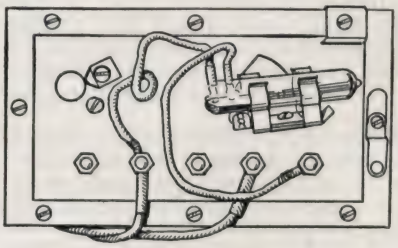
Nozzles are made in various sizes to suit different loads, and with the fine adjustments obtained with the pressure-regulating valve, permit a quick and easy setting of oil flow to exactly suit the heating load.

Continued on next page

THE ELECTROL CONTROL SYSTEM

The Electrol Master Control

When the Electrol Burner was conceived, the necessity for a device to make oil burning automatic and safe was one of the first problems. Many devices were tried out—starting with the old trip bucket and other elaborate devices that were complicated and costly to manufacture, until the safety control system now called the Electrol Master Control was developed and patented by Electrol engineers. This control system makes Electrol absolutely safe and it will shut down the burner and place it in a non-operative condition if any abnormal condition occurs in the firebox. In conjunction with and a part of this control system is the



Control Panel

safety switch, which is a part of the burner unit, for it is the flame of combustion that controls the action of the Master Control.

The safety switch as used in the Electrol Burner is very sensitive, however, not affected by basement temperature, and is automatic in its action. The Electrol safety switch active element cannot become covered with soot, which is a heat insulator, and therefore this switch does not become sluggish, resulting in a longer safety setting.

This safety switch is actuated by fresh clean air taken from the air receiver which passes through a nickeled heat loop in back of the flame, thence to the safety switch. The nickeled heat loop will absorb heat from the flame, heating air that passes through it. The warm air passing through the safety switch holds that switch in position so that the burner may operate. However, should there be no flame, the air going through the nickeled heat loop will cool, which would cause the safety switch to remain open and stop the burner. A mercury tube is used to make or break the connection in the safety switch as well as all other Electrol controls. Electrol was the first burner to use mercury tube switches, but now many other burners are using them as parts of their electric circuit. The mercury control tube prevents corrosion of contact points. It will function continuously without failing.

The Electrol control system of the Electrol Burner eliminates the combustion control that is commonly called the stack control. The Electrol safety control has been used for many years. The control system of the Electrol Burner will not permit the burner to operate under any of the following conditions:

(1) Retarded fuel delivery through feed line.

(2) A break in the electric wiring, short circuit or ignition failure.

(3) Any condition which prevents motor from operating at normal speed.

(4) Operation of burner without oil.

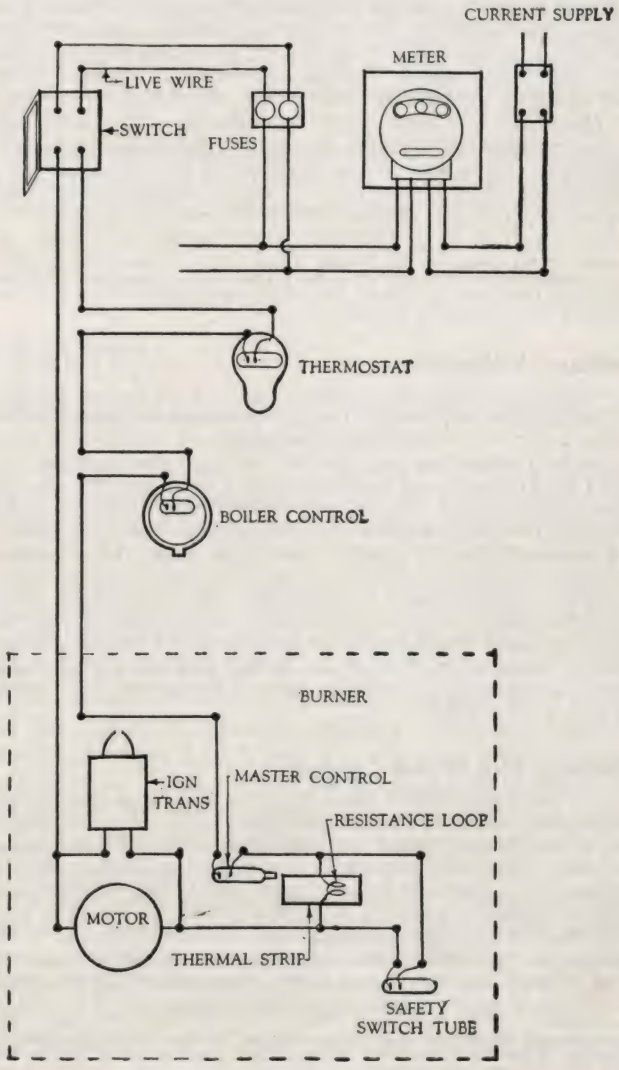
(5) No flame of burning oil.

(6) Any abnormal condition in the combustion chamber.

Wiring Diagram of Control System

The wiring diagram on this page clearly indicates that all of our controls are on the live or hot side of the power line. Also note that all controls are 110 voltage which is the usual line voltage, and that no secondary low voltage controls are used in our standard installations. By using (110-volt) high voltage controls we eliminate a great many extra parts, relays and transformers. No relays or transformers are required to reduce the high voltage to a low voltage. However, we are in a position to furnish low voltage control systems on Electrol Burners where customers specify that type of control system. The control panel and the wiring diagram shown on this page clearly illustrate the simplicity of the Electrol control system.

The dotted line in the wiring diagram indicates that the wiring shown within the dotted line is part of the burner wiring. When you look under the hood of an Electrol Burner your eye takes in at a glance the neatness and simplicity of our control system.



Wiring Diagram of Control System

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OIL BURNER CONTROLS

(1) Thermostats—All automatic oil burner systems should have a room thermostat to control operation and insure the maintenance of the desired temperature. We furnish high voltage thermostats as standard equipment. We are in a position to furnish low voltage clock thermostats if they are desired.

(2) Steam System Controls—In addition to a thermostat, a steam system should be provided with an automatic limiting device, which will shut down the burner whenever the pressure in the boiler rises above a predetermined point. We furnish a high voltage limiting device as standard equipment with every installation.

(3) Vapor System Controls—High voltage vapor controls are furnished for the most sensitive vapor or vacuum systems where working pressure is below atmospheric pressure.

(4) Hot Water Controls—Hot water systems are controlled by a hydrostat attached to a riser or in the boiler. The hydrostat operates to shut off the burner when the temperature of the water rises above the temperature for which the hydrostat is set, regardless of the action of the room thermostat.

(5) Warm Air Furnace Controls—The warm air furnace control operates to shut off the burner when the temperature in the hood rises above a predetermined figure, usually 250° to 300° F.

(6) Low Water Cut-off—The use of a low water cut-off is an additional safeguard recommended for steam and vapor systems. The cut-off operates to shut down the burner if the water level in the boiler should drop below a fixed level. The low water cut-off and pressurestat may be obtained in one unit called a duplex switch.

(7) Boiler Feed Controls—Several companies make automatic boiler feeders which will maintain the boiler water at a constant level. Where the city water pressure is greater than the pressure maintained in the boiler, a boiler feeder may be used (see Underwriters' Rules). However, a closed system with no steam leaks rarely requires this type of control.

(8) Oil Line Controls and Accessories—The installation of an antisiphon valve in the oil line in order to prevent flooding in case of a broken pipe, is obligatory if the tank is installed above the level of the burner. When an inside storage tank feeding by gravity is used no antisiphon valve is required.

Note: Fuel oil gauges are not compulsory, but they are a great convenience to the owner of the heating plant. There is generally an extra charge made for installing an oil gauge. Their use is recommended if the owner does not wish to gauge the tank periodically by means of the measuring stick ordinarily provided.

Garbage Incineration

The intense heat of the flame from an oil burner is ideal for incinerator operation. Complete combustion is assured and smoke and odor are virtually eliminated.

Some incinerators are designed to burn the garbage and utilize the heat given off to heat domestic hot water. For installations of this type, the oil burner operation should be controlled by the temperature of the domestic hot water. A hydrostat connected to the storage tank will make the operation entirely automatic.

When incineration is conducted in a specially constructed furnace, using an oil burner for the heat, the burner should be controlled manually or by means of a special furnace control. Even where the furnace control is used, it is advisable to have an attendant on hand to turn off the burner when incineration is completed.

Domestic Hot Water Control

(a) Indirect Water Heaters—The oil burner may be advantageously used for economical heating of domestic hot water during the summer months as well as in winter. In the steam or vapor boiler the installation is simple, requiring only the addition of an oversize* indirect water heater and a boiler thermostat, ordinarily called a hydrostat, which is set at a predetermined temperature of about 190° and so connected to the burner that the boiler water temperature is maintained at that point. This boiler thermostat works independently of the room thermostat to maintain only the proper temperature of the boiler water to supply sufficient heat for domestic hot water. When heat is required the room thermostat will, of course, control the burner.

In the case of a hot water boiler a slightly different application of the same method is used. The oversize indirect water heater is connected in practically the same manner. The burner in this case, however, is controlled exclusively by the boiler thermostat. When heat is needed in the house the room thermostat starts a separate control motor which is connected to quick-closing valves installed in each riser. When the desired temperature is reached in the house the separate motor closes the valves and the circulation stops.

The constant maintenance of the boiler water at approximately 190°—a condition essential to obtaining proper temperature of domestic hot water—is of real advantage in the operation of the heating plant. Circulation of hot water begins *immediately* upon the opening of the valves in the risers. For entirely satisfactory operation under all conditions, the boiler, whether steam or hot water, should have a capacity slightly exceeding that required for maximum requirements of the standing radiation. Some boiler companies desire two square feet additional boiler rating for each gallon of hot water heated per hour.

Experience of users has shown that economy of operation is effected by indirect heating of domestic water by oil in comparison with the cost of heating the same water by gas. Cost of installation is extremely moderate in cases where a hot water storage tank is already in use.

During the winter heating season there is but slight expense for hot water service. In summer the very limited operation of the oil burner to provide hot water is inexpensive. Furthermore, the use of the burner during the summer months keeps both burner and boiler in good operating condition.

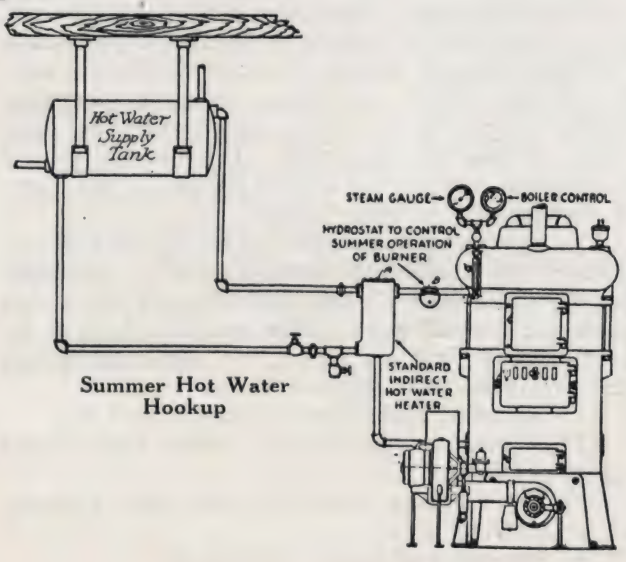
When a burner is in constant use supplying domestic hot water, a sudden cold snap will put the room thermostat in action and thus provide heat without attention from the owner.

(b) Direct Method of Heating Domestic Hot Water—When the domestic hot water requirements exceed the limitations of a 300-gallon storage tank, the indirect method is not recommended, due to the fact it would require an excessively large boiler to handle the combined load of heating the home and supplying domestic hot water.

When a storage tank of 300 gallons or greater capacity is required, a separate hot water supply boiler should be installed.

An oil burner installation in a hot water supply boiler is entirely automatic, operating through a hydrostat connected to the storage tank, maintaining a constant supply of hot water and, when the maximum temperature is reached, the hydrostat automatically cuts off the burner, saving fuel during the period when the domestic hot water is not required.

For most satisfactory operation with an oil burner, a hot water supply boiler should have at least a 15-in. diameter grate.



Summer Hot Water Hookup

*Oversize heating coils are recommended because of the intermittent operation of the oil burner and because most manufacturers' ratings are based upon steam temperatures.

Continued on next page

TANKS

UNDERWRITERS' LABEL TANKS WITH APPROXIMATE DIMENSIONS AND WEIGHTS

Capacity, gal.	Diameter	Length	Weight, lb.
550	48″	70″	800
1000	48″	137″	1400
1500	60″	10′–4″	1630
2000	64″	12′	2000
2500	65″	15′	2525
3000	64″	18′	2800
4000	65″	23′–5″	3865
5000	72″	23′–8″	6200
275	Obround	26x42x67″,	300 lb.

The last tank listed in the table (275-gal. capacity) is an obround tank usually supplied for inside basement installation. Tanks of 550 gal. or over can be supplied in two diameters. We give above a table of tank sizes with over-all dimensions listing the standard Underwriters' label tanks.

All tanks have standard openings (two 2-in. and two 3½-in. pipe thread) for pipe connections, but additional openings may be ordered.

When used with Electrols these tanks do not require manholes; we provide, however, a clean-out pipe, which should be sufficient.

In New York City any tank over 1000-gal. capacity must be provided with a manhole. Consult local ordinances on the subject.

Oil tanks and outside underground piping should be painted with asphaltum paint to preserve the steel against rusting by underground water.

Under no conditions should the inside surfaces of a tank be painted, for the action of the fuel oil will peel off this paint and cause suction line and strainer stoppage. Fuel oil itself will preserve the inside surfaces of the tank.

When choosing the size of a storage tank for oil, a number of things must be considered, for the size of the storage tank will greatly affect the cost of an oil burner installation. In most cities oil deliveries are sufficiently reliable to allow the inside 275-gal. storage tank to be used. Where inside storage tanks are used, a fill line is run to the outside of the building so that the delivery of oil can be easily made. A vent line to the outside of the building is also installed. The advantage of the small inside storage tank is that it reduces the initial cost of an installation.

The difference in cost between a 550-gal. and a 1,000-gal. storage tank is very little. Therefore, if an outside storage tank is required, the 1,000-gal. tank gives more storage space at very little additional cost. The 1,000-gal. tank is of ample capacity for any residence where the roads are clear during the winter months. Larger tanks should be used where buildings are inaccessible in snowy winter weather.

A 1,000-gal. tank is ample capacity for any building where the standing radiation is not over 1,000 sq. ft. of steam. A 1,500-gal. tank is suitable for buildings that have between 1,000 and 2,000 sq. ft. of steam radiation. Where buildings have over 2,000 sq. ft. of radiation, a 2,000-gal. tank may be used. Beyond these figures special consideration should be given to fuel delivery and the unusual conditions that may exist locally.

The Underwriters' rules require that a tank be installed 2 ft. under the ground, so long as this tank is below the burner pump inlet. If the tank is installed above the burner pump inlet, it will be necessary to install an antisiphon valve in the line, or install a wall tank.

When making calculations on the amount of excavation necessary for a tank, allow 1 ft. extra on all sides of a tank, to permit a man, when making inspection, etc., to work past the sides of the tank.

PIPING AND VALVES

General Specifications—Standard iron, brass pipe or copper tubing should be used for all oil lines. Galvanized pipe for oil lines is unsatisfactory because of scaling. For the vent pipe galvanized is recommended.

Valves and fittings should be the best obtainable, sufficiently rugged to stand jarring. Shut-off valves, if used, should have a good packing gland, in order to be sure that no leakage occurs.

Sizes—Pipe for suction and return lines should be of the same size.

The following sizes should be specified according to the installation:

For 275-gal. inside tank, ⅜-in. pipe.

For 1,000-gal. or larger tank underground installation, ¾-in. from tank to building wall; ½-in. from wall to burner. Where the location of the tank is 50 ft. or more from the wall, ¾-in. pipe should also be used from the wall to the burner.

Swivel Joints—Where suction, return, vent and fill pipes emerge from underground tank, swivel joints or copper tubing should be installed as a safeguard against leakage in the pipe caused by settling of tank. All piping outside of the building when buried under the ground, should be painted with asphaltum paint to prevent any action by underground water.

Copper tubing for the suction and return lines of oil burners is coming into greater use and we refer you to our page on Standard Installations for the sizes of copper tubing to be used. Copper tubing will give a more secure oil tight line and is more readily installed than standard pipe.

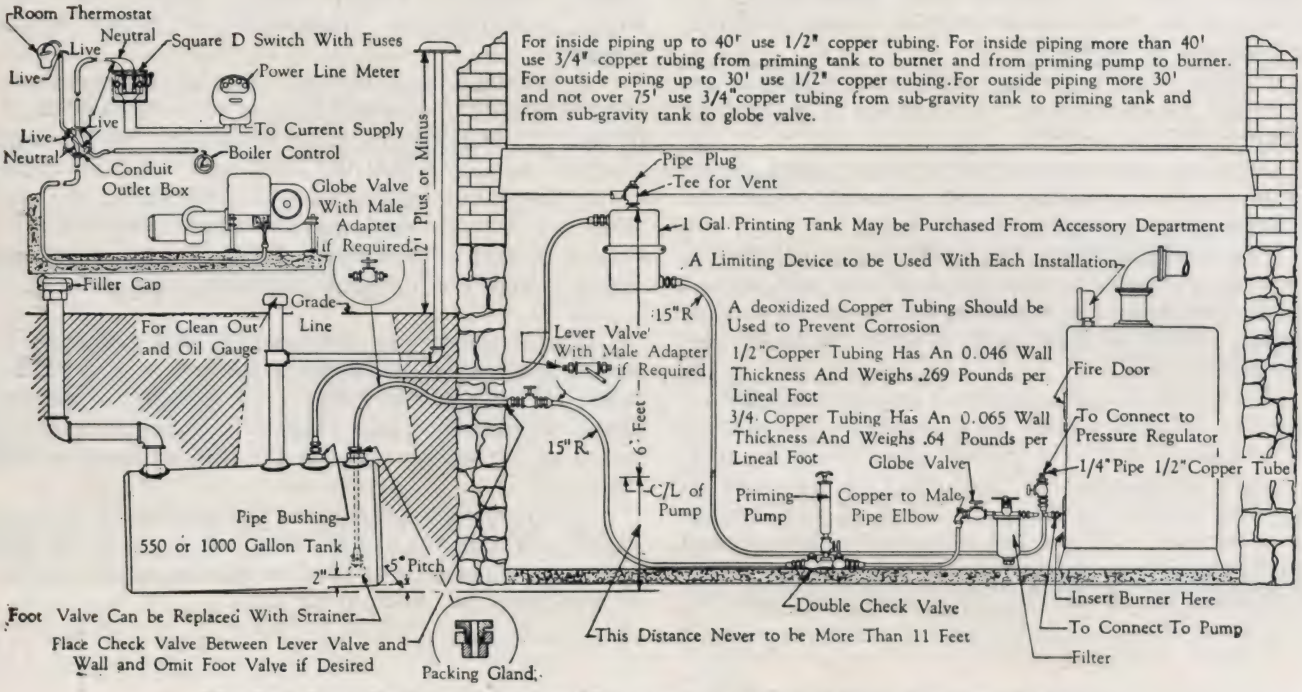
There are two types of antisiphon valves on the market, which should be used when specified by the Underwriters' rules and installed in a high point in the oil line just as it enters the building. The first type is a weighted bellows type and will not pass oil through it unless there is a definite vacuum on the suction line created by the burner pump. The second type is simply a fusible link type similar to a sprinkler head, but inverted, which, when it comes in contact with heat or a fire, will open this line and cause air to enter the high point of the line, thus destroying any siphon action. In a great many cases instead of installing antisiphon valves when the tank is above the burner, a wall tank may be used, which tank has a motor and pump in it that draws oil into a small reservoir, feeding the burner by gravity.

Continued on next page

TYPICAL INSTALLATIONS

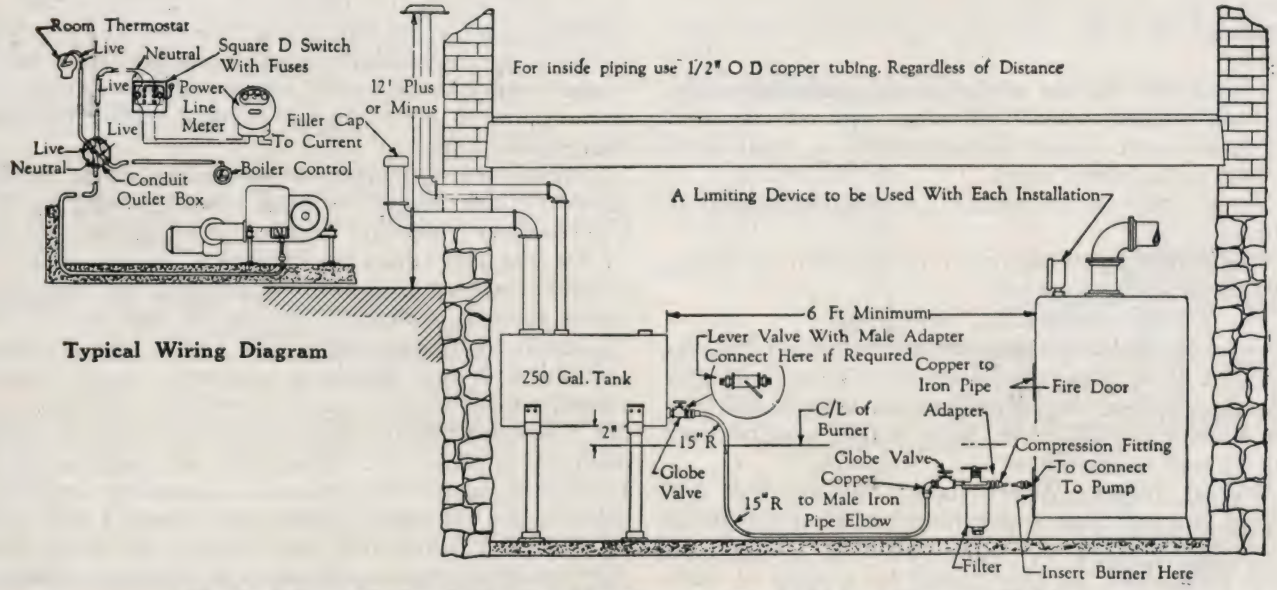
The diagrammatic sketches on this page illustrate typical Electrol installations using seamless copper tubing rather than iron pipe. This is a relatively new development in oil burner work, although tubing has the marked advantage of eliminating many joints. Although Underwriters' Laboratories, Inc., permit the use of tubing for oil burner installation, some municipal authorities do not, so that local ordinances should be consulted before specifications include this material.

In using iron or brass pipe, appropriate changes in the sketches would be needed to provide the correct valves and fittings, although the general layouts would be the same in both cases.



Typical Installation with Outside Storage Tank Using Copper Tubing

Typical wiring diagram shown in upper left hand corner



Typical Wiring Diagram

Typical Installation with Outside Storage Tank Using Copper Tubing

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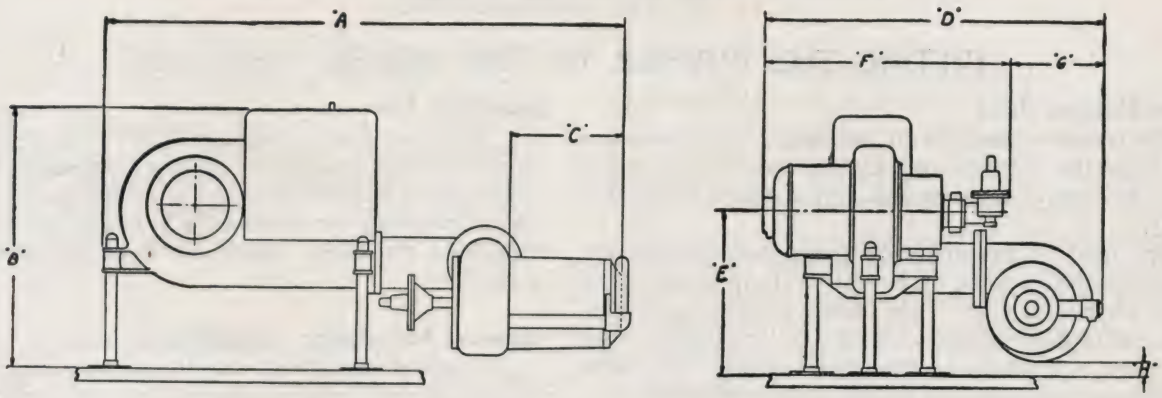
FITTING THE BURNER TO THE BOILER



ELECTROL BURNER DIMENSIONS AND CAPACITIES

Model	Dimensions, in.			Gal. of oil per hr.		Steam	Hot water
	A	B	D	Minimum	Maximum		
TJ	32½	16½	22	1	2½	200- 800	350- 1300
TU	40¾	22¾	27¼	2	9	600- 3000	1000- 5000
M	47½	22¾	28	9	22	3000-10000	5000-15000

The capacities given in square feet of cast iron radiation are based upon including piping and risers which must be added to the net radiation on any specific job to determine the required burner capacity. If there is any doubt, consult the nearest Electrol representative.

Boilers, Furnaces and Oil Burning

It may be generally said that the Electrol burner can be successfully applied to any good boiler or furnace. Heating plants will differ in efficiency when fired with oil just as they do when fired with coal, but due to the fact that Electrol burners fire automatically at the best efficiency practicable in any given plant and reproduce the same conditions at each operation, economical results may confidently be expected.

Care should be taken in choosing the boiler to be sure of ample heating surface in proportion to radiation load. If oil is specified, grates and fire tools are not needed, although many manufacturers now furnish boilers particularly fitted for oil firing. There are also steel and copper tube boilers on the market which have been designed especially for oil burning and which have developed remarkable efficiencies.

Thousands of warm air plants are being fired with Electrol burners to the entire satisfaction of their owners. Obviously care must be taken to insure that the furnace is tight but this same precaution is needed when using coal.

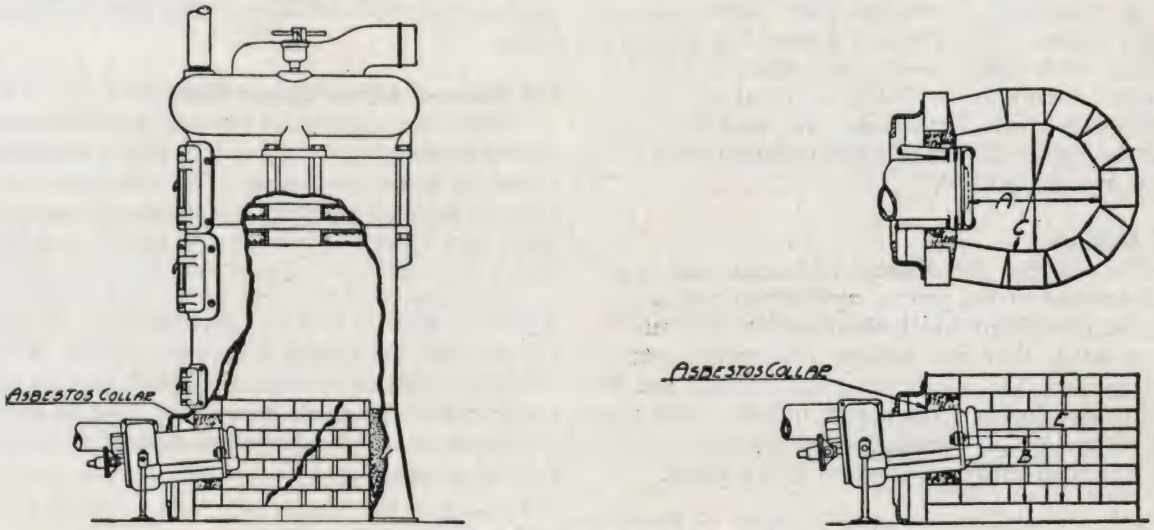
Combustion Chambers

A properly designed and constructed combustion chamber placed in the ash pit section of the boiler is an essential part of each Electrol installation. This chamber serves two important purposes:

First—To maintain the burning mixture of oil and air at a temperature that will insure complete combustion.

Second—To direct the slowly moving clean hot gases resulting from combustion through the boiler in such manner that the greatest proportion of useful heat can be transferred to the water.

Electrol Engineers and installers are skilled in combustion chamber designs and proportions to insure the best possible results.



A Typical Combustion Chamber Applied to a Round Boiler

Electrol combustion chambers are made in a variety of shapes and sizes, each designed to suit the particular plant in which it is built

Continued on next page

FITTING THE BURNER TO THE BOILER *(Continued)*

Larger Heating Jobs

The various methods of automatic operation possible with the Electrol oil burner are found to be useful in many applications other than residential heating.

The field of automatic oil firing may be said for practical purposes to be up to 10,000 ft. of steam radiation or its equivalent. This includes many apartment houses, churches, theatres, factories, institutions and other buildings where in the labor saving, cleanliness and uniform temperatures resulting from Electrol heating are of particular advantage.

Industrial Uses

There is also a large field for this equipment in laundries, bakeries, dairies, dyeing establishments, newspaper plants and the hundreds of other plants of similar nature, not only for heating the building, but for various industrial processes where accurate temperatures are desired.

Unusual Installation Conditions

Unusual installation conditions sometimes are met, due to special local ordinances, as are found in New York City, or topographical variations in individual sites. In either case, the local Electrol representative is well versed in the problems involved, and will gladly give any information required. He is also familiar with local oil suppliers, and is competent to recommend those most suitable for the burner and the individual installation.

A Typical Installation Showing How the Electrol Burner Operates Entirely Outside the Heating Plant

Multiple Installations

It is sometimes advisable to install two burners in a single large boiler, rather than one large burner in this boiler. The installation of two burners in one furnace is permissible, provided each burner has its own safety device. The Electrol burner is a complete unit with its own safety device, and when installed in this manner a certain flexibility is obtained, for in moderate weather one burner may be used to supply what heat is required. We will gladly supply data covering any specific project.

Electrol Dealers

Electrol dealers are chosen with care and thoroughly instructed in the proper application and installation of the equipment which they handle. Moreover, in case of need, they are free to call upon factory-trained engineers for advice or help. Work can be entrusted to an Electrol Dealer with full assurance that it will be carried out in complete accordance with specifications and with entire satisfaction to the client.

Oil Burners Affect House Design

Conditions following the use of oil burners in residential heating permit many interesting and useful variations in house designing. The cleanliness of the oil burner-equipped basement makes it practical to consider using this space for amusement rooms, laundries, children's playrooms, living quarters, servants' quarters, etc.

In some cases the area of the basement excavation may be reduced. If it be unnecessary to provide access for coal and ash trucks, it may be possible to modify or eliminate driveways, in that oil fill lines may be carried to the curb. In small houses, an outdoor entrance to the basement may be dispensed with, if there be no need for ash removal.

Continued on next page

OPERATING COSTS

The Electrol Burner, because of its high pressure atomization, presents an advantage in its ability to successfully burn a wider range of fuel oils.

It is designed to burn an oil showing a 28° Baumé gravity which is known to the trade as No. 3. Also on the Pacific Coast; Diesel oil not heavier than 25° Baumé when viscosity is not more than 54 sec. (Saybolt-Universal at 100° F.)

Methods of Estimating Operating Costs

Where coal consumption is not known *as in a new heating plant* the estimation of oil consumption requires a sufficient knowledge of local conditions and of oil burner operatings to be able to estimate, first, the length of the average heating season and, second, the per cent. of the heating season during which an oil burner is actually operating. The steps in the calculation are the following:

(1) Calculate the number of hours in the heating season.

(2) Multiply the figure by the total radiation.

(3) Multiply the product of 1 and 2 by the radiation constant (240 for steam, 145 for hot water, etc.) for the kind of heating system.

(4) Multiply the product of these operations by the per cent. of time during which the burner is actually operating.

(5) Divide the product of these operations by the B.t.u. content for one gallon of oil multiplied by the operating efficiency of the heating plant.

If for example the heating season were 7½ months, or 5,400 hours, and an oil burner is in operation 45 per cent. of the time, and that oil of 140,000 B.t.u. content will be burned at 62½ per cent. efficiency, the amount required for heating a building containing 500 sq. ft. of steam radiation would be obtained as follows:

$$\frac{5{,}400 \text{ hr.} \times 500 \text{ sq. ft. rad.} \times 240 \text{ rad. constant} \times 45\%}{140{,}000 \text{ B.t.u.} \times 62\tfrac{1}{2}\% \text{ efficiency}}$$

equals 3,332 gal. of oil per season.

When Past Coal Consumption Is Known

To determine the amount of oil that will be consumed, multiply the B.t.u. content of 1 lb. of coal by 2,000 (lb. per ton), by the number of tons consumed, by the efficiency of operation of a coal-fired heating plant and divide this figure by the B.t.u. content of 1 gal. of the oil to be used, multiplied by .62½% (average efficiency in oil consumption). This will give the gallons of oil that will be consumed, per ton of coal.

For instance, if the B.t.u. content of the coal was 12,000 (which is average for anthracite coal), and the B.t.u. content of the oil 140,000 (average for 1 gal.), and the amount of coal consumed in the house was 20 tons for the heating season, the number of gallons of oil required would be:

$$\frac{12{,}000 \text{ (B.t.u. coal)} \times 2{,}000 \text{ (lb. per ton)} \times 50\% \text{ (efficiency with coal)}}{140{,}000 \text{ (B.t.u. oil)} \times .62\tfrac{1}{2}\% \text{ (efficiency with oil)}}$$

This is 137.1 gal. per ton of coal, or approximately 137 gal. per ton, which, multiplied by 20 tons, gives an estimated consumption of 2,742 gal. for the season.

The same method may be used for estimating oil consumption as compared with *gas*—except that it is necessary to obtain the B.t.u. content and the efficiency of the gas produced in the particular locality, there being considerable variation.

Proportionate amount of oil required for different months of the heating season may be generally accepted from the following chart which has been compiled from the experience of several miscellaneous installations covering an average heating season:

Month end	Oil consumed	
	% of years total	% for month of years total
Oct.	8.8	9.2
Nov.	20.0	12.7
Dec.	38.0	19.9
Jan.	59.0	18.2
Feb.	74.2	15.6
March	86.8	12.9
April	97.8	9.4
May 15	100.0	2.1

There has been prepared and appended hereto another table showing cost comparisons, taking into consideration the number of tons of coal burned per season as compared with the number of gallons of oil required to produce the same B.t.u. and the number of cubic feet of gas that would be required, assuming that the gas was of a quality equal to 420 B.t.u. per cu. ft.

COST COMPARISON PER SEASON
Based on Data from U. S. Bureau of Standards

Number tons coal burned per season	Number gallons oil required		Gas, cu. ft.
	U. S. gal.	Imperial	
5	670	555	191,000
6	804	666	230,000
7	938	777	268,000
8	1072	888	306,000
9	1206	999	350,000
10	1340	1110	383,000
11	1474	1221	421,000
12	1608	1332	460,000
13	1742	1443	498,000
14	1876	1554	536,000
15	2010	1665	574,000

Note: From your yearly coal consumption find at the right the corresponding oil consumption in gallons. Multiply by gallon cost of low-priced heavy domestic fuel oil in your locality—and you have approximate cost figure. However, these figures are general—usually Electrol will show substantial savings over them. Table based upon the following values:

Coal—11,765 B.t.u. per U. S. pound. Oil—141,000 B.t.u. per U. S. gallon or 169,200 B.t.u. per Imperial gallon. Gas—420 B.t.u. per cubic foot.

Efficiencies used are averages obtained in practice.

In presenting this data the variables of installation must be taken into consideration. Every installation must be made according to the circumstances which must be determined by a study of the problem at hand—the fluctuating heating seasons in the different parts of the country—the class of building to be heated—the exposures to which it is subjected, go to compile the manifold ramifications of a complete heating problem.

Continued on next page

SPECIFICATIONS FOR OIL-BURNING EQUIPMENT

General—These specifications cover the installation of an oil burning system, including burner, combustion chamber, tank, controlling and limiting devices, necessary pipe, fittings, fill box, vent hood and electric connections, including all material and labor to make a complete automatic oil burning installation. The burner shall be installed in a boiler provided by the owner. When installed, the system shall be tested and left in condition to automatically start when the owner has secured the necessary oil supply and the main control switch has been closed. Thereafter the burner will start and stop as heat is required, controlled by the thermostat. The entire fuel oil burning system, when installed, shall comply with the rules of the National Board of Fire Underwriters and also any local fire and electric rules or ordinances that are in force. These specifications are intended to cover the oil burning system, complete in every respect, installed in a heating system of sufficient capacity as determined by standard heating practice to properly care for the heating requirements of the building, all according to manufacturer's printed instructions and drawings. The fan, or blower end of the oil burner must be installed so as to be 1 in. lower than the burner tip end of the burner assembly. No part of the burner assembly shall extend inside the firebrick lining of the combustion chamber.

Burner Guarantee—The burner must be guaranteed for one year by a company of approved responsibility against failure of any parts, due to defective material or workmanship, said company to make good by replacement or repair any original defect in parts, material or workmanship specified or described in these specifications. This obligation is assumed only in the event that written notification be given within a period of one year after said equipment has been installed.

Burner—The oil burner shall have continuous electric ignition, while oil is being sprayed into the furnace and be positively controlled in its operation so that if anything occurs to affect safe operation of the burner, it will stop automatically and not operate again until manually restarted. No overflow or tripper device, where quantities of oil are exposed to the atmosphere, for controlling the burner will be permitted or accepted.

Pump—The oil pump shall be integral with the burner, directly connected to the motor shaft. The pump shall be of the rotary gear type, having one driving gear and one idling gear. It shall be self-sealing, no stuffing box being employed. The pump shall be of sufficient capacity to supply oil of any gravity between 25° Baumé and 45° Baumé for the full capacity of the burner. It shall lift oil direct from underground tank without auxiliary equipment.

Oil Atomization—The oil shall be completely atomized by the pressure mechanical atomizing principle and intimately mixed with the proper amount of air required for complete combustion.

Regulating Valve—A pressure regulating valve shall be employed in conjunction with the pump so that the supply of oil to the nozzle may be carefully regulated to suit combustion requirements of the furnace.

Service—The contractor shall agree to inspect and adjust the burner after same has been put in operation, and thereafter to furnish service for the first 12 months of the first heating season after installation of the equipment.

Boiler Work—The burner must operate at full capacity with a 60% free swinging damper or damper in open position. The boiler and smoke pipe shall be thoroughly cleaned of any accumulation of soot and ashes before work of installation is started. All dampers, or draft control apparatus, shall be removed from the smoke pipe and chimney, or properly fastened in an open or approved position so that operation with a fully closed damper will never occur. The grate bars shall be removed and combustion chamber constructed within the boiler of No. 1 firebrick, of such design as to efficiently burn the oil delivered by nozzle and direct the resulting hot gases against the heating surface of the boiler. This work shall be carefully performed, because it is recognized that the size and proportion of this combustion chamber have a very definite relation to the size of the nozzle and the size and type of the boiler.

Smoke Flue—Whenever possible, the present smoke flue shall be used, but should any defects be present which prevent the proper combustion of oil, the owner agrees to make any reasonable changes that are considered necessary for proper operation of the burner.

Tank—The tank shall be of 1000 U. S. gal. capacity, made of open hearth tank steel, free from defects, with all seams welded, riveted and welded, or riveted and caulked. It shall contain the necessary openings for fill, vent, suction, return, gauge and cleanout connections and carry the Underwriters' label. The tank shall be located as shown on plan or as described by owner. In all respects the tank installation must conform to the requirements of the local authorities and be placed at least 24 in. below grade. All pipe shall be connected to the tank with lateral swing joints. Any necessary excavation, backfilling and resurfacing of the top soil and carrying away of surplus soil shall be a part of the contract.

Rock Excavation—Rock excavation is not included in the contract, and the owner is to pay for any rock excavation necessary to install the tank. In this sense, rocks weighing more than 500 lb. shall be considered "rock." If water is encountered in sufficient quantity to necessitate sheet piling or pumping, or if the tank has to be weighted to prevent floating, the exact cost shall be paid by the owner.

Piping—The oil piping system shall be installed in accordance with the Underwriters' rules and other local ordinances, and consists of the necessary fill pipe, vent pipe, suction pipe and return oil pipe from the tank to the burner. All necessary fittings, valves and vent hood shall be part of the piping system. All piping shall be of the best grade of black iron, galvanized steel, brass or copper tubing. All piping shall be assembled with malleable fittings and good clean cut thread or compression fittings in the event copper tubing is specified and all joints shall be turned in with Permatex, shellac or a litharge and glycerine compound. Rough in all pipes in or below concrete floors, or through walls and place sleeves where required, as general contract work progresses. All pipe lines to and from outside storage tank shall be buried not less than 2 ft. below grade. No piping is to be suspended from ceiling unless approved by architect or owner. All inside pipe lines shall be laid in or below floor of boiler room, or otherwise in compliance with local ordinances, or placed on top of

Continued on next page

SPECIFICATIONS FOR OIL-BURNING EQUIPMENT *(Continued)*

boiler room floor, with a covering of concrete mixed 1-2, using a good grade of portland cement and fine screened sand.

Control Devices—An automatic master control shall be installed as an integral part of the burner, and shall be wired in series with all other controls, so as to immediately and automatically shut off electric current and oil to the burner if for any reason the oil burner does not function properly. The controlling devices shall consist of an electrically operated thermostat and boilerstat, square D switch, the necessary wire and BX cable or conduit to connect all these devices together and to the burner from the fuse panel to make a complete automatic control system. The thermostat shall be placed so that an average temperature may be obtained throughout the house, or located where agreed upon by the owner. The maximum pressure, or temperature control shall be installed in the boiler and according to the manufacturer's printed instructions. This control, as stated before, shall be wired in series with the burner to automatically prevent creation of excessive pressure or boiling temperature in the boiler. All wiring shall be performed as required by local ordinances and in accord with the National Board of Underwriters' regulations. The motor wiring shall be run from a service box, independent of the house wiring. The master safety control will render the oil burning installation safe under any of the following conditions:

(1) Failure of power supply.
(2) The breaking of ignition wiring, short-circuiting or failure of ignition.
(3) Excessive motor current, caused by abnormal resistance.
(4) No oil in tank.
(5) Presence of excessive water in oil tank.
(6) A reduction in fuel delivery through line, or strainage stoppage.
(7) Failure of combustion or any abnormal condition that should arise in the combustion chamber.

Electric Current—The owner shall provide a convenient electric supply of the proper voltage to operate the burner. If necessary, the owner, in cooperation with the electric company, will provide leads of sufficient capacity to prevent excessive drop in voltage from the outside service.

Fireproofing—Fireproofing of the boiler room, if required by the local fire ordinances, shall be completed by the owner.

Permits—All necessary permits that must be obtained from local governing boards shall be provided by the contractor, except that a recurring periodic charge by any governing board shall be borne by the owner.

Omission—The omission from these specifications of any minor detail of construction, installation, material, specialties, etc., shall not relieve the contractor from furnishing same in place complete, and such omission shall not entitle the contractor to make claims or demands for extra materials or labor. If extra work of any nature is to be completed, the contractor shall notify the architect or owner in writing and shall receive instructions from him to that effect, for which the contractor shall receive a sum equal to the actual cost of such extra work, plus 15%. The word "cost" as herein above used, shall be understood to consist of actual field cost and overhead.

Note: We urge architects and engineers when making up specifications to give the following information:

(1) Type of job—steam, vapor or hot water, and the particular pressure or temperature that should be maintained so that the correct controls can be figured on.
(2) If clock or manual operated thermostat is required.
(3) If low water cut-off, duplex switch or boiler feeders are required.
(4) Give notation if any parts of contract such as excavation, backfill, fireproofing when required, is being taken care of by others.

OIL BURNER SERVICE FOR ARCHITECTS AND ENGINEERS

For complete understanding of any mechanical device, it is advisable to see it in actual operation. Therefore, Electrol dealers place their facilities at the architect's and engineer's disposal. The Electrol dealer will gladly make arrangements for you to see one or more of his installations, at any time which will suit your convenience. He will be glad to consult with you on any problem relating to the installation of oil heat in a particular building, or to give you information on any problem in which his experience may be of value.

Electrol Engineers are always at the service of architects and engineers. Their services in laying out systems or in devising means to overcome unusual conditions are available at any time. For this service there is neither charge nor obligation.

Local Sales and Service Organizations

We refer you to the local Classified Telephone Directory for the name and address of the local Electrol Dealer.

HARDINGE BROTHERS, INC.

MANUFACTURERS AND ENGINEERS

Fuel Oil Burning Equipment for Any Plant
"From Bungalow to Skyscraper"

MAIN OFFICES AND FACTORY
4149 Ravenswood Avenue, CHICAGO, ILL., U. S. A.

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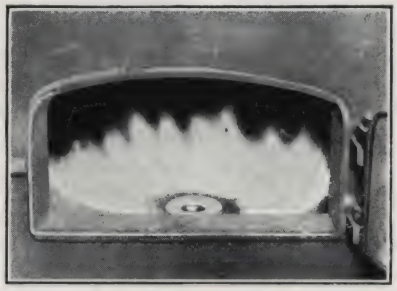
FOREIGN

BUENOS AIRES, S. A. QUEBEC, CANADA HALIFAX, N. S. LONDON, ENG. SYDNEY, AUSTRALIA BUCHAREST, RUMANIA

History and Products

HARDINGE BROTHERS, INC., have been established in the manufacture of precision built machinery since 1890. They occupy an enviable position in the machine manufacturing field, having built an internationally famous line of lathes, watchmaking tools and optical measuring devices for forty years.

Hardinge Fuel Oil Burners have been built and installed for fourteen years, pioneering the field in which they now lead in scope and range of their equipment. Financial strength coupled with renowned engineering ability and production facilities assures durability, efficiency and economy of the burners.



The Hardinge Flame—the Foundation of Economical Heat Production

Description of the Equipment

Burners—Hardinge Fuel Oil Burners are of the centrifugal atomizing type, and in their design and operation are incorporated three major principles. These are (1) Durability of assembly, (2) Flexibility of operation and adaptation, and (3) Efficiency, economy and quietness of operation.

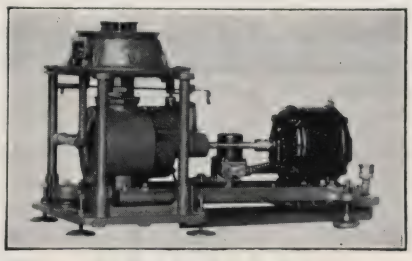
Simplicity of design, accurate workmanship, correctness of engineering and slow moving parts insure durability of equipment. Hardinge burners are built in a range of models to meet the exact specifications of any heating or power plant. Each burner can utilize several interchangeable atomizers of different capacities insuring flexibility of operation. The Hardinge Rotary Feed Valve is the only non-cloggable oil metering device in the industry. Dirt, grease, or sludge will not interfere with the operation of this valve which is an integral part of all Hardinge burners designed to burn 28 gravity Baumé oil or heavier.

HARDINGE BROTHERS, INC., have kept the fact in mind that oil burners are mechanical generators of heat from liquid fuel, and therefore the burners are to be installed in boilers designed to burn coal. The rate of draft travel of coal-fire heat is slow, in order that the boiler may absorb the heat before it escapes. Any device not complying with this condition, and forcing the heat through the boiler and out of the stack at an excess rate of draft travel not only loses boiler absorption of heat and creates tremendous stack losses but defeats its own end—increased efficiency and economy. The Hardinge burner employs no fans, blowers or compressors. Its efficiency and economy of operation finds its answer in the ability to burn completely the lower grades of oil as well as to utilize a flame which covers the entire area of the boiler firebox.

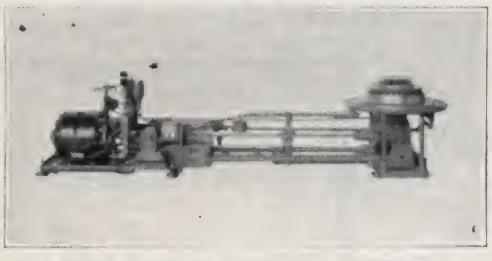
Atomization—Atomization of oil with the Hardinge burner is secured without recourse to vaporization or air pressure. Under low pressure, oil is introduced into the atomizer, the rotation of which carries the oil up and over its sharp edge by centrifugal force. As the oil leaves the edge of the atomizer, it is completely broken up into a mist. Closely controlled air from the vanes of the atomizer is then introduced to the atomized oil at the point where it leaves the atomizer, thus securing an intimate mixture not approached by any other method.

Ignition—Automatic ignition is obtained by expanding gas pilot, straight electric ignition, or gas-electric ignition—depending on the size equipment necessary.

Controls—The Hardinge Burner utilizes five main controls. Safety sump, automatic shut-off valve, boiler control, safety trip bucket, or stack control, and room thermostat. Other controls necessary for special situations are available and utilized to meet particular conditions.



A Residential Burner



An Industrial and Commercial Burner

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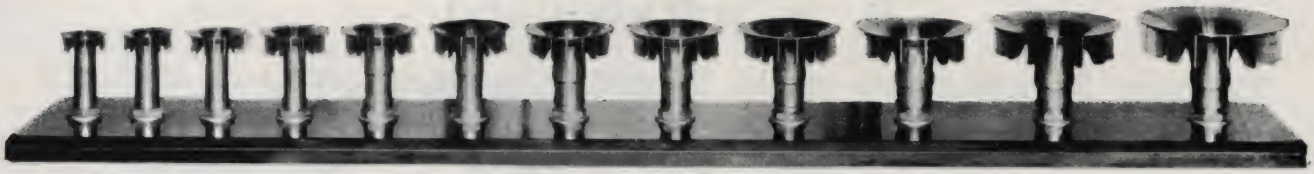


Various Sizes of Hardinge Atomizers

Hardinge atomizers are made in interchangeable sizes in accordance with the chart here shown, to meet any load capacities. These units furnish complete atomization in themselves without resort to any other method of breaking up the oil

Oils—For automatic installations Hardinge burners are listed as standard by the Underwriters' Laboratories, Inc., for fuel oils of 18° Baumé or above.

ATOMIZER SIZES AND RATINGS

Atomizer diameter, in.	Steam radiation capacity, sq. ft.	Hot water radiation capacity, sq. ft.	Atomizer diameter, in.	Steam radiation capacity, sq. ft.	Hot water radiation capacity, sq. ft.
2½	350	500	6	4800	7680
3	500	800	6½	5500	8800
3½	800	1280	7	6500	10400
4	1200	1920	8	10000	16000
4½	2000	3200	9	15000	24000
5	3000	4800	10	25000	40000
5½	3800	6080			

Industrial installations may utilize 14° Baumé or above, preheated when necessary.

Approvals

Hardinge Fuel Oil Burners are listed as standard by the Underwriters' Laboratories, Inc., of 207 East Ohio Street, Chicago. They are approved by the New York Board of Standards and Appeals, Massachusetts State Board of Safety and Fire Prevention Boards of principal cities.

Adaptability and Capacity

Hardinge Fuel Oil Burners are adaptable to any type of modern boiler or furnace and will meet any particular conditions of installation. Remote storage tank installations can be adequately handled. Remote control of burners can be accomplished with close adherence to operating conditions.

Hot water for residences, apartments, schools, public buildings or industrial plants can be furnished automatically from the burner in the heating boiler both winter and summer. Special controls for high pressure work, unit heaters, and varied currents or frequencies can be installed as a unit with the burner.

The minimum and maximum burner capacities vary from ¾ to 60 gal. of oil per hour, 350 to 25,000 ft. of steam radiation load, or from 3 to 225 hp. Flexibility, efficiency and economy of operation are shown by the following official tests:

Excerpts from Official Tests

Test of No. 317 Steel Kewanee Boiler—

Taken by	Kewanee Boiler Co.
Burner	Hardinge, 8-in. atomizer
Duration	Eight hours
Fuel oil	21.47° A.P.I.
Stack temp.	293° F.
CO_2	14.0
Furnace draft	.005
% Rating	85.9
Efficiency	83.14
Cost per 1000 lb. steam	47.3¢

Test on Mills No. 34, C. I. 8 Sections—

Taken by	L. E. Seeley, Yale University
Burner	Hardinge, 4-in. atomizer
Duration	Six hours
Fuel oil	27.3 A.P.I.
Stack temp.	342° F.
CO_2	14.0
Efficiency	80.5

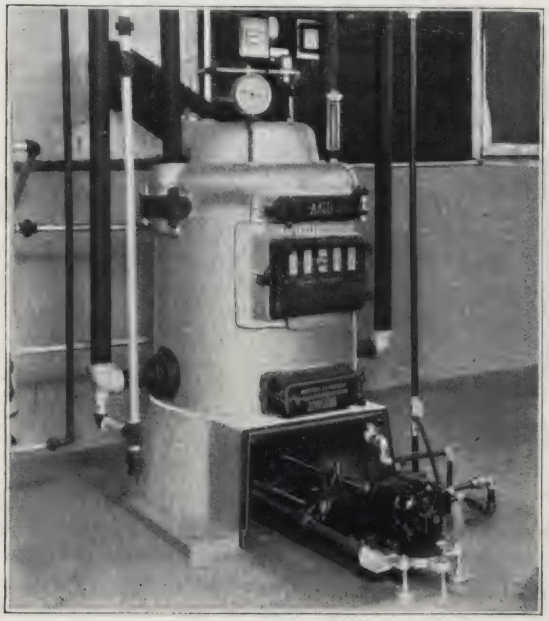
Test on Oil City Boiler No. 922—

Taken by	G. F. Gebhardt, M.E.
Burner	Hardinge, 9-in. atomizer
Duration	Eight hours
Fuel oil	26° Baumé
Stack temp.	270° F.
CO_2	15.6
Draft	.03

Burner set for 35 gal. per hour

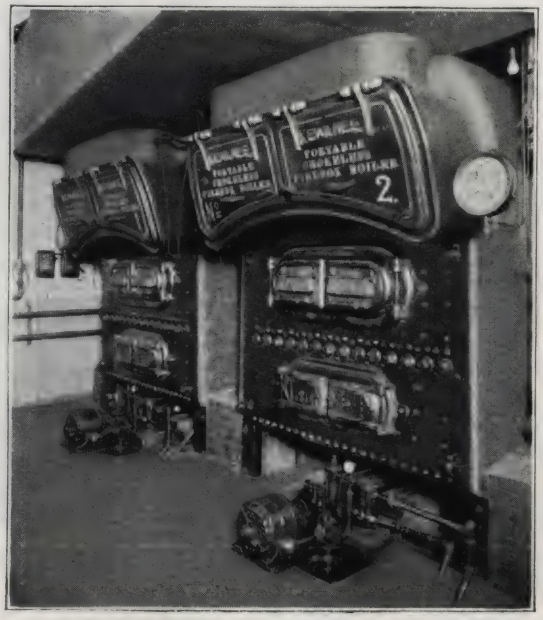
Engineering and Architectural Service

We invite consultation in regard to burning fuel oil. Data on combustion, efficiencies, costs, etc., nationally gathered is available. Catalogs and engineering booklets available to architects and engineers.



A Residential Installation

There is a particular model of Hardinge Burner for every type of Boiler or Furnace



A Commercial Installation

S. T. JOHNSON CO.

Exclusive Manufacturers of Oil Burning Equipment for Over 25 Years

EXECUTIVE OFFICE AND FACTORY
940-950 Arlington Street
OAKLAND, CALIF.

FACTORY BRANCH OFFICES: SAN FRANCISCO, SACRAMENTO, SAN CARLOS AND STOCKTON, CALIF., PHILADELPHIA, PA.

LOCAL REPRESENTATIVE

Johnson Products

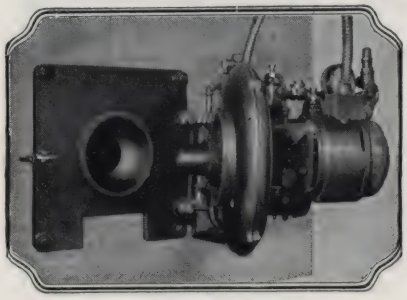
There is a JOHNSON OIL BURNER for every domestic, commercial and industrial heating or power purpose.

Rotary Oil Burners, with either full automatic or semiautomatic control, Low Pressure Air Atomizing Oil Burners, Oil Pumping and Pre-heating Equipment, also Steam Atomizing, Natural Draft and Whirlwind Oil Burners.

JOHNSON OIL BURNERS®

Listed as Standard

Johnson Oil Burners were one of the first burners to be listed as standard by the Underwriters' Laboratories, Inc., approved by the New York Board of Standards and Appeals, and fire prevention bureaus of principal cities.



Johnson Rotary Burners Swing Easily Out of Firing Position for Adjusting and Inspection

Johnson Rotary Oil Burners

Johnson Rotary, or mechanical draft oil burners, are designed for use in all types of high and low pressure domestic, commercial or industrial heating systems; power plants, furnaces, ovens, ranges, kilns. They are made in four styles, catalogued as Types "28," "26-A," "30-A," and Type "B."

Type "28"

Johnson Type "28," manually ignited rotary fuel oil burner, is made in six sizes, providing a range up to and including 41,700 sq. ft. of steam radiation or its equivalent, and is listed to burn industrial fuel oils Nos. 4, 5 and 6, preheated when necessary.

Type "26-A"

Type "26-A" automatic oil burner is made in five sizes, covering a range up to and including 27,800 sq. ft. of steam radiation or the equivalent, and is listed to burn domestic fuel oil No. 3 and Pacific Coast Diesel.

Type "30-A"

The Johnson Type "30-A" Rotary Fuel Oil Burner is designed to automatically preheat and burn industrial fuel oil as heavy as No. 6.

Type "B"

The Junior or Type "B" automatic oil burner is made in one size only, and designed for use in all types of heating systems, requiring up to and including 825 sq. ft. of steam radiation or its equivalent, and is listed to burn domestic fuel oil No. 3 and Pacific Coast Diesel.

Features of Importance

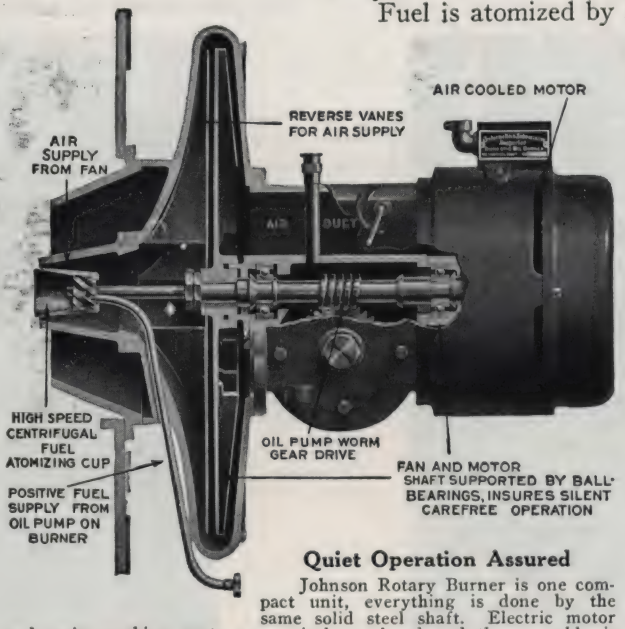
Pump or Gravity Feed—The fuel is delivered automatically by an oil pump, built as an integral part of Johnson Rotary Burners Nos. 1½, 2½, 3½, 4½, 5½ or by gravity or auxiliary pump system from the storage tank, when Type "B" and burners Nos. 1, 2, 3, 4, 5 and 6 are used. The oil pump worm gear drive is machined as an integral part of the steel shaft, thus eliminating any possibility of eccentricity, and assuring a positive flow of oil to the burner, as well as quiet, carefree operation.

Full Automatic or Manual Ignition—Johnson Type "28" Rotary Fuel Oil Burner is manually ignited, Type "30-A" by expanding gas pilot, while Type "26-A" and "B" rotary burners are automatically ignited either by electricity or expanding gas pilot as may be desired.

Fuel Economy Secured by Complete Combustion—Johnson Rotary Burners have the advantage of burning the cheaper grades of fuel oil economically, because of the complete combustion secured through the Johnson method of centrifugal atomization.

Fuel is atomized by a combination of air and centrifugal force, which sprays the oil in minute particles from the rim of a revolving atomizing cup surrounded by air discharged in an opposite direction. This impact completely atomizes the fuel and carries it as vapor into the firebox.

Maximum Heat from Minimum Fuel — The amount of air necessary for perfect atomization is supplied by a motor and fan, built as an integral part of the burner, and is regulated by a shutter in the rear of the Type "B" burner, and by a butterfly valve on Types "28," "26-A," and "30-A." The oil supply, once properly regulated by the oil regulating valve, also is a fixed and constant quantity.



Quiet Operation Assured

Johnson Rotary Burner is one compact unit, everything is done by the same solid steel shaft. Electric motor and main working parts are entirely enclosed and the assembly is perfectly balanced to produce a non-vibrating and quiet running burner, which produces maximum heat from every drop of fuel

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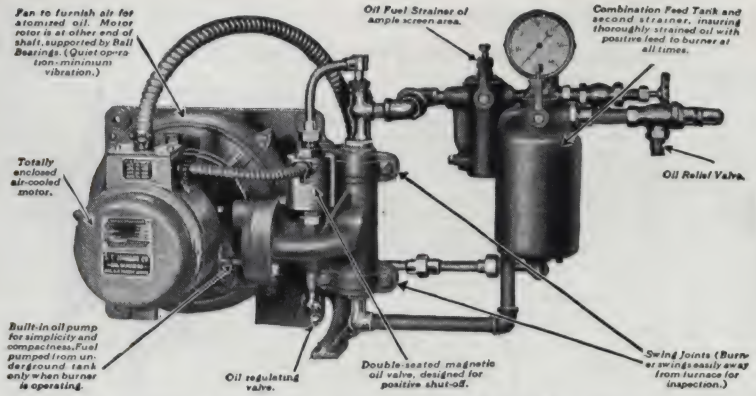


Johnson Type 26-A Automatic Rotary Oil Burner

The atomized fuel is burned in suspension, producing a soft, clean flame, which is evenly distributed throughout the firebox—a Johnson feature, assuring the maximum amount of heat from every drop of fuel.

Ajustable Flame—The flame can be easily adjusted as to width, length and volume, by the air control lever, oil regulating valve, and by the use of different combinations of fuel atomizing cups and air nozzles.

Automatic or Semiautomatic Control—Johnson Type "30-A," "26-A" and "B" Rotary Burners are automatically ignited and controlled. The Type "28" manually ignited burner constructed with built-in pump may be semiautomatically or manually controlled, while the non-pump Type "28" manually ignited burner may be equipped with either the air and oil control, automatic oil relief valve, or steam operated oil regulator to insure the correct ratio of atomizing air and fuel for efficient combustion under varying loads.

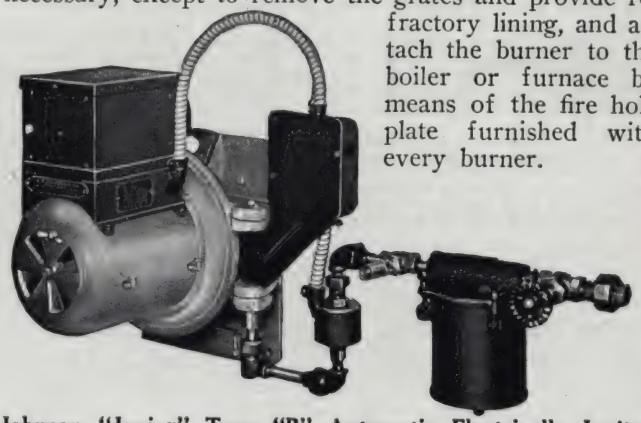
Clean Oil Assured—An efficient oil strainer of generous screen area is standard equipment on all Johnson Rotary Burners. The screen is constructed of monel metal to resist the attack of the oil, and is housed in a cast iron container, designed so that the screen may not only be easily removed and cleaned, but any accumulation of foreign matter or water may be drained through the bottom of the strainer.

Pressure Equalizing Tank—The air and water separator or pressure equalizing tank is another exclusive Johnson feature which is standard equipment on Type "30-A" and "26-A" rotary burners. The tank provides absolute protection against foreign matter entering the fuel and being lodged in the regulating valves. It also insures a constant oil pressure as well as an emergency supply of oil sufficient to start and operate the burner from 10 to 20 minutes.

Positive, Carefree Lubrication—A continuous circulation of lubricating oil is supplied to all bearings by either oil chain on the gravity feed burner or the worm drive on the pump type burner from gear case, filled through oil cup on side of the burner—a feature assuring long life and carefree operation.

Dependable Motor—A 3400 r.p.m. air-cooled motor quietly propels the air fan, fuel atomizing cup and oil pump gears. This motor operates on single phase or polyphase 60-cycle, 110 or 220-volt alternating or direct current, except on burners Nos. 5, and 6, which are equipped with either a 2 or 3-phase, 220-volt, 60-cycle motor.

Easily Installed on Any Make of Boiler—The Johnson Rotary Fuel Oil Burner is one of the simplest to install. No change in the heating or power plant is necessary, except to remove the grates and provide refractory lining, and attach the burner to the boiler or furnace by means of the fire hole plate furnished with every burner.

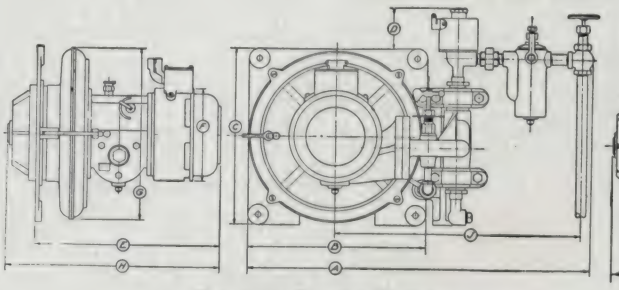


Johnson "Junior" Type "B" Automatic Electrically Ignited Rotary Oil Burner

Service for Architects and Engineers

The accumulated information resulting from our experience of over 25 years in the manufacture and installation of oil burning equipment, is at your disposal. Our Engineering Service Department will not only gladly assist in the solution of your more difficult heating problems and in the preparation of oil burner specifications, but will welcome the responsibility of appointment as "your headquarters" for oil heating information. Take full advantage of this service, remembering no obligation is incurred.

Dimensions and Capacities



Type 28 Rotary Burner

Size	Rating, sq.ft. steam	H.p. rating	Gal. oil per hr. Min.	Gal. oil per hr. Max.	Motor h.p.	Dimensions, inches A	B	C	D	E	F	G	H	J
1	1,385	10	1¼	3¼	¼	28⅛	12¾	12¾	4⅜	14¼	6¾	11⅞	16⅜	21⅜
2	2,775	20	2	6½	⅓	29	13⅞	13⅞	3¼	14¼	7¼	13⅜	16½	21⅜
3	6,950	50	3¼	16	½	30¼	15⅞	16⅛	2⅛	14¾	7¼	15¾	17⅛	22¼
4	13,900	100	6½	32	¾	38⅛	19½	17	3⅝	19¼	8⅞	18⅛	21	27⅞
5	27,800	200	13	64	2	39⅜	21½	21½	1⅝	19¾	10⅜	20½	23⅜	27⅞
6	41,700	300	25	96	2	39⅜	21½	21½	1⅝	19¾	10⅜	22	23⅜	27⅞

Type 26-A Rotary Burner

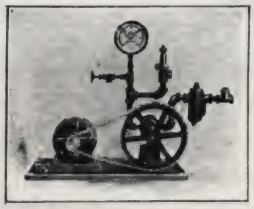
Size	Rating, sq. ft. steam	Motor h.p.	Gal. oil per hr. Min.	Gal. oil per hr. Max.	Dimensions, inches A	B	C	D	E	F	G	H
1½	1,385	¼	1¼	3¼	34	12¾	12¾	16½	14¼	6¾	11⅞	16⅜
2½	2,775	⅓	2	6½	35	13⅞	13⅞	16¾	14¼	7¼	13⅜	16½
3½	6,950	½	3¼	16	37	15⅞	16⅛	17¾	14¾	7¼	15¾	17⅛
4½	13,900	¾	6½	32	49	19½	17	21⅛	19¼	8⅞	18⅛	21
5½	27,800	2	13	64	51	21½	21½	22¾	19¾	10⅜	20½	23⅜

Continued on next page

OTHER JOHNSON OIL BURNING EQUIPMENT

Johnson Fuel Oil Pump Set

The Johnson Electric-driven Fuel Oil Pump Set combines sturdy construction with simplicity. The set is designed for use with gravity type burners, and will pump all grades of fuel oil or distillate from an underground storage tank, maintaining a dependable and constant flow of oil under pressure to one or more burners.



The set consists of oil pump and motor securely mounted on cast iron base plate, and equipped with oil pressure gauge, automatic relief valve, oil strainer and check valve, as illustrated.

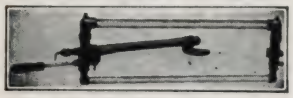
Johnson Fuel Oil Pump Sets are made in two sizes, catalogued as Nos. 1 and 3. Set No. 1 may be obtained with either belt or chain drive, while the chain drive is exclusively used on set No. 3. The chain-driven equipment should be specified when heavy oil is being burned, or when the oil is drawn through restricted areas and many turns, or through a long suction.

SIZES AND CAPACITIES, JOHNSON FUEL OIL PUMP SETS

Size No.	Drive	Motor hp.	Gal. per hour	Shipping weight, lb.
1	Belt	1/8	65	100
2	Chain	1/4	75	110
3	Chain	1/2	200	160

Note: Larger oil pumping sets gladly made upon request to meet special requirements. When ordering pumps, state viscosity of fuel to be burned; also, electric current available.

Johnson Low Pressure Air Atomizing Oil Burners



Johnson Low Pressure Air Atomizing or Gun Type Oil Burners are designed for use in all types of commercial and industrial heating systems, foundries, furnaces, ovens, ranges, kilns, plating, galvanizing and heat treating plants.

They are made in two styles, catalogued as the round or flare tip gun type burner, and the swing-joint (shown here) bake oven low pressure air atomizing oil burner, and will successfully vaporize all kinds of fuel oil with air pressure of between 1 and 5 lb. per sq. in.

The gun type burner is made in three sizes, Nos. 5, 6 and 7, while the swing-joint burner is made in one size, catalogued as No. 5 swing-joint burner.

All Johnson Low Pressure Air Atomizing Oil Burners are equipped with an angle-ported valve, especially designed to not only permit very close and even regulation of the fuel, but to produce a flame of extremely high temperature and efficiency.

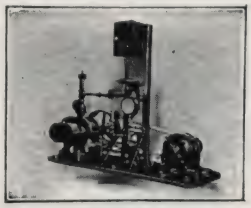
SIZES AND CAPACITIES, JOHNSON LOW PRESSURE AIR OIL BURNERS

Size No.	Oil per hour, gal.		Boiler capacity, hp.		Connection, in.		Shipping weight, lb.
	Min.	Max.	Min.	Max.	Air	Oil	
5	1/2	8	1	25	1	3/8	25
6	5	20	15	60	1 1/2	1/2	35
7	10	35	30	100	2	1/2	50

Note: Maximum oil burning capacities are with 2 1/2 lb. air pressure and heavy oil. Air and oil valves are furnished with burners. Johnson Low Pressure Burners also constructed as swing-joint burners for use on continuous or inside-fired bakers' ovens.

Low Pressure Air and Oil Pumping Equipment

The Johnson Belt Connected Low Pressure Air and Oil Pumping Equipment combines simplicity with perfection of design and performance. It will economically and dependably pump all grades of fuel oil and maintain a constant pressure of air to the burners.



The set consists of electric motor with sliding base connected to a pressure blower by means of an endless leather belt. Motor, blower and oil pump are securely mounted on cast iron base plate. An overload and no voltage starting switch is enclosed in metal box conveniently located as illustrated.

Johnson Low Pressure Air and Oil Pumping Sets are built in eight sizes and are ordinarily furnished with the number and size of low pressure atomizing oil burners shown by the table. However, when desired, a different size or quantity of burners may be used. The size and number of burners that can be successfully operated will depend upon the size of the air nozzle on the burners and the capacity of the set.

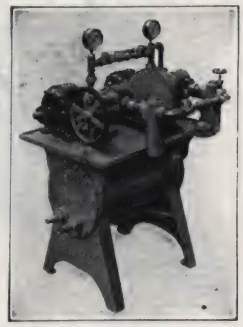
SIZES AND CAPACITIES, JOHNSON LOW PRESSURE AIR AND OIL PUMPING EQUIPMENT

Size No.	Capacity radiation, sq. ft.	Size* Motor, hp.	Size base, in.	Shipping weight, lb.	Number burners regularly included
0	1,200	1/2	14x40	450	1 No. 5
1	2,500	3/4	18x42	550	1 No. 5
2	4,500	1	20x50	750	2 No. 5
3	9,000	2	24x56	900	2 No. 5
4	16,000	3	33x65	1500	2 No. 6
5	18,000	5	22x65	1600	2 No. 6
6	30,000	7 1/2	45x72	2100	2 No. 7
7	40,000	10	48x75	3300	3 No. 7

Note: *Standard direct-current motors are designed for 115 or 230 volts. Alternating-current motors may be had for 110-220-440 volts single or polyphase, and a frequency of 50 or 60 cycles. Other voltages or frequencies may be had for a slight additional cost.

Capacity refers to low pressure steam boiler ratings. Divide by 100 to equal approximate horsepower rating. Divide capacity by 40 to equal approximate pounds of oil per hour rating. Actual ratings governed by draft conditions.

Johnson Duplex Oil Pumping and Preheating Equipment



The Johnson Combination Oil Pumping and Preheating Equipment is designed for use where continuous operation is essential, and preheating of oil is necessary to increase its fluidity and to insure most efficient atomization. Live steam is employed to heat the fuel oil passing through the coil heaters, and the sets are equipped with two pumps constructed to operate individually or together as may be desired—a Johnson feature assuring continuous operation.

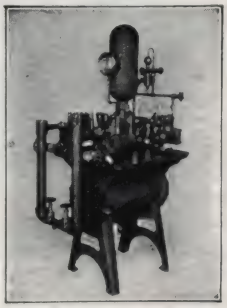
This Johnson equipment is made in two sizes, catalogued as sets Nos. 1 and 3. Set No. 3 may be obtained with either a long or short coil heater, while the short coil heater is used exclusively on Set No. 1.

Each set is furnished completely assembled, as shown. Fittings include oil strainers, check valves, automatic relief valves, pressure gauges and starting switch; chain guards are also standard equipment. Auxiliary strainers are furnished at additional cost.

SIZES AND CAPACITIES, JOHNSON DUPLEX OIL PUMPING AND PREHEATING EQUIPMENT

Size of set	Heater coil	Oil per hour each pump, gal.	Motor hp.	Approximate shipping weight, lb.
No. 1 Duplex	Short	75	1/4	840
No. 3 Duplex	Short	250	1/2	860
No. 3 Duplex	Long	250	1/2	900

Johnson Steam Driven Oil Pumping and Preheating Equipment



Johnson Steam Driven Oil Pumping and Preheating Equipment is designed for installations carrying steam pressure in excess of 50 lb., and when a number of boilers are to be fired simultaneously.

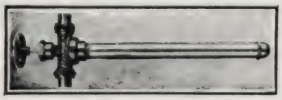
The set is made in three sizes, and furnished completely assembled, as illustrated, and includes two duplex oil pumps, sight feed lubricator, oil pressure gauge, oil preheating chamber and coil, air chamber, suction by-pass connection with valve, double basket type strainers, live steam connection with throttle valves, exhaust steam connection with valves, live steam by-pass to heater and oil pressure relief valve and automatic pump governor.

All unions have brass ground joints and high grade navy regrinding valves are used throughout. Piping is arranged so that either exhaust steam from the pumps or live steam may be used to preheat the oil, and the automatic pump governor insures a steady oil pressure at all times.

SIZES AND CAPACITIES, JOHNSON STEAM DRIVEN OIL PUMPING AND PREHEATING SETS

Duplex pump sets	Capacity boiler, hp.	Approximate shipping weight, lb.
3 x2 x4 (two pumps)	400	900
4 1/2 x2 3/4 x4 (two pumps)	1000	1400
5 1/4 x3 1/2 x5 (two pumps)	2000	2500
3 x2 x4 (one pump)	400	650

Johnson Steam Atomizing Oil Burners



Johnson Steam Atomizing Oil Burners are made in three styles and five sizes, catalogued as burners Nos. 1, 2, 4 and 4-special.

Burners Nos. 1 and 2 (shown at right) are designed to burn low cost domestic fuel oil No. 3 in small vertical steam boilers, kitchen ranges and furnaces; while burners Nos. 3 and 4 (shown at left) and 4-special will handle the heavy industrial fuel oil No. 6 in boilers of from 20 to 300 hp. and all types of large industrial furnaces.

Flame may be adjusted as to width, length or volume by use of different types of burner tips, and the steam, air and oil supply controlled either by hand or semiautomatically by boiler steam pressure.

Johnson Steam Atomizing Oil Burners are also constructed as a swing-joint burner for continuous and inside firing of peel or bake ovens. As swing-joint burners, they may be used with air pressure of from 10 to 100 lb., and oil pressure of from 2 to 50 lb.

SIZES AND CAPACITIES, JOHNSON STEAM ATOMIZING OIL BURNERS

No.	Capacity, gal. per hour	Approximate shipping weight, lb.
1	1/2 to 3	8
2	1 to 5	12
3	4 to 10	25
4	8 to 40	40
4-special	20 to 62	50

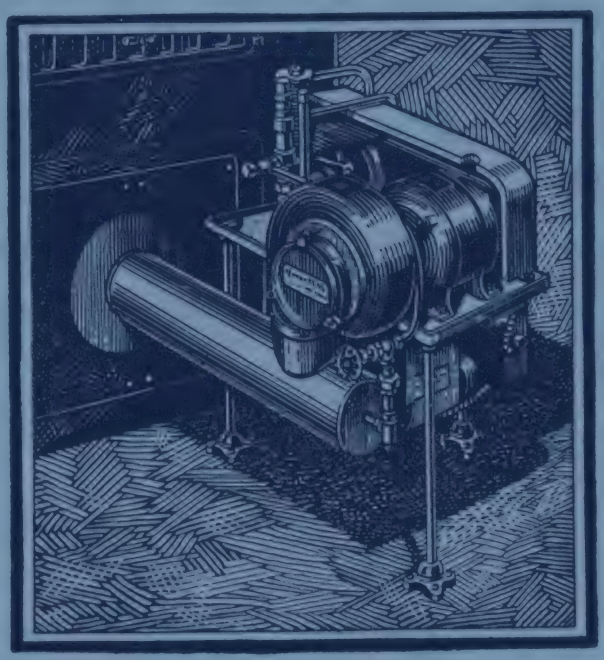
Johnson Whirlwind Oil Burners

Where gravity feed is permitted, the Johnson Whirlwind Oil Burner may be easily installed at minimum cost. Simple, clean, economical and easy to operate, they are designed to operate steam heating and hot water boilers in apartments, bakeries, hotels, houses, office buildings, schools, greenhouses, dryers, etc.

They are made in two styles and six sizes, ranging from 500 to 4000 sq. ft. of steam radiation and from 5 to 40 hp.

For complete information on this equipment ask the Johnson dealer for Bulletin No. 16.

QUIET MAY
AUTOMATIC
OIL BURNER



MAY OIL BURNER CORPORATION
BALTIMORE, MD.

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MAY OIL BURNER CORPORATION

MAY OIL BURNER CORPORATION

Manufacturers of Quiet May Automatic Oil Burners

FACTORIES AND GENERAL OFFICES
BALTIMORE, MD.

May Oil Burner of Canada, Ltd.
TORONTO, CANADA

NEW YORK
331 Madison Avenue

CHICAGO
35 East Wacker Drive

PHILADELPHIA
717 North Broad Street

LONDON (ENG.)
15 Great James Street

PARIS
15 Rue de la Paix

The Company, Its Products, and Distribution

Company and Products

The MAY OIL BURNER CORPORATION was organized in the year 1924 and the present management of the corporation became active in the conduct of its business in the Fall of the same year.

The company manufactures oil burners exclusively. The company was organized for the purpose of manufacturing and distributing the Quiet MAY Automatic Oil Burner, which operates on the principle of mechanical atomization. Experience since then has confirmed the belief that this type of oil burner is the most practical, economical and efficient type and the basic principles of the construction of the Quiet MAY have not been altered since the company was organized. From the very start, the company has been managed by officers whose capital is invested in it and all of the activities are under their close personal supervision.

The Quiet MAY is manufactured in but one type, but in five sizes which will take care of the heating requirements of buildings requiring from 1½ to 45 gallons of oil per hour. This range is suitable for a wide variety of buildings, from a six-room house to the large apartment house, institution or commercial building. All sizes operate on identically the same principle. This minimizes the requirement of spare parts and if through any emergency replacement of parts is required, this service matter is greatly simplified.

Distribution

The distribution of the Quiet MAY has gradually and consistently expanded until today the company maintains direct wholesale branch offices in New York City, Chicago, Philadelphia, Paris, and London, and has special representation in South America. Direct factory branch retail outlets are maintained in Baltimore, Philadelphia, Chicago and Milwaukee. Reliable dealers handle the Quiet MAY in all parts of the United States and their methods of selling and installing them are supervised by factory representatives, thoroughly trained in the merchandising, selling and servicing of automatic oil burners.

The company maintains an Engineering School at its factory and all dealers are required to send to this school for a thorough course in training, mechanics whose duty it is to install and maintain the Quiet MAY after it is sold.

A View of the General Offices at Baltimore, Md.

In Canada, The May Oil Burner of Canada, Ltd., with headquarters in Toronto, takes care of the rapidly increasing Canadian business.

The company maintains a field engineering staff whose duty it is to instruct dealers in the correct installation of the Quiet MAY and supervise such installations. The company continues to maintain its interest in the Quiet MAY after it has been installed.

The greatest care is exercised in manufacturing, testing and assembling the Quiet MAY Automatic Oil Burner and nothing is left to chance or to the word of suppliers of material outside of the Quiet MAY organization.

In the following pages are described some of the parts and the manufacturing operations which are carried out with the most meticulous care.

Continued on next page

Adaptability and Efficiency

The Quiet MAY Automatic Oil Burner is designed and built in five sizes with a range of capacities from 1½ gallons to 45 gallons of oil per hour.

Each size is designed to operate with a maximum of efficiency at any rate within its range so that it is possible to choose from the five sizes a burner that is exactly fitted to meet any specific requirement.

In the chart below is shown the minimum and maximum designed ratings of the five sizes of the Quiet MAY. Each model may be operated efficiently at any rate within the range given for that model.

All models are designed to be operated fully automatically and with electric ignition at any rate up to the maximum capacity of the largest size. They may be operated manually if desired.

Operating Range

Gallons per hour	A-c. Motor Hp.	Motor R.p.m.	Pump R.p.m.	Fan R.p.m.
Type A—from 1½ to 2 gallons	⅛	1725	900	1725
Type M—from 2 to 3 gallons	⅛	1725	750	1725
Type L—from 3 to 7½ gallons	¼	1725	900	1725
Type C—from 7½ to 25 gallons	½	1725	1100	1725
Type R—from 25 to 45 gallons	1½	1725	1100	1725

Burner Ratings in Equivalent Radiation Representing Total Connected Load at Boiler

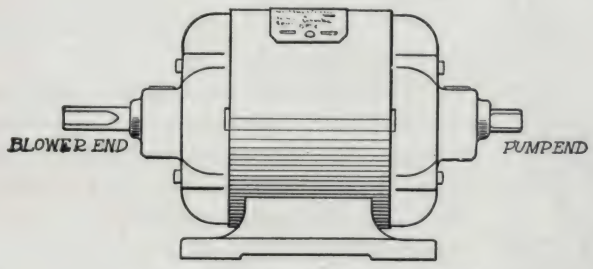
	Type "A"	Type "M"	Type "L"	Type "C"	Type "R"
Steam capacity, sq. ft.	600	900	2400	8400	14000
Hot water, sq. ft.	1000	1400	4000	14000	21000

In arriving at the maximum amount of connected load at the boiler which we guarantee each size to operate at, we have adopted the following method of calculation: (In order to avoid complicated figures we use round numbers.)

Using 140,000 as the B.t.u. content of 1 gallon of No. 3 oil and 2 gallons per hour as the maximum rating of our Type "A" burner, we have 280,000 B.t.u. per hour. Assuming an average efficiency for intermittently and automatically operated installations in a residence to be 70%, we have 196,000 B.t.u. aavilable. Carrying further the thought of the intermittent operation with the frequent cold start we allow 25% additional to take care of this situation, which gives us 147,000 B.t.u. (25% for cold start—see "Ideal" Fitter.)

Two hundred and forty B.t.u. per hour are required for 1 sq. ft. of steam radiation and dividing 240 into 147,000 gives us the equivalent of 600 sq. ft. of load at boiler. Load at the boiler is the sum total of standing room radiation plus mains and risers or any other form of connected load such as indirect connected domestic hot water heater.

Motors



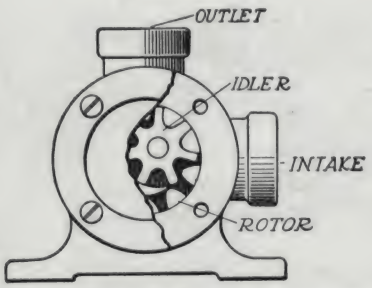
STANDARD SPEED ELECTRIC MOTOR

A-C. Motor, G-E and Century—The motor for the Type "A" burner is manufactured to our specifications by General Electric Co. and for Types "M," "L," "C," and "R" by Century Electric Co. All motors meet the requirements of the N.E.L.A. for fractional horsepower motors for intermittent domestic use.

Burners for Use with D-C.—To retain the important feature of electric ignition where only direct current is available, we have had designed and built for us an inverted rotary converter the functions of which are dual in that it supplies power to operate the pump and fan and it develops alternating current for the ignition transformer. Types "L," "C" and "R" are built for use with direct current.

Where direct current only is available Type "L" will operate efficiently in the capacity ranges of Types "A" and "M."

Pumps



INTERNAL ROTARY GEAR QUIET MAY PUMP

The pump is of the internal rotary gear type. This pump is built to our rigid specifications by the Viking

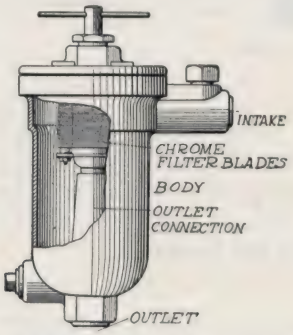
Continued on next page

Pump Co. It is self-lubricating and one pump serves the double purpose of taking oil from the storage tank and delivering it to the atomizer under sufficient pressure to atomize it finely enough to insure perfect combustion.

Each individual pump is carefully and thoroughly tested before it is assembled in a Quiet MAY Automaitc Oil Burner. When the bottom of the fuel tank is 12 ft. below the pump, a vacuum pull of 10 in. is required to raise the oil from the tank, and the operating pressure in the atomizer is between 100 and 150 pounds per sq. in. In the testing of these pumps, however, each pump must create a vacuum of 15 in. while developing a pressure of 100 lb. at the atomizer and the maximum pressure test of the pump is never under 250 lb. per sq. in. The exceptional efficiency of this pump will permit the placing of the oil tanks as much as 100 ft. from the oil burner and 12 ft. below.

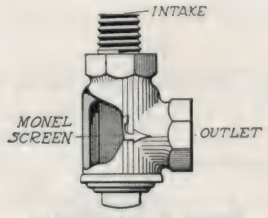
Strainers

There are two oil strainers on a Quiet MAY, the most important one being on the suction or pump line.



SELF CLEANING FILTER

This is actually a filter and is of the self-cleaning type. Ordinarily in this case of filter, brass is used in the self-cleaning mechanism, but the Quiet MAY exclusively uses chrome nickel. While the cost of this material is twice as great as of the commonly used brass, the durability of chrome nickel justifies the additional cost. The body casting of the main filter is die cast and of our own exclusive design.

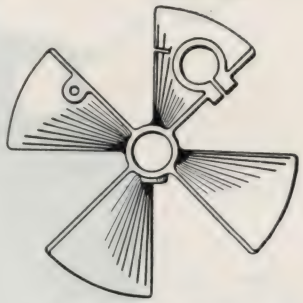


ATOMIZER LINE STRAINER

The secondary strainer is in the atomizer line and has very little to do because of the efficiency of the primary filter. It will, however, catch any foreign material that may accidentally enter the system while it is disassembled. The filtering unit is of double wrapped monel metal wire cloth, 100-mesh. With this efficient filtering system the clogging of the lines of the atomizer is practically impossible.

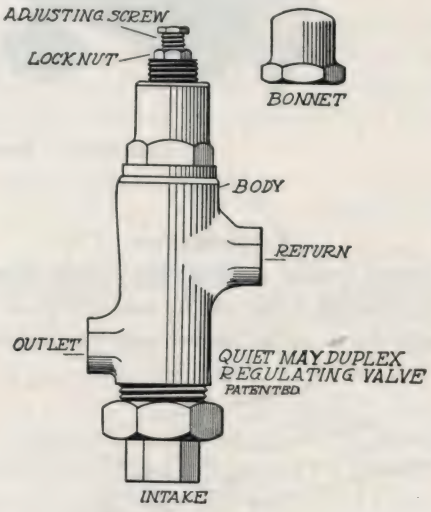
Turbulator

The turbulator is of cast bronze and is stationary. It is situated in the windpipe near the outlet. The turbulator has four vanes which are constructed at an angle to create that degree of turbulence which will give the most efficient mixture of air with the oil mist. This feature is a very important one, it accomplishing good combustion.


AIR TURBULATOR

Regulating Valve

The regulating valve is of the spring loaded piston-needle type. It is our own special design patented by us, and is built for us (according to our own rigid specifications) by the Lunkenheimer Co., a large manufacturer of high quality brass specialties.



The regulating valve has a dual purpose—first, it regulates the amount of oil returned to the tank, and secondly, regulates the pressure at which the oil is delivered to the atomizer. The pump delivers from 200% to 500% excess of oil and it is the return of this excess to the tank that the regulating valve controls. A secondary function of the regulating valve is to check the flow of oil to the atomizer until sufficient pressure has been built up for the operation of the pump to produce efficient atomization. It also shuts off the flow of oil from the atomizer the moment the pump stops, thus preventing the dripping of oil when the burner has ceased to operate. The regulating valve is properly adjusted at the factory and there is no occasion for the user to make any adjustments on it whatever.

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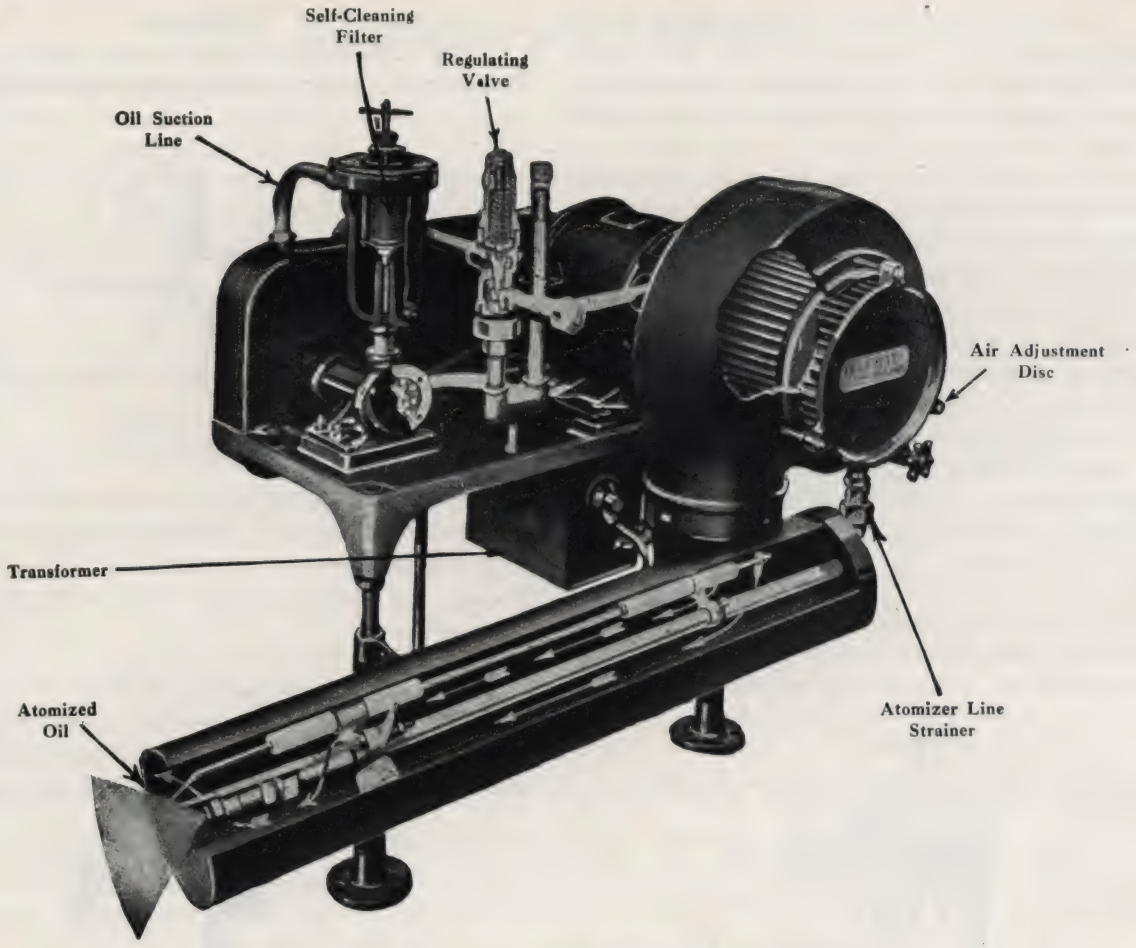
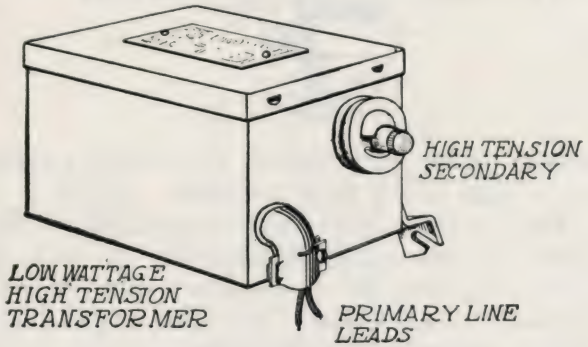


Construction Details—The Quiet May Automatic Oil Burner

Transformer

The transformers used on the Quiet MAY are conceded to be the most efficient in use, which is the result of five years' work on the part of our electrical engineers,

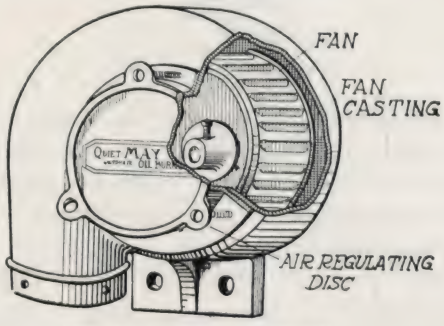


in conjunction with the engineers of the General Electric Co., Dongan Electric Co. and other transformer manufacturers. The specifications used in the Quiet MAY Production Laboratories for the test and acceptance of electrical transformers for ignition purpose have been accepted by the industry as standard. The general type of construction is of the step-up type, with no moving parts, no vibrators, no contact points; nothing but a series of coils, which are very carefully insulated with the very finest insulating materials placed in a metal case, and then filled with high quality of high temperature compound for the elimination of damage due to vibration and infiltration of moisture.

The primary windings are for 110 or 220 volts; the secondary windings develop 10,000 volts and approximately 23 milliamperes. These transformers are tested by us for voltages as low as 80 volts and up to 135% of their primary ratings. While the general operation of the transformer is for intermittent duty, yet they are built, tested and accepted by us under continuous duty specifications.

Fan

The fan is the Sirocco type, made of steel and accurately balanced. It is amply large to have a reserve



LOW VELOCITY BLOWER

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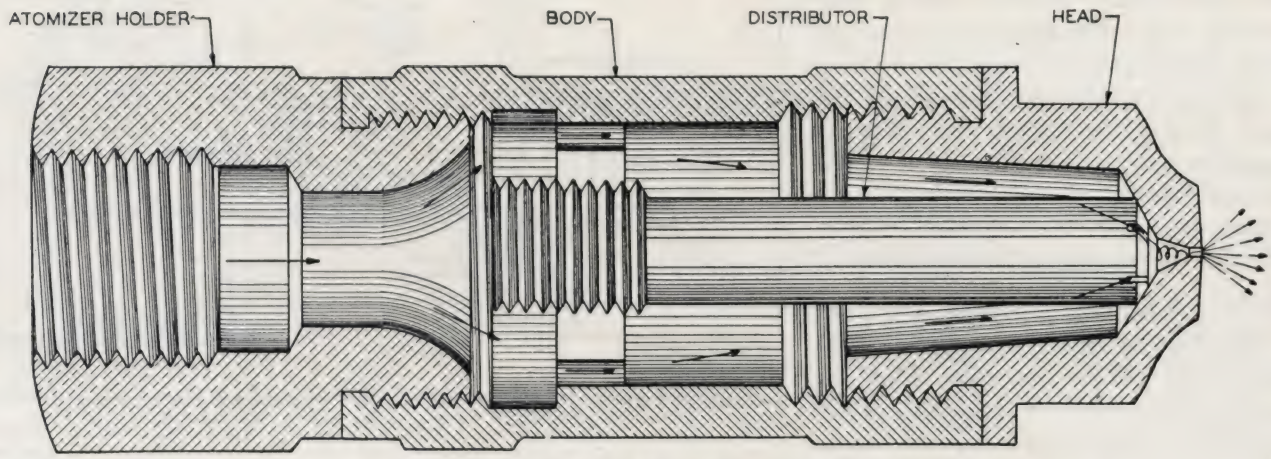
capacity and operates at a low velocity, which eliminates noise. The Quiet MAY Automatic Oil Burner uses no primary air to assist in the atomization of the oil since sufficient atomization is obtained by means of the correct pressure in a correctly designed atomizing nozzle. The fan simply furnishes a metered quantity of secondary air that will insure perfect combustion.



Construction Details of Brass Atomizer Nozzle

Pressure Atomization

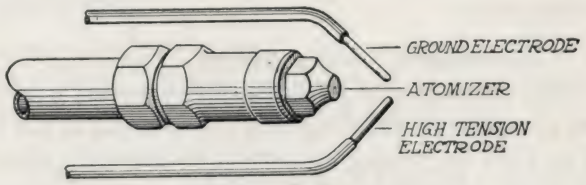
The success of the efficient atomization of oil in the Quiet MAY is due to the design and perfect workmanship in the construction of the bronze atomizer, or nozzle.

These nozzles are built for us under our specifications by an organization of precision machinery manufacturers, who have been building nozzles for the United States Government, large merchant-marine interests, and other organizations who have demanded carefully executed machine parts for over twenty-five years.

The nozzle can be removed very quickly, without the use of any special tools, examined, and cleaned, if necessary, without disturbing any other part of the burner, and without the necessity of opening the fire door on the boiler, since no part of the Quiet MAY extends into the combustion chamber or operates within the combustion chamber of the furnace or boiler.

Electric Ignition

The subject of ignition cannot be discussed very well without bringing in the subject of efficient atomization. The knowledge of the fact that electric ignition is by far the most desirable form of ignition for an automatic oil burner, has long been accepted by the industry. In our opinion, the reason that all oil burners are not equipped with electric ignition only, is because of the fact that the atomization of the oil is not fine enough or that the volume of the atomized oil cannot be controlled to a degree which makes it possible for the oil to become ignited, from the electric arc produced by the low wattage transformers such as used on the Quiet MAY. It has always been a simple matter to ignite oil from a long gas flame—it has also been a simple matter for some burners to ignite this gas flame from an electric spark, and then have the oil ignited from the gas flame; it has, however, been quite a difficult task for most oil burners to atomize or vaporize, or in some other form, bring their oil into such a fine mist, or a division, so that an electric arc, such as is produced by the low wattage transformer used on the Quiet MAY, could ignite their oil.



ELECTRIC IGNITION ASSEMBLY

The Quiet MAY has always been strictly an electric ignition automatic oil burner from the original days when the use of a magneto was employed, up until the present time, when we are using through the co-operative efforts of our electrical engineers and those of the General Electric Co., a transformer which has no moving parts, no vibrator points, nothing mechanical about it at all, simply a series of windings. In other words, the simple analysis of an oil burner as to the efficiency of its atomization is to know whether or not it can use straight electric ignition of the Quiet MAY type.

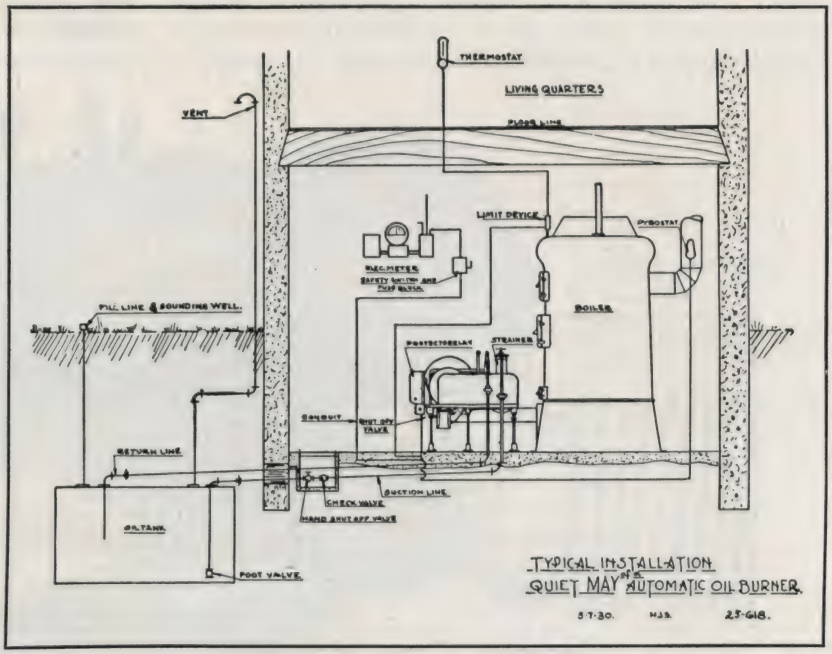
We do not believe that it is necessary for us, in this catalogue, to go into the danger of a gas pilot in automatic oil burners, whether it be forced draft or natural draft design.

Continued on next page

Controls

Thermostat

The thermostat is of conventional room type, manufactured by the Minneapolis-Honeywell Company. It can be furnished either plain or equipped with an eight-day clock by means of which the temperature can be controlled and any desired temperature obtained during any period of time. The thermostat should be located on the wall of a room that requires the temperature desired throughout the house. It should be located where it is not exposed to drafts. The Quiet May Automatic Oil Burner will stop and start under the control of this thermostat on the fluctuation of two degrees of temperature.



Limiting Devices

The limiting device is designed to discontinue the burner operation when the steam pressure, water temperature or air temperature reaches a predetermined limit. If it so happens that the temperature of the room in which the thermostat is located cannot be raised to the desired degree because of open doors, windows and other causes, the burner will continue to operate. To prevent excessive steam pressure or excessive water or steam temperature, this boiler limiting device is installed and will automatically stop the burner before these excesses occur.

Combustion Safety Switch (Pyrostat)

The pyrostat or combustion safety switch is of the open contact type, requiring only the breaking of the circuit and not the making to cause it to function properly. The main function of the pyrostat is to permit the burner to continue to operate only so long as heat is being normally maintained in the smoke pipe from combustion. Should there be a cessation of flame due to water in the oil tank, lack of oil or lack of electric current, the combustion safety switch control will automatically break the circuit which operates the burner, and the burner will stop. This precludes any possibility of the burner pumping oil into the boiler or furnace unless combustion is taking place normally.

Control Panel (Protectorelay)

The control panel or protectorelay is the instrument that synchronizes the operation of several control units and causes them to operate as a well organized system of control instruments. Specifically, several of its particular functions are as follows:

(1) It will not permit the operation of the burner if the voltage drops below 90 volts.

(2) It definitely times the duration of the ignition spark.

(3) It permits an immediate re-start of the burner system on resumption of power after a shutdown due to interruption of the electric current.

(4) It will not permit a re-start after shutdown, except after the elapse of a predetermined time, which allows all gases to pass from the boiler and out through the chimney.

Tanks

The choice of tank sizes is dependent on the amount of heat which the Quiet May will be called on to provide. An average home using a Type "A" or a Type "M" Quiet May when an outside tank is required should be provided with a storage capacity of 500 gallons. The type "L" should be installed with a storage capacity of 1000 to 1500 gallons. In this way it is possible to anticipate close to the season's full requirements and reduces attention to the oil storage.

Types "C" and "R," designed primarily for commercial heating where large loads are involved, should be installed with tank of such a size as to permit delivery of a minimum of 1000 gallons of oil when the supply has reached the ten-day requirements. Through the purchase of oil in 1000-gallon lots, it is often possible to effect an economy in the delivery price of the oil.

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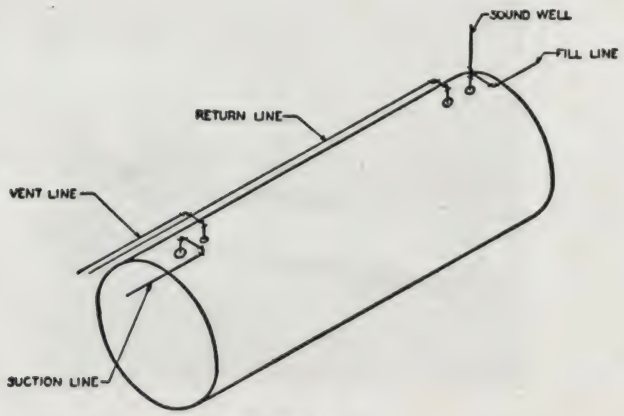


Figure "A"

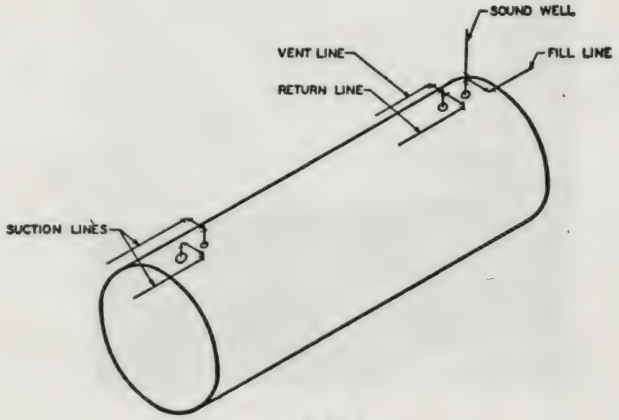


Figure "B"

Tank Dimensions

Below is shown the over-all dimensions of various sizes of storage tanks:

Capacity, gallons	Dimensions, In. Ft. In.	Capacity, gallons	Dimensions, In. Ft. In.
275	30 x 7 6	2000	64 x 10 0
500	48 x 5 9	2500	64 x 15 0
1000	48 x 10 8	3000	64 x 17 10
1000	64 x 6 0	4000	64 x 23 9
1500	64 x 9 0		

Tank Openings

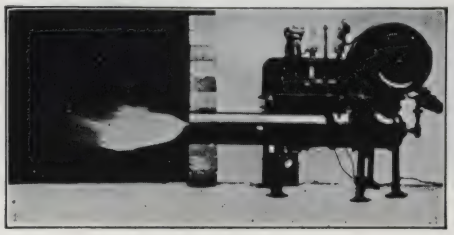
The storage tanks are generally available with four openings. These should be arranged in the manner shown in Figs. "A" or "B." The latter for two burners, since each must have its individual suction line. In cases where it is impossible to obtain four openings in the tank, three may be used, and the method of running the pipe in this case is shown in Fig. "B" for the return and vent lines.

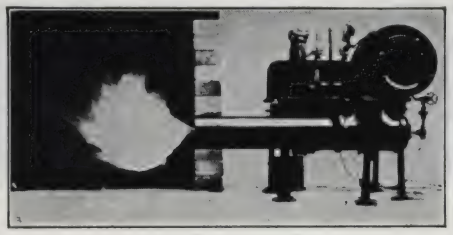
Combustion Chamber

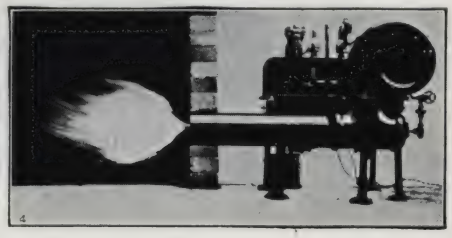
Flame Shape

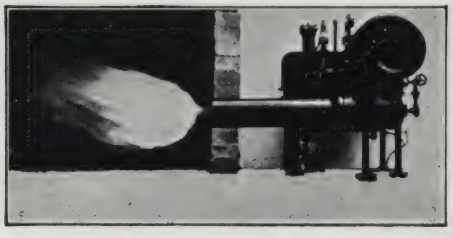
With the Quiet MAY Automatic Oil Burner it is possible to secure a flame adaptable to any type of boiler. Atomizers are provided to produce a spray of such characteristics as to produce the best results either in small round boilers or long narow combustion chambers. The pictures appearing below are from actual photographs without retouching. It can be seen that it was possible to adjust the flame to both the exact furnace conditions and the load the boiler is carrying.

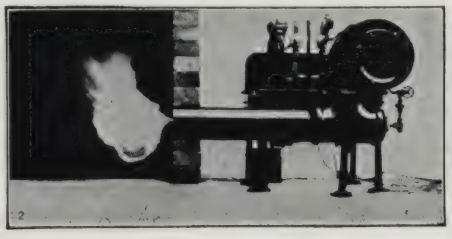
Atomizers are inexpensive, completely interchangeable, and each Quiet MAY dealer is provided with an assortment to meet all requirements.

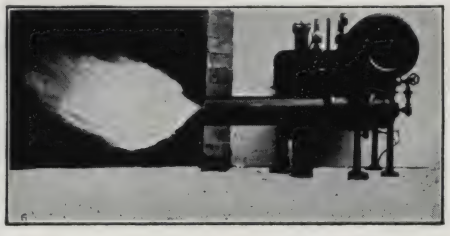












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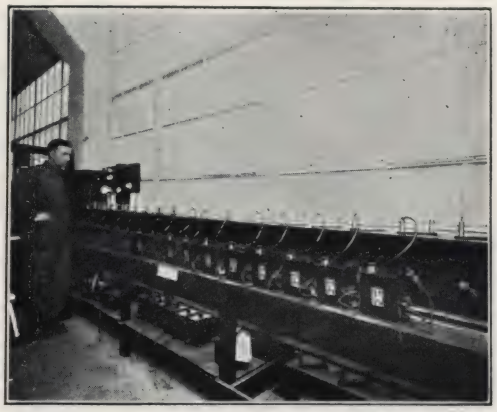


Fig. 1

Fig. 2

Fig. 3

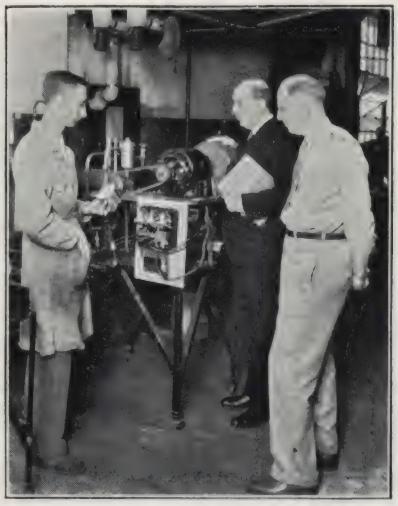


Fig. 4

Fig. 5

Fig. 6

Fig. 7

Factory Tests

Above we picture a few of the many tests through which each Quiet MAY must successfully pass before it may be declared ready to be shipped into "the field."

Fig. 1 shows a transformer "break down" test in which the transformers shown are being tested under most abnormal conditions.

Fig. 2 shows valves on test under extremely high pressure.

Figs. 3 and 5 show precision tests through which certain parts must pass before they are declared fit for use, and in Fig. 4 is shown a Quiet MAY being run and timed in our Final Test Department.

Fig. 6 shows a view of the paint department where Quiet MAYS are given their final coating of color. Fig. 7 shows an atomizer nozzle being tested for its spraying qualities.

Continued on next page

Oil Burner Section of a Set of General Specifications

BURNER The burner shall be of the mechanical atomizing type designed for the service and duty, to be Type "L" Quiet MAY as manufactured by the MAY OIL BURNER CORPORATION, and guaranteed to be of sufficient capacity to develop the full rated capacity of the boiler in which it is installed.
The oil burner shall be of the mechanical oil presssure atomizing type, using only electric ignition, fully approved by Underwriters' Laboratories, Inc. It shall be a Quiet MAY, or of equal quality, and of the size and capacity to amply take care of the designed load of the heating plant. Its operation and control shall be fully automatic, and the control system shall be of the Quiet MAY type, that is: Plain or clock thermostat, timed ignition and delayed return, main control panel; boiler or furnace limiting device and a Combustion Control. The operation and synchronization of the control system shall be in a circuit that only permits the burner to function so long as the secondary controls are calling for heat and the combustion control is in the hot position due to proper combustion.
The electric ignition shall be so designed as to permit of either continuous or intermittent operation. The operation shall not produce any objectionable radio interference.

FUEL The fuel shall be what is commonly known as fuel oil, having a Baumé gravity between 28 and 32°, A.P.I. No. 3.

TANK The oil storage tank is to have a capacity of One Thousand (1000) gallons, shall be approximately 48 in. in diameter and 12 ft. in length, with $\frac{3}{16}$-in. shell and shall be built in accordance with the regulations of the Underwriters' Laboratories, Inc., and shall bear their label.

EXCAVATING All excavating, trenching, and backfilling for tank and piping will be done by the oil burner contractor, but it is understood that if rock, water, or quicksand are encountered the owner will pay additionally for overcoming these obstacles.

PIPING Pipe shall be of wrought iron or steel of standard weight and shall be of such size as recommended by MAY OIL BURNER CORPORATION in their regularly published "Instructions for the Installation and Service of the Quiet MAY Automatic Oil Burner."
Fittings shall be of the beaded pattern galvanized malleable iron. Unions are to be of galvanized iron with brass to brass, or brass to iron seats. Suction line to terminals inside tank within 3 in. of bottom with a double poppet Quiet MAY foot valve.

OIL GAUGE There shall be furnished and installed one Liquidometer Junior oil gauge which shall be placed in the basement to indicate the level of the oil in the tank.

BRICKWORK The combustion chamber of the boiler is to be lined in accordance with the "Instructions for the Installation and Service of the Quiet MAY Automatic Oil Burner."

ELECTRICAL WORK The electrical work is to be done in an approved manner and an Underwriters' certificate covering the work is to be furnished. The oil burner contractor is to be furnished with an electrical outlet in the boiler room for the purpose of supplying current to the burner, and the balance of the electrical work in connection with the burner installation is to be furnished by him.

PERMITS The oil burner contractor will apply for and obtain all necessary permits and certificates.

GUARANTEE The entire installation is to be guaranteed to the owner to be free from any imperfections in materials or workmanship for a period of one year from the date of the installation.

SERVICE The installation is to be serviced free of charge to the owner for a period of one year from the date of the installation. The oil burner contractor is to maintain a service department operating 24 hours a day so that service is obtainable day or night.

QUIET MAY

AUTOMATIC OIL BURNER

"Built to Last a Lifetime"

KING BURNER CO., INC.

Gas Burners and Combustion Equipment

Burt Building
DALLAS, TEXAS

Products

SYNCHRONOUS GAS BURNERS, ATOMIZING OIL BURNERS. Also accessories.

Description

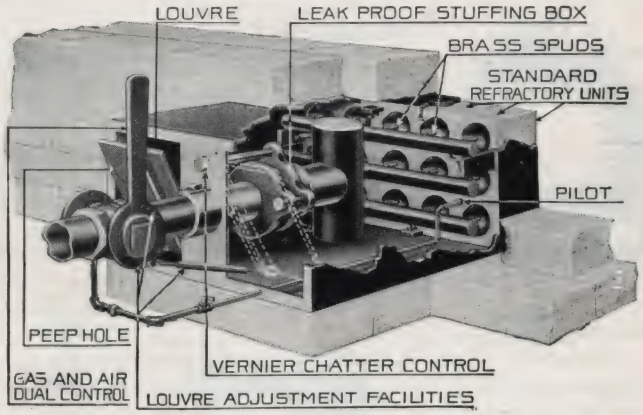
The King Synchronous Gas Burner is of the atmospheric type, using gas at low pressure and air under ordinary draft. It is quiet, efficient, economical, easy to regulate, and has adjustment features that allow for correction of boiler peculiarities and defects. There is a size to fit every job from the smallest Arcola type heating plant to the largest boiler plant. Dependable operation is assured with unskilled labor as there is nothing to get out of order. The mechanical control that makes King Synchronous Gas Burners instantly adaptable to any firebox condition is patented and found in no other burner. Elimination of combustion impediments with King control is like tuning a radio receiver—synchronization of combustion factors is obtained. A staff of engineers is constantly observing the performance and results of operation of thousands of King Burners in service, and no effort is spared to make the King Synchronous Gas Burner a product that architects and engineers can recommend with assurance of satisfactory performance. An entire refund will be made to any user of King equipment who is dissatisfied with results obtained. King equipment is the result of twenty years' experiment and research in combustion phenomena and costs no more than the average.

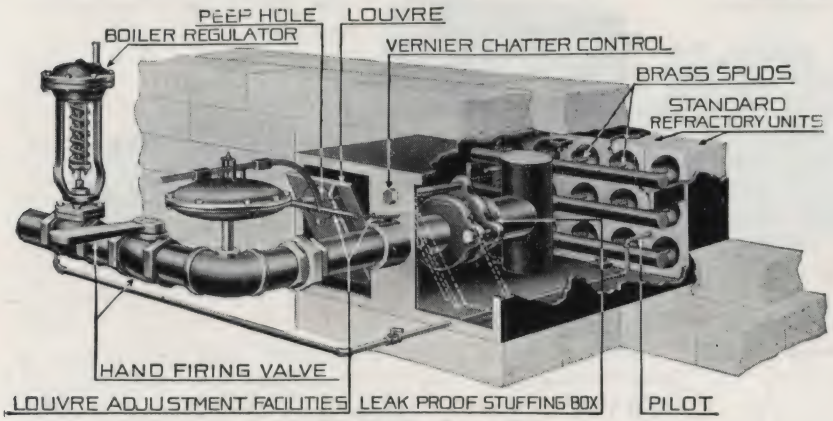
Construction

Inspection of the drawings will at once reveal the simplicity of construction. King burners are made of cast gray iron throughout, giving them strength, rigidity and endurance. The gas nozzles or spuds are of brass, accurately machined from bar stock. The front of the burner is of refractory material designed to withstand the highest temperatures of firebox service.

Installation

Complete plans for the installation of King Synchronous Gas Burners for all types of boilers are on file and will be forwarded upon request. These detail drawings show a wide variety of installations to meet most requirements, but any specific combustion problem will be worked out gladly, without obligation whatever.





Automatic Control

Steam pressure or thermostatic control may be co-ordinated with King Synchronous features.

With automatic low water cut-off attachment, this installation is ideal. Only one boiler regulator is required for a battery of burners. A separate louvre control is provided for each burner and is actuated by the slightest gas pressure variation

Manual Control

Lever movement decreases or increases gas and air injection at the correct ratio for all load stages. Firing economy is thus assured. For less steam, less gas; less gas, less air

CORRECTION TABLE

Note: The sizes and capacity of King Synchronous Gas Burners shown in the table are based on gas of 1000 B.t.u. per cu. ft. For gases of lower heat content larger size burners should be figured to carry the same boiler load. The following table gives the per cent of increase of the burners as the B.t.u. content of the gas is decreased.

B.t.u. content	1000	950	900	800	700	600	500	535
Percent increase of burners required	0	5	10	20	30	40	50	47

In estimating the size of burners required for a certain boiler capacity for elevations greater than 1000 ft. above sea level where the heat content of the natural gas is not known, a good rule to follow is to add 4% to the estimated size of the gas burners required for each 1000 ft. additional elevation.

KING BURNER CAPACITIES

Burner No.	Number of burner spuds	Dimensions of burners, in.				Gas pipe connection, in.	Capacity at 4-ounce pressure on 1000 B.t.u. gas				Capacity at 8-ounce pressure on 1000 B.t.u. gas			
		Height	Width	Depth	Over-all depth including valve		Cu. ft. gas per hour	Boiler h.p. per hour	Sq. ft. of equivalent steam radiation	Sq. ft. of equivalent hot water radiation	Cu. ft. gas per hour	Boiler h.p. per hour	Sq. ft. of equivalent steam radiation	Sq. ft. of equivalent hot water radiation
2B	2	4	7½	10½	18½	¾	100	2	250	400	139	3	350	500
2A	2	4	7½	10½	18½	¾	180	4	500	800	248	5	650	1050
2	2	4	7½	10½	18½	¾	400	8	1000	1600	600	12	1550	2500
4A	4	7½	7½	11½	19½	1	600	12	1550	2480	900	18	2350	3700
4	4	7½	7½	11½	19½	1	800	16	2100	3300	1200	25	3250	5150
6	6	7½	10½	11½	19½	1¼	1200	25	3250	5150	1800	35	4550	7250
9	9	10½	10¾	17½	26½	1½	1800	40	5200	8250	2700	55	7150	11450
12	12	10½	14	20	29	2	2400	50	6500	10300	3600	75	9750	15500
15	15	10½	17½	20	29	2	3000	65	8450	13450	4500	95	12350	19650
18	18	10½	25	20	29	2	3600	75	9750	15500	5400	115	15000	23800
20	20	14	17½	20	29	2½	4000	85	11000	17600	6000	125	16300	25900
24	24	14	21	20	29	2½	4800	100	13000	20700	7200	150	19500	31000
28	28	14	24½	20½	29½	2½	5600	120	15600	24800	8400	175	22800	36200
32	32	14	27½	20½	29½	2½	6400	135	17550	28000	9600	205	26500	42500
36	36	20½	21	20½	29½	3	7200	155	20150	32100	10800	230	30000	47500
42	42	20½	24½	20½	29½	3	8400	180	23400	37200	12600	270	35000	56000
48	48	20½	27½	20½	29½	3	9600	210	27150	43500	14400	310	40000	64000

This table applies for elevations up to 1000 ft. above sea level and 1000 B.t.u. gas. See corrections above for other conditions.

ESTABLISHED 1922

NU-WAY CORPORATION

Manufacturers of Automatic and Manually Controlled Oil Burners

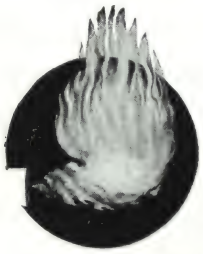
ROCK ISLAND, ILL.

Product

NU-WAY OIL BURNERS.

Range of Application

Nu-Way Oil Burners are designed to replace solid or gas fuel in all types of boilers or warm air furnaces for domestic heating purposes, or for generating steam up to 50 hp. boiler capacity. Also adaptable for boilers used to heat domestic water supply.



Mechanical Description

Nu-Way Burners are built in complete units and include automatic controls to control burner in case of ignition, oil or flame failure, thermostat to regulate temperature in home; boiler controls to regulate steam pressure or water temperature.

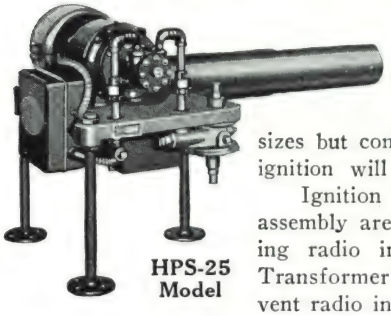
Dual purpose pump self-sealing type, is an integral part of motor and transfers the fuel from underground storage tank to burner nozzle, maintaining constant pressure.

The pump is provided with direct connected drive which serves as a safety device and will prevent overloading of motor, by releasing motor from pump load if subject to abnormal load conditions. Belt drive is used on HPS-15.

Pressure regulating valve controls at all times maximum and minimum pressure.

Ignition—high voltage electric flame of intermittent type is regular equipment in all sizes but combination gas and electric ignition will be supplied on request.

Ignition transformer and ignition assembly are of two-pole type reducing radio interference to minimum. Transformer is specially wound to prevent radio interference.



HPS-25 Model

Electric Current Requirements

110-volt, 60-cycle is standard on all models but HP-55 and HPS-55. 220-volt, 60-cycle is standard on these two models, however, any model may be obtained with any frequency or voltage upon request.

Oil Requirements

Nu-Way Burners are listed to burn successfully 28-32° gravity oil as per No. 3 Furnace oil specifications, but will operate just as satisfactorily on the lighter gravity grades of distillate or gas oils.

Principles of Atomization

Pressure from 90 to 150 lb. is used to force the oil through the nozzle tip, mixing the oil particles with air supplied by blower fan and causing the oil particles and air to become a perfect atomized inflammable mixture which burns readily in suspension.

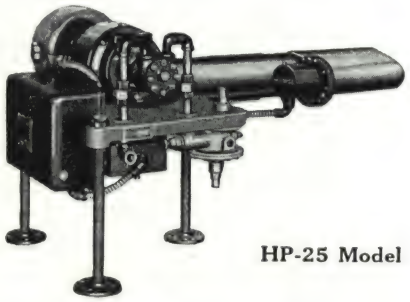
Flame is of a low velocity and bushy shape resembling a free floating gas fire. It is slow moving and is easily controlled. It will heat all refractory material to maximum temperature, causing more perfect combustion and reducing heat loss out of stack to a minimum—all of which is conducive to great economy in fuel consumption and to quietness.

Quietness

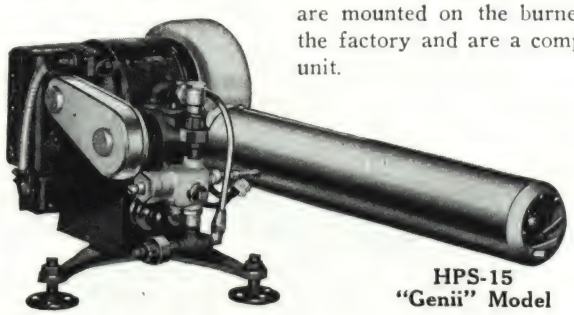
Nu-Way Burners are extremely quiet. By the elimination of air in the oil supply line a fire is produced which is void of the usual combustion roar.

Installation

Remove grates, build combustion chamber of high grade refractory material (specifications for size of combustion chamber to suit boiler and load requirements are furnished on application) and set unit in place. No part of the Nu-Way Burner goes in the firebox. The pump and controls are mounted on the burner at the factory and are a complete unit.



HP-25 Model



HPS-15 "Genii" Model

Oil Storage

When possible, install high tanks with gravity feed to burner as one fuel line to burner only is needed. 1000-gal. capacity or underground storage is most desirable. With installation of storage tank below level of burner a suction and return pipe from burner to tank is necessary.

Service

Nu-Way Burners are sold and serviced by dealers who are under factory supervision in all parts of the United States.

Approval

Nu-Way Burners are listed by the Underwriters Laboratories, Inc.

SIZES AND WORKING DATA

Model Nu-Way	Fuel cap., g.p.h.	Steam radiation, sq. ft.	Hot water radiation, sq. ft.	Warm air grate size, in.	Motor hp.	Controls, voltage
HPS 15	1½ to 2	200 to 500	320 to 800	14 to 24	1/10	High
HPS 25	1¾ to 3	500 to 1000	800 to 1600	24 to 28	1/8	High
HPS 35	3 to 7	1000 to 3000	1600 to 4800	28 to 32	1/4	High
HPS 55	7 to 19	3000 to 8000	4800 to 12800	36 to 40	3/4	High
HP 25	1¾ to 3	500 to 1000	800 to 1600	24 to 28	1/8	Low
HP 35	3 to 7	1000 to 3000	1600 to 4800	28 to 32	1/4	Low
HP 55	7 to 19	3000 to 8000	4800 to 12800	36 to 40	3/4	Low

Electric ignition furnished as standard equipment but gas and electric will be furnished on request.

110 or 220-volt motors and controls furnished as standard equipment. Direct current or odd frequency motors and controls furnished upon request.

RAY BURNER COMPANY

SUCCESSOR TO THE W. S. RAY MANUFACTURING COMPANY, INC.

SAN FRANCISCO, CALIF.

Dealers Are Listed in Classified Telephone Directories in All Principal Cities

Products

RAY AUTOMATIC FUEL OIL BURNERS: Ray Automatic Burners are built in sizes to meet the requirements of small cottages, average homes and large mansions. They are also built in larger sizes with capacities up to 36,000 sq. ft. steam radiation per burner, for use in apartments, hotels and large commercial heating projects. All Ray Automatics may be installed in any standard type boiler or furnace.

RAY SEMI-AUTOMATIC FUEL OIL BURNERS for single or battery installation: These burners must be manually ignited. They are equipped with the Ray Patented Low Pressure Control. This control is actuated through any standard sylphon regulator by boiler steam pressure. It automatically regulates the flame as the boiler load fluctuates. These burners may be installed in any standard type, low pressure steam or hot water boiler.

Note: In addition to the burners described above, RAY BURNER COMPANY manufactures a complete line for high pressure steam boilers, industrial furnaces, and steam turbine driven burners.

(Reg. U. S. Pat. Off.)

Special Ray Features

Ray's two most conspicuous advantages are its dependability and economical operation. The first is a result of Ray's simplicity of design and sturdy construction. The second is a result of Ray's patented method of atomization. The Ray Angular Vane Nozzle reduces air noise by eliminating high pressure air, small apertures, etc. It insures finer and more complete atomization of even the heavier grades of oil. Stratification is impossible, and a clean, soft, turbulent flame which can be fitted to long or short fireboxes, makes the Ray easily adapted to any make of boiler or furnace.

Engineering Service

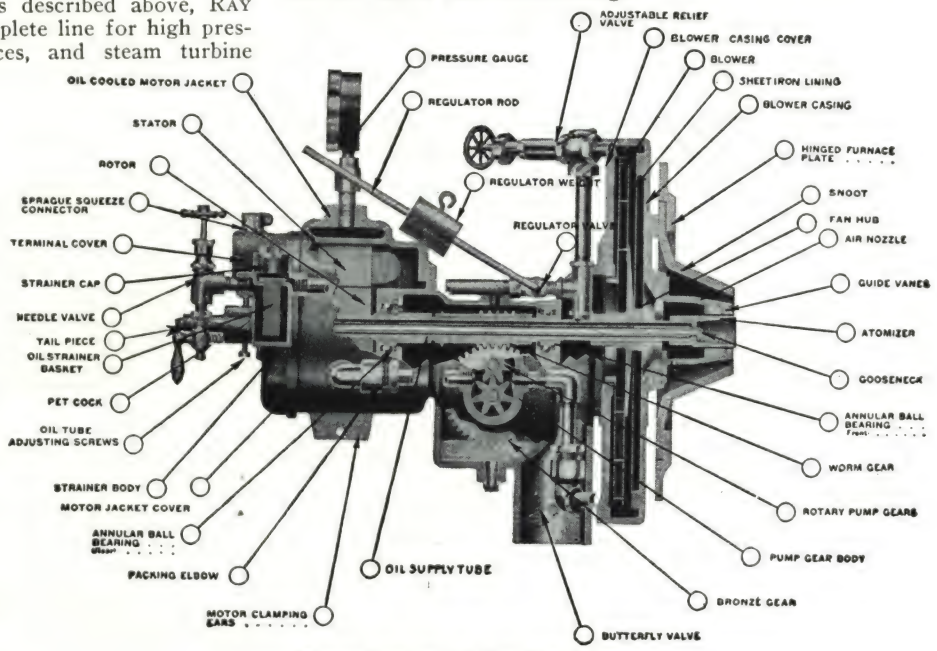
RAY BURNER COMPANY maintains a staff of combustion engineers, and invites architects to avail themselves of its services for which there is no charge.

Construction Details and Current Characteristics

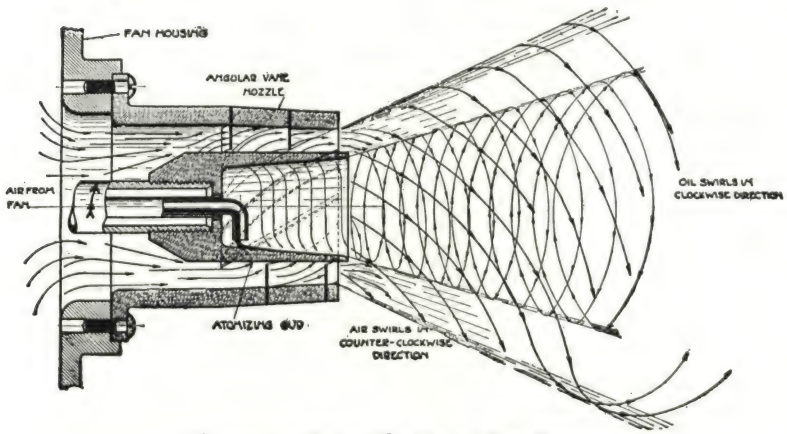
Ray Burners for 50 or 60-cycle current are driven direct by a motor which is an integral part of the burner. For operation with other frequencies, and direct current the motor is mounted on the burner and drives the shaft through a short belt. Semi-automatics are available on furnace front plate or tile lined door. Full automatics are mounted on tile lined door with a bed plate optional for warm air jobs.

Fuel

Ray Industrial Type Burners are listed by the Underwriters' Laboratories, Inc., for No. 6 fuel as heavy as 14 degrees gravity. Ray Automatics are approved for No. 5 Fuel for gas-electric ignition and No. 3 Fuel for straight-electric ignition.



Cross Section of the Ray Burner



Operating Principle of the Ray Burner

SIZES AND RATINGS FOR RAY OIL BURNERS

Burner size	Max. load boiler, hp.	Max. steam rad., sq. ft.	Max. hot water rad., sq. ft.	Max. warm air rad., sq. in.	Burner motor, hp.	Max. oil con., g.p.h.
0*	6	800	1,300	500	¼	2
	9	1,200	2,000	750		3
	15	2,000	3,000	1,250		5
1†	24	3,000	5,000	2,000	½	8
	33	4,500	7,000	2,750		11
2	45	6,000	10,000		½	15
3	60	8,000	13,000		½	20
4	75	10,000	16,000		¾	25
5	100	14,000	22,000		1	33
125	125	19,000	30,000		1½	45
175	175	25,000			2	60
250	250	35,000			3	85
400	400	60,000			5	135
600	600	90,000			7½	200
800	800	110,000			10	265
1,000	1,000	140,000			10	320

*Size 0 burners are equipped with a nozzle plate to give three capacities listed above.

†Size 1 burners are equipped with a nozzle plate to give two capacities listed above.

Note: Boiler ratings and radiation figures used are compiled from averages. They are intended for ready reference and not exact engineering use.

SILENT AUTOMATIC CORP.

Manufacturers of the Silent Automatic Oil Burner

12001 East Jefferson Avenue, DETROIT, MICH.

SALES AND SERVICE BRANCHES

DETROIT, MICH. ST. PAUL, MINN. PROVIDENCE, R. I. ST. LOUIS, MO. PHILADELPHIA, PA. BOSTON, MASS. MINNEAPOLIS, MINN. BALTIMORE, MD.

DOMESTIC AND COMMERCIAL OIL BURNERS

Adaptability—The Silent Automatic Burner is adaptable to heating systems within the following general classifications:

Hot Water Systems	Steam Systems	Warm Air Systems
Gravity	Pressure	Gravity
Pressure	Vapor	Mechanical Circulation
	Vacuum	

Underwriters' Listing — All Silent Automatic Burners, equipped with either gas or electric ignition, are listed as standard by the Underwriters' Laboratories, Inc.

Approvals—New York Board of Standards and Appeals; State of Connecticut; Department of Safety, Commonwealth of Massachusetts; Modern Priscilla Test Laboratory and Popular Science Institute of Standards.

Member—Oil Heating Institute and American Oil Burner Association.

Certificate of Endorsement — Sesquicentennial International Exposition, Philadelphia, 1925.

Certificate of Merit—International Heating and Ventilating Exposition, Commercial Museum, Philadelphia, 1930.

Burner Models—Model "E"; Model "A"; Model "B-L."

Ignition Requirements—Gas and electric ignition —all burner models.

Power Requirements—*Model "E"*—1/40 hp. motor. *Model "A"*—$\frac{1}{12}$ hp. motor. *Model "B-L"*—$\frac{1}{6}$ hp. motor.

110-volt alternating-current circuits, 20, 30 and 60 cycle. 110-volt direct-current circuits.

Fuel Requirements—*Model "E" Burner*—Oil fuel not heavier than No. 1. *Model "A" Burner*—(Electric Ignition)—Oil fuel not heavier than No. 2. *Model "B-L" Burner*—(Electric Ignition)—Oil fuel not heavier than No. 2. *Model "B-L" Burner*—(Gas Ignition) —Oil fuel not heavier than No. 3. Fuel oils Nos. 1, 2 and 3 conform to the American Oil Burner Association specifications.

CAPACITIES OF SILENT AUTOMATIC OIL BURNERS

	Burner Limits		
	Model "E"	Model "A"	Model "B-L"
Round Heaters Diameter of combustion chamber	Minimum 11½ in. Maximum 19 in.	Minimum 20 in. Maximum 40 in.	Minimum 40 in. Maximum 72 in.
Rectangular Heaters Width at grate line	Minimum 11½ in. Maximum 19 in.	Minimum 18 in. Maximum 40 in.	Minimum 30 in. Maximum 72 in.
Maximum ratio of length to width of combustion chamber	2 to 1	2 to 1	2.25 to 1
Maximum grate area	3.5 sq. ft.	12 sq. ft.	24 sq. ft.
Connected Load on Boiler Steam	Round heaters: Maximum 400 sq. ft. Rectangular heaters: Maximum 500 sq. ft.	Minimum 350 sq. ft. Maximum 2500 sq. ft.	Minimum 2500 sq. ft. Maximum 7500 sq. ft.
Water	Round heaters: Maximum 640 sq. ft. Rectangular heaters: Maximum 800 sq. ft.	Minimum 560 sq. ft. Maximum 4000 sq. ft.	Minimum 4000 sq. ft. Maximum 12000 sq. ft.
Connected load equals	Standing load plus 30% for pipe losses	Standing load plus 25% for pipe losses	Standing load plus 25% for pipe losses
Warm air leader area	900 sq. in.		

Note: Grate lugs or other obstructions should not be included in heater dimensions.

UNIFORM OIL SPECIFICATIONS AS ADOPTED BY THE AMERICAN OIL BURNER ASSOCIATION AND FEDERAL SPECIFICATIONS BOARD

Grade of Oil	No. 1 Light Domestic Fuel Oil	No. 2 Medium Domestic Fuel Oil
Former designation before adoption of specifications	36-40 deg. Be. furnace oil	32-36 deg. Be. gas oil
Flash Minimum Maximum	110° F. or legal 165° F.	125° F. or legal 190° F.
Water and sediment—maximum	.05%	.05%
Pour point—maximum	15° F.	15° F.
Distillation test	10% pt. max. 420° F. End pt. max. 600° F.	10% pt. max. 440° F. 90% pt. max. 620° F.

Continued on next page

Fuel Oil Recommendations

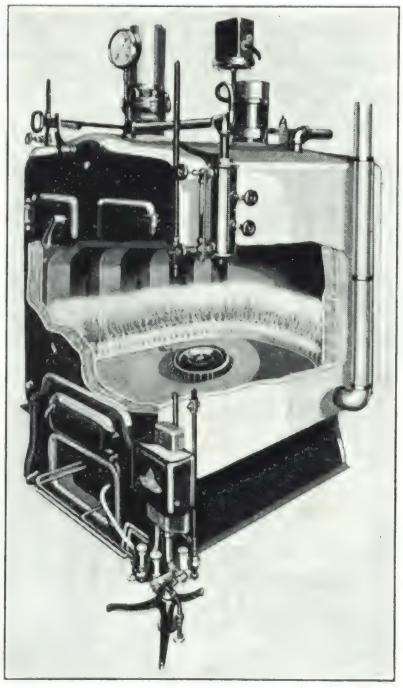
The Silent Automatic Model "A" is listed as standard by the Underwriters' Laboratories, Inc., to burn No. 1 and No. 2 oils. This is the result of the Silent Automatic Model "A" Burner having passed satisfactorily all the tests required to prove its adaptability and suitability to the use of No. 2 oil.

In spite of price differences as well as difference in heat value claimed for heavier oils, SILENT AUTOMATIC CORP. recommends No. 1 furnace oil for Models "A" and "E." Cost per gallon is not in itself proof of economy—nor is heat value alone a yardstick by which to measure economy in a fuel. Complete combustion, with a minimum of excess air and proper flame placement are of greater consequence than the advantages claimed for heavier oils. Silent Automatic's recommendations are based upon the results of exhaustive laboratory and field tests—and years of experience with thousands of installations in many parts of the country.

For proper combustion of oil and air, they must be intimately co-mingled before ignition takes place. Since it is impossible to mix air with oil in the liquid state, and it is difficult to introduce air at low temperatures into a flame at a much higher temperature, it becomes necessary to vaporize or gasify the oil before ignition. This can only be accomplished in the limited space provided in the average domestic furnace by the use of the more volatile No. 1 oil.

Silent Automatic's method of combustion made possible by the use of light oil, cuts down to a minimum the excess air required for complete combustion. The velocity of the gas travel is greatly reduced allowing the hot gases a longer time to contact with the heating surfaces within which to give up their heat.

The slow, swirling, wiping *wall-flame* is a unique feature of the Silent Automatic made practical by the use of light oil. Thus, we have co-ordinated the factors of combustion efficiency and heat utilization with a resulting over-all efficiency and low heat costs not possible with heavier oils. No. 1 furnace oil is also recommended by SILENT AUTOMATIC CORP. in preference to heavier oils because it is of more uniform quality. The specifications of the heavier oils allow wide variations in the characteristics of the oil. These variations may affect the rate of flow and proper preparation of the mixture for combustion with a resulting decrease in efficiency. To offset these variations, the burner must be adjusted to use a relatively high excess of air—which means that a superfluous amount of air dilutes the gases of combustion and robs them of heat which would otherwise be given up to the heating surfaces.



Rectangular Boiler Installation

No. 1 oils are more readily ignited and completely burned with a minimum of excess air, regardless of furnace temperatures—therefore, greater efficiency is obtained during the entire burner running period.

No. 1 furnace oil is unquestionably cleaner and does not have the sludge forming tendencies of heavier oils. Furthermore its quality is consistent and burners using No. 1 oil require less service.

Thousands of satisfied Silent Automatic users have proved that there is no economical substitute for quality.

SILENT AUTOMATIC CORP. recommends No. 2 furnace oil for Model "BL" because the greater dimensions give greater refractory, providing more heat for vaporization.

General Description

The Silent Automatic Burner is a rotary type mechanical draft oil burner in which the air required for combustion is induced, and the fuel distributed, by rotation of the burner head.

The Silent Automatic Burner is adaptable for installation in various sizes of heaters of conventional design.

The flexibility of its adjustments permit wide operating limits, maintaining the same relative efficiencies in either large or small installations.

In the burner installation a rigid refractory hearth is constructed at the grate level with Silent Automatic Multisurface Tile at the outer edge. The burner is located in the center of the refractory hearth, with the burner head projecting into the combustion chamber.

The Silent Automatic Burner is inherently silent and its principle of operation is distinctly unique.

Principle of Operation

The operation of the Silent Automatic Burner is automatically controlled by a thermostat which functions through a master control connected to a series of temperature and pressure controls.

Continued on next page

Complete automatic temperature maintenance is accomplished by starting the burner automatically when the temperature commences to fall below the comfort level and stopping it automatically when the temperature commences to rise above that level.

In operation, oil is fed to the burner through an oil regulating valve. Rotation of the burner head elevates the oil, simultaneously drawing air through an adjustable Air Gate, and impells this mixture of oil and air to the outer edge of the hearth, where it is ignited by pilots.

The flame is evenly distributed around the periphery of the hearth and reaches its maximum intensity just above the multisurface tile. The flame and hot gases sweep upward and against the heat absorbing walls of the heater, rapidly transferring heat to the heating system.

Silent Automatic not only produces efficient combustion, but also employs a flame placement which assures maximum recovery of heat by the boiler or furnace.

The Company Behind the Product

Entering the oil burner field five years ago, when many companies were already well established, Silent Automatic has become a leader in the industry in oil burner sales. This positive evidence of public preference is the direct result of sound financial strength and a manufacturing and merchandising policy which provides:

(1) A quality oil burner at a reasonable price.

(2) User satisfaction assured by the definite responsibility assumed by the company after the sale for continuous trouble-free service. No Silent Automatic has ever been sold, or ever will be sold, except where the positive assurance of factory-trained installation and prompt service can go with it.

Research

Silent Automatic has established one of the finest and most up-to-date Research Laboratories in the oil burner industry, comprising a Designing and Drafting Department, Patent Office, Experimental Machine Shop and Testing Laboratory.

Facilities

Our new factory in Detroit is, probably, the largest and most completely equipped plant in the world devoted exclusively to the manufacture of oil burners. The personnel of our Engineering Department is composed of mechanical, electrical and chemical engineers, expert machinists and tool makers, all of whom are engaged solely with oil burner development and the verification of our knowledge of oil burners and control apparatus.

In addition, Service Training Schools are maintained at the factory where every Silent Automatic Branch and Dealer installation and service man must receive training.

Distribution

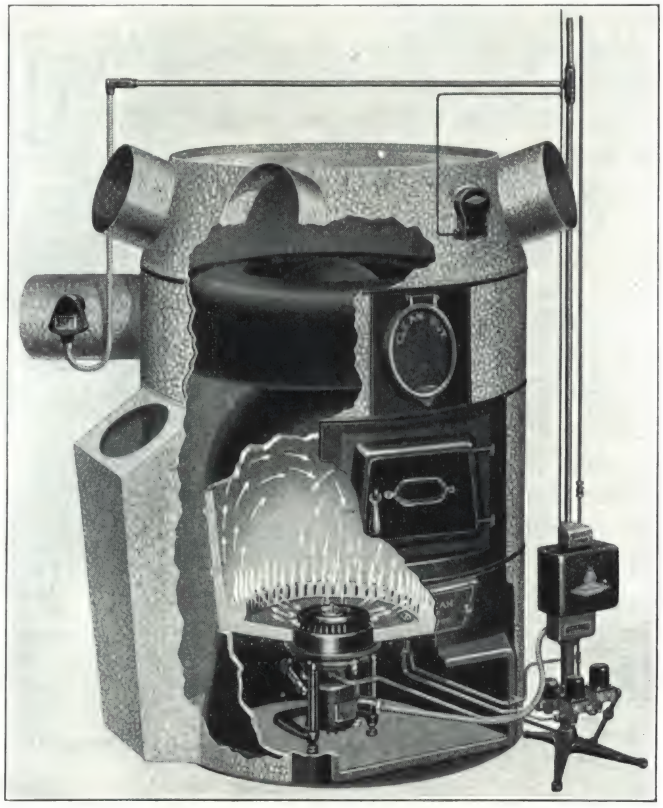
Silent Automatic oil burners are sold nationally through (a) direct factory branches, (b) direct dealer agencies.

Advantages

Silent Automatic oil heat affords the home owner definite advantages in greater healthfulness, cleanliness and the convenience of finger-tip heat control. Yet in spite of this increased service, operating costs compare favorably with home heating by any other method.

Basement Utilization

Instead of the heating plant, fuel and ashes consuming major space requirements, the furnace or boiler equipped with a Silent Automatic Oil Burner occupies a minimum of actual floor space and makes possible a wide variety of uses for the additional areas thus acquired. Lounging rooms, music rooms, dancing floors, children's playrooms, gymnasiums, billiard and game rooms, and any number of other uses in keeping with the demands of modern living, present fascinating possibilities in addition to the usual laundry and storage space required.



Warm Air Furnace Installation

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SPECIFICATION FORM

This specification contemplates the installation of a complete Silent Automatic Oil Burning System including all necessary installation permits, oil burner, automatic controlling and safety devices, oil storage equipment, gauges, pipe and fittings, electrical connections, etc.

The entire installation should be made to conform with all governing local and State ordinances.

All materials used in the installation should be of best quality and all work executed in a neat workmanlike manner. The installation should be completely tested and inspected and left in condition for proper operation and the architect should be notified on the completion of the work.

General

The owner or contractor shall provide a suitable boiler or furnace (state size, type and name and address of manufacturer) with an adequate system of piping and sufficient radiation to guarantee the owner that the building may be heated to 70° F. in zero weather under normal operating conditions.

The owner or contractor shall provide a chimney of suitable height and cross-sectional area which shall be at least equal to the minimum requirements specified by manufacturers of the heating unit.

Burner Installation

Furnish and install one Silent Automatic, Model ––Burner in (name and size of heater) in accordance with the approved installation instructions and tables issued by the Silent Automatic Corp., Detroit, Mich. Furnish and install one Silent Automatic Draft Stabilizer in the smoke pipe.

Controls

Furnish and install one thermostat, located as indicated on plans, which will function to start and stop the burner when the room temperature varies within one degree from a predetermined setting.

Furnish and install approved automatic control to maintain safe working pressures or temperatures at the heater, according to the type of heating system, i.e., steam system, hot water or warm air system.

Furnish and install approved automatic control for regulating the burner motor current and fuel oil in a definite and positive manner.

Furnish and install an approved automatic combustion safety control which will operate to shut off the oil if it does not burn for any reason.

Furnish and install all electrical equipment and wiring required to connect the control apparatus to the motor, and all electric materials and wiring required to connect the burner unit to the lighting circuit located within the cellar or basement.

All electrical work shall be executed in accordance with the requirements of the National Electrical Code, unless otherwise required by local ordinances.

Pipe and Fittings

Furnish and install all necessary gas piping and fittings required to pipe gas from (state size) inlet located in the basement (specify distance to the burner).

Furnish and install all piping and pipe fittings to connect the fuel oil storage tank with the burner, including float strainer for supplying strained oil at a constant head.

Oil Storage

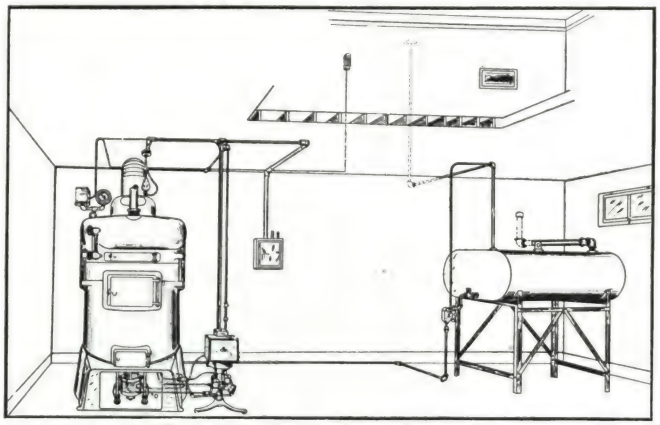
Furnish and install a suitable fuel oil supply tank (specify whether inside or outside, buried or above ground and capacity in gallons). Tank capacity shall conform with local ordinances and wherever possible should provide storage sufficient for two weeks' burner operation.

Outside Tank Installations

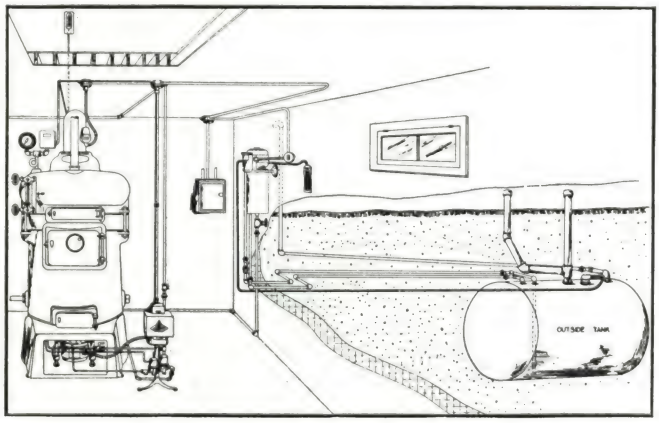
Furnish and install an approved automatically operated pump for pumping oil from outside tank directly to the burner or to auxiliary tank.

Guarantee

The Silent Automatic Oil Burner shall be guaranteed for a period of *one* year from date of installation by the Silent Automatic Corp. of Detroit, Mich., against any imperfection in material and workmanship and to supply heat up to the normal heating capacity of the boiler or furnace as determined by standard heating methods; provided that the oil used is of the grade and quality specified by the Silent Automatic Research Laboratory.



Typical Inside Tank Installation



Typical Outside Tank Installation

WILLIAMS OIL-O-MATIC HEATING CORPORATION

Manufacturers of Automatic and Manually Controlled Oil Burners

BLOOMINGTON, ILL.

FACTORY BRANCH OFFICES

NEW YORK, Graybar Building CHICAGO, 185 North Michigan Avenue

Products

WILLIAMS OIL-O-MATIC and OIL-O-MATIC JUNIOR fully automatic fuel oil burners for residences and buildings.

For Williams Ice-O-Matic Electrical Refrigeration, see Manufacturers' Index.

Applications of Oil-O-Matic Heat

For every heating need, consider Oil-O-Matic automatic heating. Installed in steam boilers or warm air furnaces, a Williams fuel oil burner assures an even healthful temperature regardless of weather condition. There is no furnace work or worry. No need for you to plan room for bulky fuel storage or ash disposal. The basement becomes as clean and usable as any other part of the building. The economy and satisfaction of Williams automatic oil heating is proved by the gratifying number of new installations and the reports of satisfied users.

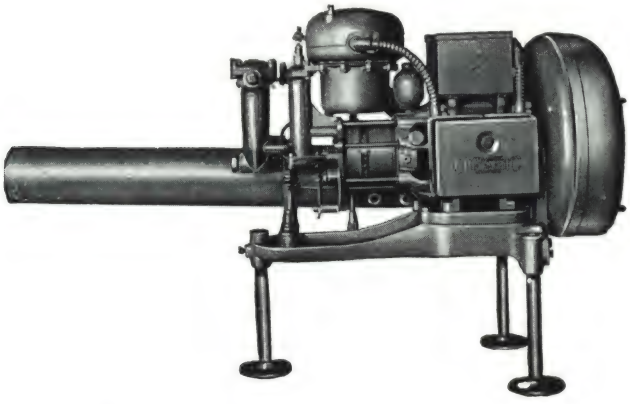
In addition to dependably heating apartments, business and public buildings, churches, schools, hospitals and greenhouses, Oil-O-Matic is being used for an endless number of business purposes. Pasteurizing milk, tempering metal, drying grain and lumber, heating large quantities of water, melting lead for typesetting machines and protecting buildings against ice as at Niagara Falls are only a few applications of Oil-O-Matic burners. Write to the Williams Engineering Department for complete information on any heating problem.

Domestic Hot Water Supply—Oil-O-Matic is ideally adapted to providing an inexhaustible hot water supply.

Service

Installation—Every Williams dealer has factory trained men who are well qualified to properly install oil burners. Williams widespread dealer organization assures service after installation. For detailed information see A.I.A. File No. 30gl, consult local dealer, or write direct to the Engineering Department at the Oil-O-Matic factory, Bloomington, Ill.

Catalogues—"Oil Heating at Its Best" and "Architects Manual of Oil Heating."



Oil-O-Matic Oil Burners

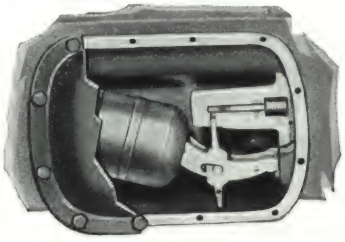
Williams Oil-O-Matic is designed, and approved by Underwriters' Laboratory, Inc., to burn heavy (28° to 30° Baume) fuel oil. This fuel is almost universally available at relatively low cost and is richer in heat unit content than lighter oils. However, lighter grades of distillate oils can be burned efficiently without any burner adjustment.

The exact ratio of fuel and air for most efficient combustion is maintained mechanically—independent of natural draft or weather.

All oil is accurately metered. This measured quantity of fuel is mixed, inside the firebox, with a predetermined amount of air. Air stream is of low velocity and adjustable. This Oil-O-Matic method eliminates high pressures of oil or air and needle valve atomization.

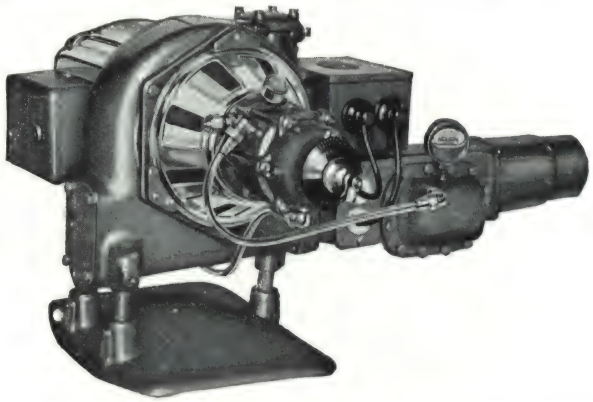
Continuous gas pilot is not used. Automatic spark and gas ignition operates only about fifteen seconds when burner starts. Room thermostat controls operation of burner. Stack, steam and water controls are additional safeguards. No part inside the firebox—oil is burned in suspension near a refractory material as recommended by combustion authorities.

Oil-O-Matic Now Has New Diffusor—The 1931 Williams Oil-O-Matic burners incorporate an important new improvement—the *diffusor*. Built into the burner, as illustrated in this photograph of a partly section model, this exclusive Williams feature makes oil heating still more quiet and still more economical. By achieving an absolutelv even pressure within the burner this Oil-O-Matic Diffusor achieves a more perfect intermingling of oil and air as it enters the firebox of the boiler. The resulting combustion is so complete that you can readily see the saving on oil bills. There is no moving part of an Oil-O-Matic inside the firebox—no need for high pressure to force oil through a pinpoint opening.



This new Oil-O-Matic Diffusor is included without extra charge, with all the other Williams patented advantages, such as the metering pump which measures oil drop by drop and permits the use of rich fuel oil or light distillate without adjustment.

Models—There are three Williams Oil-O-Matics, the new Junior, Model J-1200 and J-1800. Oil-O-Matic Junior will serve up to 750 sq. ft. of direct steam radiation, 1250 sq. ft. of hot water radiation or warm air furnace up to 30-in. grate diameter. Model J-1200 will serve up to 1500 sq. ft. of direct steam radiation, 2500 sq. ft. of hot water radiation or warm air furnaces up to 36-in. grate diameter. Model J-1800 will serve up to 4000 sq. ft. of direct steam radiation, 6400 sq. ft. of hot water radiation or warm air furnaces with grate area of 14 sq. ft. Two or more burners are the most economical method of carrying larger loads.



Electrical Current Requirements

For all Oil-O-Matic models the standard motors are 110 and 220 volts, 60-cycle, a-c. or d-c. Special motors will be promptly furnished for special cycles or voltages.

Oil Storage

An outside tank of 1000 gal. or greater capacity is recommended. For small installations a 275-gal. tank, installed inside, is satisfactory. Gravity flow may be used or pump attached to burner motor. An independent pumping unit has many advantages.

BAILEY METER COMPANY

1045 Ivanhoe Road, CLEVELAND, OHIO

BOSTON HOUSTON ATLANTA NEW YORK PHILADELPHIA BUFFALO PITTSBURGH
CINCINNATI CHICAGO ST. LOUIS ST. PAUL KANSAS CITY DENVER SAN FRANCISCO SEATTLE

BAILEY METER COMPANY LIMITED, MONTREAL, QUE., CAN.

Products

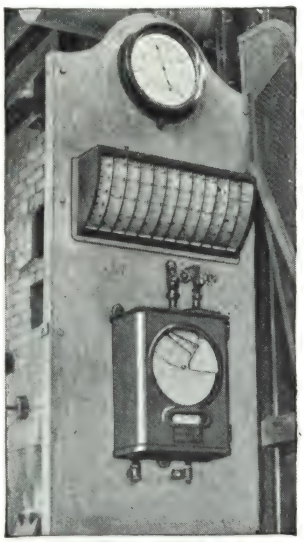
Boiler Meters; Multi-Pointer Gages; Fluid Meters; Feed Water Regulators; Long Distance Indicators and Recorders; Automatic Control; Coal Meters.

Also Draft Recorders, Drainage Controls, Gas Flow Meters, Gravity Recorders, Liquid Level Gages, Manometers, Pressure Recorders, Pump Governors, Tachometers, Temperature Recorders and V-notch Weir Meters.

Boiler Meter

The Bailey Boiler Meter records important factors in boiler operation such as steam flow, air flow and flue gas temperature on a uniformly graduated 12-in. circular chart. Through the steam flow-air flow relation it shows preventable losses as soon as they occur and at the same time indicates what adjustments are necessary to maintain the maximum combustion efficiency consistent with economical operation.

Bulletin No. 43 describes the Boiler Meter in detail.



Boiler Meter and Multi-Pointer Gage on Panel

Multi-Pointer Gage

This gage is made with any number of pointers from one to twelve. The 10-in. scales are illuminated from within and indicate drafts, pressures, temperatures, etc.

Ask for Bulletin No. 162.

Fluid Meters

Bailey Electrically Operated Fluid Meters are used for the measurement of steam, water, oil, air, gas and other fluids where it is desirable to have the indicating, recording and integrating instruments in a centralized location.

They are described in Bulletin No. 131.

Bailey Mechanically Operated Fluid Meters are extremely accurate for the measurement of both high and low pressure steam and water. Pressure and temperature recorders can be supplied to record on the same chart with the flow.

Ask for Bulletin No. 37.

In case only records of pressure and temperature are desired, a recorder can be furnished with as many as four pens to record on a 12-in. uniformly graduated chart.

Electrically Operated

Mechanically Operated

Coal Meter

Used for the measurement of coal or other granular material in gravity chutes from overhead bunkers.

The total amount is shown on a large illuminated counter that can be easily read at a distance of 50 feet.

Rugged in construction and very accurate under suitable conditions for installation.

Write for Bulletin No. 221.

Bailey Coal Meter

Feed Water Regulator

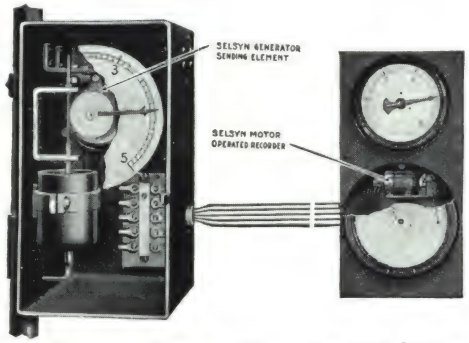
This thermo-hydraulic feed water regulator maintains the desired boiler water level by controlling feed water flow in accordance with load. A continuous feed at normal ratings with freedom from danger of flooding banked boilers results from the fully balanced tight-seating regulating valve which is hydraulically operated through an all-metal leakproof system. Valve seats are easily removed for inspection or reseating.

Completely described by Bulletin No. 82.

Long Distance Indicators

Bailey Meter Selsyn operated equipment for recording and indicating pressure, temperature, draft, liquid level and other factors at practically any distance from their source, is extremely accurate and reliable. Single-phase 110-volt alternating current is the transmitting medium. Several receiving instruments may be operated from the same transmitter.

Write for Bulletin No. 110.



Long Distance Pressure Recorder and Indicator

THE BRISTOL COMPANY

Manufacturers of Indicating, Recording and Controlling Instruments

WATERBURY, CONN.

BRANCH OFFICES.

AKRON, OHIO, 572 So. High Street
BIRMINGHAM, ALA., Comer Building
BOSTON, MASS., Consolidated Building
CHICAGO, ILL., 205 W. Wacker Drive
DENVER, COLO., U. S. National Bank Building
DETROIT, MICH., Book Building
LOS ANGELES, CAL., 747 Warehouse Street
NEW YORK, N. Y., 114 Liberty Street
PHILADELPHIA, PA., Widener Building
PITTSBURGH, PA., Frick Building
ST. LOUIS, MO., Boatmen's Bank Building
SAN FRANCISCO, CAL., Rialto Building

Products

TRADE-MARK
BRISTOL'S
REG. U. S. PAT. OFFICE

RECORDING and INDICATING PRESSURE and VACUUM GAUGES; RECORDING THERMOMETERS for temperatures up to 1000° F.; INDICATING and RECORDING PYROMETERS for temperatures up to 3000° F.; RECORDING VOLTMETERS, AMMETERS, WATTMETERS, all these for both permanent mounting and portable use.

Also complete equipment for Automatic Temperature Control to use with gas, oil, steam, water and electrically heated apparatus.

Bristol's Field Engineering Service

To aid in selecting the right equipment, Bristol's Field Service Engineers are available to co-operate in every way possible—for consultation, to survey conditions peculiar to individual needs, to specify equipment needed, and outline installation details. These men bring to the job over 50 years of accumulated knowledge of the Bristol's Engineering Staff. Also a wealth of personal experience gained in contact with temperature control installations covering thousands of industrial processes. This Engineering Service is offered without obligation.

For more complete information or request for interview, write nearest branch office or direct to main office at Waterbury, Conn.

Bristol's Recording Pressure and Vacuum Gauges

Recording Gauge
Model 11 Inverted

Recording Gauge Model 11, Inverted—This type instrument is available in two sizes, using 12-inch and 8-inch diameter charts. Can be furnished to record over any selected range from full vacuum to 12,000 pounds pressure per sq. in.

Case is constructed of an aluminum alloy (rustproof) metal and is dustproof. Can be arranged for front or back connection.

Inverted pen arm is standard though upright pen can be furnished if desired. Standard finish is black enamel.

Initial purchase includes supply of 100 charts, ink, etc.

Recording Gauge
Moistureproof—Model 40

Recording Gauge Moistureproof Model 40—The Rectangular Case is especially rugged; of moisture- and fume-proof construction. It is built to house the same movement as used in the Model 11. This instrument is recommended for use where exposed to excessive dust, moisture, fumes or gases which would otherwise affect operation of equipment. Can be furnished with inverted or upright pen arm. Illustration shows upright pen arm. Standard case finish is black enamel.

Bristol's Recording Thermometers

For Temperatures up to 1000° F.

Recording Thermometer Model 341—The Round Form Recording Thermometer illustrated, is known as the Gas Filled Type. In operation, the gas filled system when exposed to temperature, builds up an internal pressure which causes the pen arm to record. The case is moisture- and dust-proof in construction, and instrument is standard with inverted pen arm.

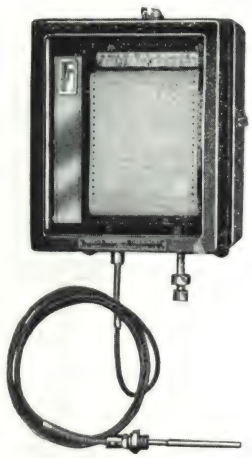
Recording Thermometer
Model 341

Suitable length of armored connecting tubing allows for convenient location of the instrument with sensitive-bulb properly located in medium to be measured.

For installations where continuous records of temperature for long periods of time are desired, the Strip Chart Instrument is available. Such instruments can be furnished to supply continuous record for 45, 30 and 15 days.

Both the Strip Chart and the Round Chart Instruments can be arranged to record more than one temperature, or temperature and pressure as the case may be.

The Strip Chart Instrument is shown arranged to record both temperature and pressure on the shame chart. Varying clock speeds are obtainable to suit practically all needs.

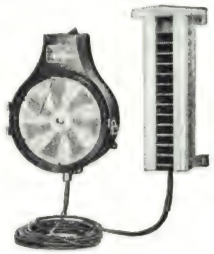


Strip Chart
Model 225

Continued on next page

Bristol's Atmospheric Recording Thermometers

Recording Thermometer for Outdoor Atmospheric Temperatures — Thermometer Model 311, shown with the weather house, is designed for recording outdoor atmospheric temperatures. The weather house with sensitive-bulb is installed out-of-doors and the instrument inside the building for easy reference. This same instrument can be furnished with two pens, one for recording indoor temperatures and the other for outdoor, giving a direct comparison on the one chart. This is especially desirable in controlling building temperatures.



Outdoor Recording Thermometer
Model 311

Recording Thermometer for Atmospheric Temperatures for Portable Service—The Portable Recording Thermometer, Model 161, is an entirely self-contained unit. The perforated case admits atmospheric temperatures to the sensitive-bulb located inside the instrument. A leather handle provides ready means for carrying instrument from place to place, and metal legs for supporting in correct position on any flat surface. Such an instrument is much used in storage rooms, ventilating ducts, hotel lobbies and public buildings of all kinds.

Portable Recording Thermometer
Model 161

Bristol's Indicating and Recording Pyrometers

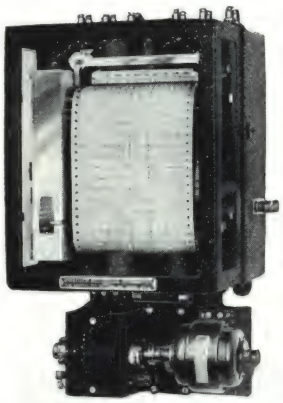
For Temperatures up to 3000° F.

Indicating Pyrometer
High resistance Model 420

Indicating Pyrometer Model 420—The Thermo-Electric Pyrometer furnished by Bristol fits many industrial uses for indicating and recording higher temperatures. The instruments are of particularly rugged quality and can be used for almost any installation with confidence of continuous operation.

The Model 420 Indicating Pyrometer has a wide open scale which is, in actual measurement, 7 in., making it easy to read even at a distance. This instrument is equipped with Automatic Internal Cold End Compensator. Zero Adjusting Screw is located on outside of instrument where it is readily accessible.

Recording Pyrometer Model 425—Strip Chart Type, provides continuous records for 45, 30 and 15 days. This type of instrument can be furnished to make 1, 2 or more records on the same chart up to and including 6.



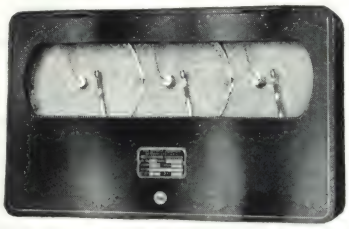
Recording Pyrometer
Model 425

By the use of multiple switch arrangement, indications or records may be had from as many as 20 different sources on the one instrument.

Note: In addition to Indicating and Recording Pyrometers, Bristol's Pyrometer Controllers are available for automatically recording temperatures up to 3000° F.

Bristol's Recording Ammeters, Voltmeters and Wattmeters

Triplex Ammeter, Three-unit 6-in. Chart—Recording Ammeters furnish continuous records of operating current under variable load conditions together with the time and duration of current fluctuations. Furnished for all ranges of direct current as required for commercial practice or with suitable transformer equipment for higher ranges of alternating current. Instruments can be furnished in Round or Strip Chart Models for permanent or portable service.



Triplex Ammeter
Three Unit 6-in. Chart

Recording Voltmeter
Model 535

Recording Voltmeter, Model 535—Bristol's Recording Voltmeters are used to check the constancy of voltage as a safety precaution and because of the effects on the life and efficiency of equipment. Used in connection with power and lighting circuits, furnaces, ovens, electric signs, elevator equipment, etc.

Recording Wattmeter, Portable Type, Model 726—The Recording Wattmeter shown is portable strip chart type, Model 726, particularly useful for test work on poly or single phase alternating current.

Convenient for carrying about to obtain records of electrical consumption or load conditions. Can be furnished for alternating or direct current in types for both permanent mounting or portable service.

Recording Wattmeter
Portable type
Model 726

GRINNELL COMPANY, INC.

Pipe Fittings and Fabricated Piping Material

EXECUTIVE OFFICES

PROVIDENCE, R. I.

OFFICES, PLANTS AND BRANCHES

ALBANY, N. Y.
ATLANTA, GA. (Plant and Foundry)
AUBURN, R. I. (Plant and Foundry)
BALTIMORE, MD.
BOSTON, MASS.
BUFFALO, N. Y.
CHARLOTTE, N. C. (Branch)
CHICAGO, ILL. (Branch)
CINCINNATI, OHIO
CLEVELAND, OHIO (Branch)
COLUMBIA, PA. (Plant)
DALLAS, TEX.
DETROIT, MICH.
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NEWARK, N. J.
NEW ORLEANS, LA.
NEW YORK, N. Y.
PHILADELPHIA, PA. (Branch)
PITTSBURGH, PA.
PLYMOUTH, FLA.
PROVIDENCE, R. I. (Plant and Foundry)
ROCHESTER, N. Y.
ST. LOUIS, MO. (Branch)
WARREN, OHIO (Plant and Foundry)

GRINNELL COMPANY OF THE PACIFIC

LOS ANGELES, CAL. (Branch) SAN FRANCISCO, CAL. (Branch) OAKLAND, CAL. (Branch) SEATTLE, WASH. (Branch)

GRINNELL COMPANY OF CANADA, LTD.

MONTREAL, QUE. (Branch) TORONTO, ONT. (Plant and Foundry) VANCOUVER, B. C. (Branch) WINNIPEG, MAN.
OSHAWA, ONT. (Foundry)

Products

PIPE FITTINGS, FABRICATED PIPE, PIPE BENDS, and WELDED PIPING.

The Grinnell Company Products include also Sprinkler Systems, Thermoliers (Unit Heaters), Thermoflex Heating Specialties, Adjustable Pipe Hangers, Equiflo Valves. For these products, see Manufacturers' Index.

GRINNELL PIPE FITTINGS

The Grinnell line of Pipe Fittings is large and embraces all usual forms and many special forms. The fittings shown on these pages are merely a few random selections for brief illustration from the Grinnell Company Catalogue No. 2 on Cast Iron Fittings and Catalogue No. 2-A on Malleable Iron Fittings which show our full line in great variety, fully described. We will send these catalogues upon request.

Nipples

Nipples are close, short, long and extra long. Made in black and galvanized steel and wrought iron, also brass, carefully threaded and finished.

Short or Long Nipple

Close Nipple

Cast Iron Fittings

Grinnell Cast Iron Screwed Fittings, Standard and Extra Heavy, meet every demand for a high grade fitting in design, utility and strength. They are tapped straight and accurately to American Briggs Standard. All fittings are chamfered, permitting an easy entrance of pipe.

We have a large variety of straight and reducing sizes.

Elbow

Tee

Long Turn Elbows and Tees—Commonly used for sprinkler piping. Sizes are 2½ to 6 in., standard and extra heavy. Designed in accordance with rules of the National Fire Protection Association. Reducing forms are available.

Elbow

Tee

Drip or Drain Tees—These forms are also commonly used for sprinkler piping.

Flanged One End—Drip or Drain Tees—Flanged Two Ends

Branch Tees or Manifolds—Made in 1, 1¼, 1½ and 2-in. pipe size, and with 2 to 12 branches.

Side Outlet Branch Tee

Cast Iron Floor and Ceiling Plates and Sockets

These are made in a variety of forms. The watertight riser sleeve shown provides for caulking at floor and around pipe.

Ceiling Plate

Floor Socket

Watertight Riser Sleeve

Continued on next page

GRINNELL PIPE FITTINGS

Malleable Iron Fittings

Grinnell Malleable Iron Fittings are tapped straight and accurately to the American Standard Pipe Thread. All fittings are chamfered.

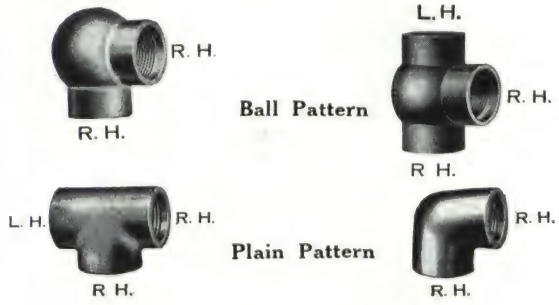
Standard Flat Band Screwed Fittings—Made to the 1927 American Standard for Malleable Iron Screwed Fittings and suitable for saturated steam working pressures up to 150 lb. Furnished in standard straight and reducing sizes in patterns as listed in manufacturer's catalogue. Side outlet and drop fittings furnished in plain pattern only.

Elbow

Cross

Standard Plain Pattern Screwed Fittings—Made in sizes up to and including 2-in. in size of elbows, tees, crosses, and couplings; also caps and reducers, or reducing couplings up to 2 in.

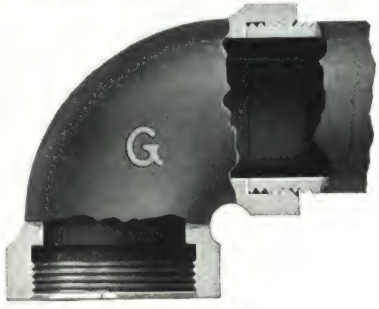
Railing Fittings—These are made in plain and ball patterns ½ to 3-in. pipe size. All necessary forms are made including bushings, finials and floor flanges.



Cast Iron Drainage Fittings

These are recessed and threaded for wrought pipe.

As shown in sectional view, these fittings are made with a shoulder, and being the same diameter as the inside of the pipe, a continuous passage is made when the pipe is screwed up to the shoulder, thus allowing no place for solid matter to collect and clog the pipe. Made in all usual patterns.



Sectional View

Cast Iron Flanged Fittings and Flanges

Standard Cast Iron Flanged Fittings—These are recommended for steam working pressures up to 125 lb.; sizes 12-in. and smaller only, for non-shock water working pressures up to 175 lb. Made in all usual patterns.

Elbow

Extra Heavy Cast Iron Flanged Fittings—Recommended for saturated steam working pressures up to 250 lb.; and sizes 10-in. and smaller only for non-shock water working pressures up to 400 lb.

45° Elbow

Flanges — Including floor, greenhouse, blind and all pipe connection forms.

Floor Flange

Locknut Flange

Special Cast Iron Flanged Fittings

These are made in standard and extra heavy cast iron, also bronze. They include many forms.

Return Bend with Back Outlet

Bronze, Brass and Special Metal Fittings

We are prepared to furnish bronze fittings cast from virgin metal and made from our various cast iron patterns. These include screwed and flanged fittings for standard and extra heavy pressures.

We can furnish on order special acid resisting fittings made from a special alloy.

We can furnish estimates for high grade special brass or bronze castings from our own or customers' patterns.

Grinnell Compound (Graphite Base)

Grinnell Compound is a high grade pipe joint compound, with graphite base, making an excellent lubricant for screwed pipe joints.

Only a thin coat is required to make a tight joint on steam, water, oil or gas lines.

Continued on next page

GRINNELL FABRICATED PIPING MATERIAL

Grinnell Triple XXX Products

The growth and development of superpower demands a line of fabricated piping materials as definite and specific in its quality as the standardized manufactured products going into such work. Such a line is Grinnell Triple XXX. Due to its very nature, quality embraces design, manufacturing standards and workmanship.

Every item in this line has stamped on it three "Xs" and underneath 40-60-90-135 representing 400, 600, 900 or 1350 lb. working steam pressure. Any piece of material bearing that stamp can unhesitatingly be used for the pressures indicated.

All joints in the Grinnell Triple XXX line are machined out of a rough lap which may be forged to twice the thickness of the pipe or seamless tubing. A specially built lap joint machine accomplishes this tremendous forging operation without changing the metal structure.

Special attention is called to the fact that the thickness of the pipe and the minimum thickness of the lap are equal.

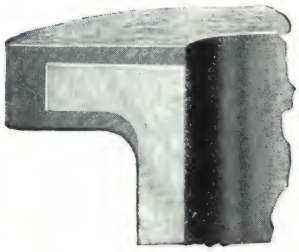
For pressures of 400 lb. and above all laps are finished on edge, face and back.

The basic idea of the Grinnell Triple XXX Pipe Joint is to provide absolute freedom in choosing the type of joint desired for varying conditions, and at the same time to assure maximum strength in the chosen type. The illustrations show clearly how the ample thickness of perfect metal in the rough forged lap allows for machining front and back for any conceivable face with a finished lap of at least 100% strength.

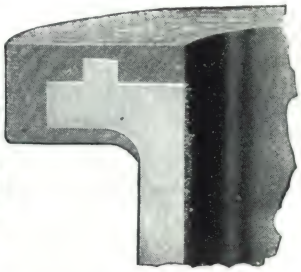
The same manufacturing exactitude, coupled with a rigorous policy governing the selection of higher quality materials, produces bends and headers worthy, with the lap joint, to carry the mark of quality—XXX.

In addition to the principal types of lap joints as shown below, we are equipped to furnish practically any type of lap joint.

The special features of the "Sarlun" Joint consist of the welding lips at the contact face and the flanges which permit sealing of the joint by welding.

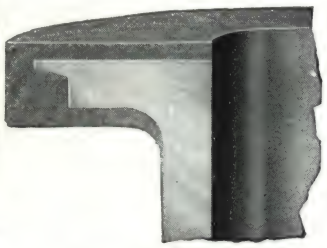


Square Lap in Rough Lap

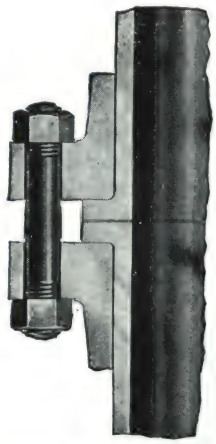


Small Tongue in Rough Lap

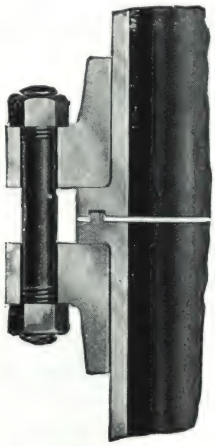
Small Female in Rough Lap



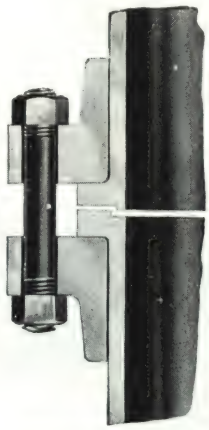
"Sarlun" Rough Lap



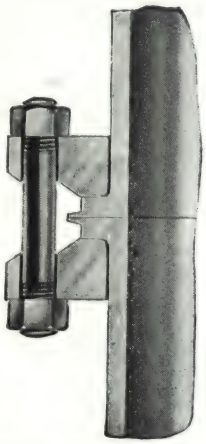
Finished Square Lap Joint



Finished Tongue and Groove Lap Joint



Finished Male and Female Lap Joint



Finished "Sarlun" Lap Joint

Upper section cuts illustrate laps before they are machined. Lower cuts show finished laps

Grinnell Triple XXX Products for Superpower

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GRINNELL FABRICATED PIPING MATERIAL

Standard Pipe Bends with Table of Radii for Steel and Iron Pipe

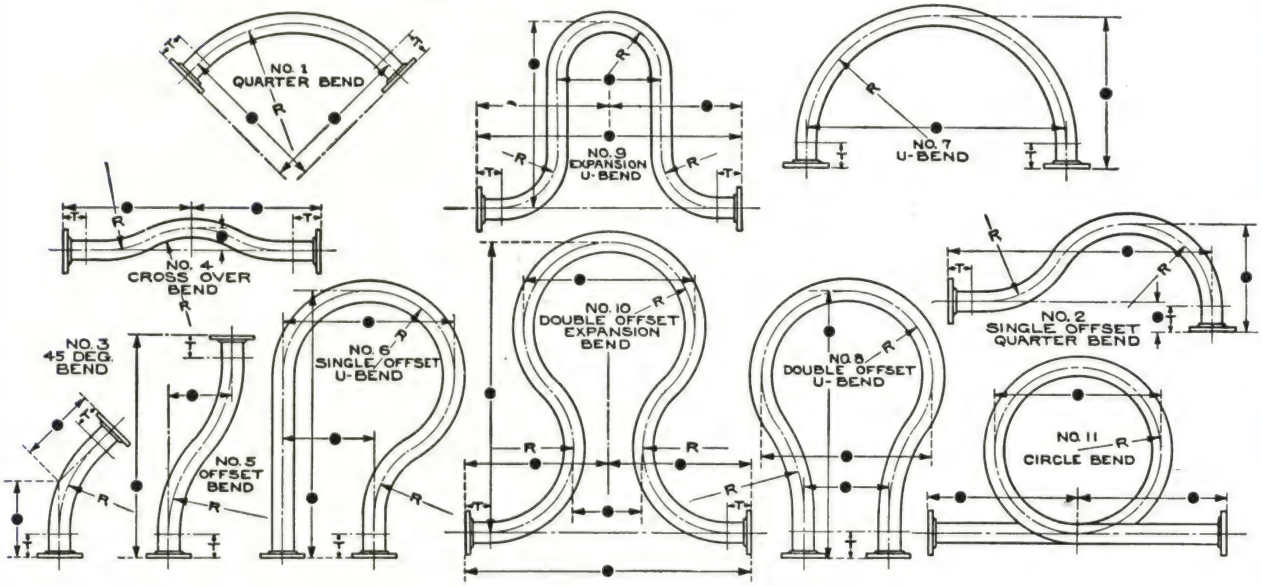

Table of Radii for Pipe Bends

Minimum Advisable Radius—Standard Weight Pipe, 1½ In. to 12 In.

Nominal pipe size	1½	2	2½	3	3½	4	5	6	8	10	12
Radii 5 diam. in.	7.5	10.0	12.5	15.0	17.5	20.0	25.0	30.0	40.0	50.0	60.0
Weight, lb. per ft., plain ends	2.717	3.652	5.793	7.575	9.109	10.790	14.617	18.974	28.554	40.483	49.562

Minimum Advisable Radius—Extra Strong Pipe, 1½ In. to 12 In.

Nominal pipe size	1½	2	2½	3	3½	4	5	6	8	10	12
Radii 4 diam. in.	6	8	10	12	14	16	20	24	32	40	48
Weight, lb. per ft., plain ends	3.631	5.022	7.661	10.252	12.505	14.983	20.778	28.573	43.388	54.735	65.415

Minimum Advisable Radius—Large O. D. Pipe

Nominal size O. D. pipe	14	16	18	20	24	Nominal size O. D. pipe	14	16	18	20	24
Radii 6 diam. in.	84	96	108	120	144	Radii 5 diam. in.	70	80	90	100	120
Thickness, in.	⅜	⅜	⅜	½	½	Thickness, in.	⅜	⅜	⅜	½	⅝

Extra strong pipe can be bent to 3 diameters, but is not guaranteed against flattening and buckling.

The thickness of the wall of the pipe in a bend should be determined by the stress due to the pressure of the liquid or gas it is conveying, the stress due to the expansion cared for by the bend, and the diameter of the pipe.

Dimension sketch or blueprint should accompany all inquiries or orders for bends.

Drawings submitted should include dimensions R—Radius, T—Tangent, and those marked ● ; also any variations from above bends.

Minimum Advisable Length of Tangents (T) or Straight Pipe on Pipe Bends When Using Lap Joint Flanges; also Screwed Flanges

Nominal pipe size, in.	LAP JOINT FLANGES									SCREWED FLANGES
	125 lb. Cast iron flanges	Series 15 Forged steel flanges	250 lb. Cast iron flanges	Series 30 Forged steel flanges		Series 40 Forged steel flanges		Series 60 Forged steel flanges	Series 90 Forged steel flanges	All pressures
	High hub	Low hub	High hub	Low hub	High hub	Low hub	High hub	High hub	High hub	
2	8	7	9	8	9	Use series 60	Use series 60	9	9	7
2½	8	7	9	8	9			9	10	7
3	8	7	10	8	9			9	10	7
3½	9	8	10	8	9			10	10	8
4	9	8	10	8	10	8	10	10	10	8
5	10	9	11	9	11	10	11	11	11	9
6	10	9	12	10	11	10	11	11	12	12
8	11	10	13	11	12	11	12	13	13	16
10	15	12	15	13	14	13	15	15	15	20
12	18	12	18	13	15	14	15	15	16	24
14-o.d.	21	17	21	17	19	18	19	20	21	....
16-o.d.	24	19	24	20	21	20	22	22	23	....
18-o.d.	27	21	27	22	24	22	24	25	....	....
20-o.d.	30	21	30	22	24	22	24	25	....	....
24-o.d.	36	27	36	27	27	27	27	27	....	....

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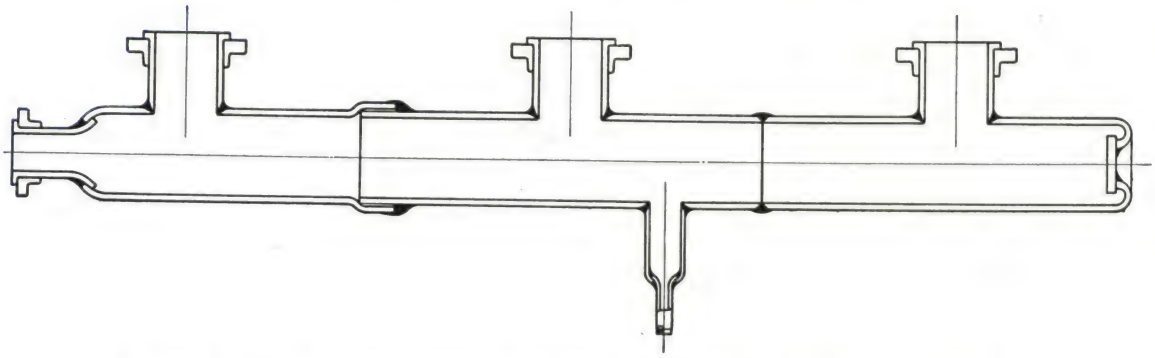
GRINNELL WELDED PIPING



Section of Welded Steam Header Illustrating Various Types of Welds Applicable

Welded Piping

Welded piping is gradually playing a more important part in the field of pipe fabrication. The most important advantages of welded piping are:

(1) The elimination of screwed or flanged joints with resulting lower maintenance costs.

(2) Lower first cost, especially where a multiplicity of connections are made to a pipe, such as in the case of headers.

(3) Decreased weights—especially where substituted for large cast iron or cast steel fittings.

(4) Continuity of insulation permitted by elimination of flanges with resulting decreased radiation losses and lower cost of insulation.

(5) Improved "service" in erection, especially in overcoming the time required for making of special or odd shaped cast fittings.

Only a few of the welded pipe joints which we make are shown on these pages. Full information will be sent on application.

Methods

The Grinnell Company furnishes piping made in its several shops autogenously welded either by the oxy-acetylene or the electric arc processes.

Guarantee

Grinnell fabricated piping material welded by either oxy-acetylene or electric arc processes is guaranteed for the same service as the piping material from which it is fabricated; but only to the extent of replacement of defective welds or any of the material incorporated into such welded pieces.

Testing

Welded piping for all pressures will be regularly tested whether or not specified.

Welded piping so tested will be subjected to pressure and impact tests with hydrostatic pressures in accordance with table below:

With Steel Flanges, Series 15 (150 lb. W.S.P)	400 lb. test
With Cast Iron Flanges, 125 lb. Standard—	
16 in. and smaller	250 lb. test
18 in. to 24 in.	200 lb. test
With Steel Flanges, Series 30 (300 lb. W.S.P.)	750 lb. test
With Cast Iron Flanges, 250 lb. Extra Heavy Standard	750 lb. test
With Steel Flanges, Series 40 (400 lb. W.S.P.)	1000 lb. test
With Steel Flanges, Series 60 (600 lb. W.S.P.)	1500 lb. test
With Steel Flanges, Series 90 (900 lb. W.S.P.)	2000 lb. test
With Steel Flanges, Series 135 (1350 lb. W.S.P.)	3000 lb. test

The Above Is an Actual Reproduction of Photograph of a Test of a Grinnell Welded Header, Where All Welds Were Subjected to Severe Bending, Twisting and Flattening Without Rupture

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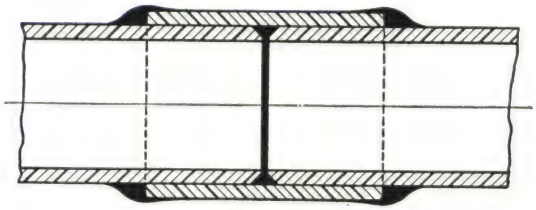
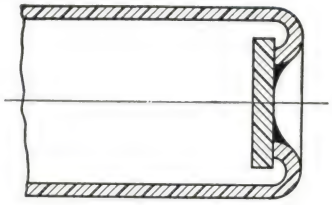
GRINNELL WELDED PIPING



Sleeve Weld



End Closure

Sleeve Weld

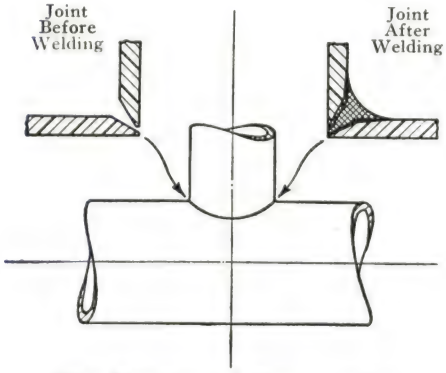
The type of weld illustrated is a "sleeve weld." It shows the use of butt weld with sleeve slipped on over weld, with both ends of sleeve welded. Where unusual stresses occur as in a pipe bend or when a reinforced type of weld is specified, "sleeve welds" are furnished by Grinnell Company for all sizes of pipe.

Note: The Power Piping Society Standard Specifications require butt welds to be reinforced by sleeves or their equivalent on all lines of pipe ½ in. or more in thickness.

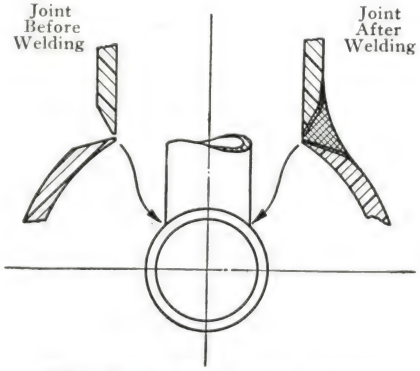
End Closure

Illustration shows an "end closure" for application to a hydraulic pressure tank, blanked header end or any other condition where blanked end is necessary to resist high pressures. This efficient weld is made by rolling inward the pipe (actually increasing its original thickness) and then welding in a metal blank of the same material. Blank may be thicker than pipe walls. Note how internal pressure acts against the pipe end and not on weld, assuring maximum strength of the materials used.

Nozzle Welds

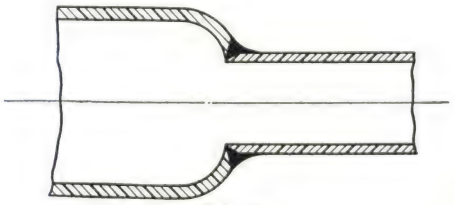


Side Elevation of Header with Welded Nozzle



End Elevation of Header with Welded Nozzle

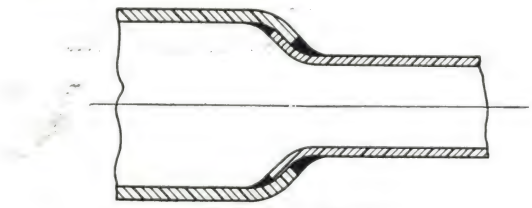
The above illustrations show the method used by Grinnell Company when making a "nozzle weld." The pipe is cut out and scarfed to receive the nozzle which has been treated in a similar manner. Great care is used to see that both pipe and nozzle have been cut to true developed form of intersection and properly scarfed to receive the weld. Straps around the pipe, or webs may be added, provided the entire section of header affected is afterwards annealed. Such details are not recommended and are only furnished upon definite specifications covering such features.



Butt Weld Reducer

Butt Weld Reducer

Illustration shows a "butt weld reducer" for light or medium pressures and is made by belling the larger pipe to match the diameter of the smaller pipe. The two are then joined together by a Standard Grinnell "Butt Weld."



Bell Type Reducer

Bell Type Reducer

Illustration shows a "bell type reducer." With this type of joint it is possible to fabricate an extremely strong joint for high pressures by making the larger pipe short enough to permit welding both the inside and outside of joint. This type of reducer is preferable for use with high pressure steam piping.

McDONNELL & MILLER

Wrigley Building, CHICAGO, ILL.
EASTERN OFFICE: Grand Central Terminal, NEW YORK, N. Y.

Products

McDONNELL No. 28 SELF-CLEANING DUPLEX BOILER FEEDERS.
McDONNELL No. 30 SAFETY FEEDERS.
McDONNELL No. 31 EMERGENCY SWITCH.
McDONNELL No. 32 EMERGENCY CUT-OFF.
McDONNELL No. 29 SELF-CLEANING SINGLE VALVE BOILER FEEDERS.

Service Recommendations

For smaller boilers—if oil or stoker fired, specify No. 30 Safety Feeder with No. 31 Emergency Switch for each boiler. If coal or gas fired, specify No. 30 Safety Feeder for each boiler.

For medium and large boilers—if oil fired or stoker fired, specify No. 28 Feeder with No. 32 Emergency Cut-off. If coal fired, specify No. 28 Feeder for each boiler. If boilers will operate majority of the time under a vacuum use No. 29 Feeder in place of No. 28.

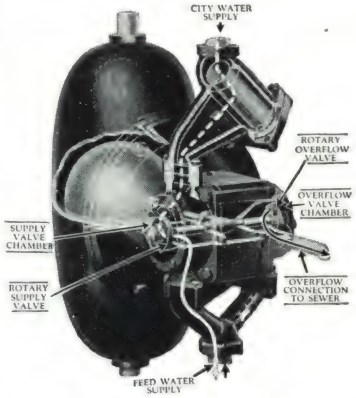
Dependable Feed Water Regulation

McDONNELL & MILLER Boiler Feeders offer a simple and positive means of maintaining the boiler water line in low pressure boilers. They protect the boiler from the costly repairs and shutdowns that result when someone forgets the boiler water line.

Absolute dependability is a proved quality of McDonnell Boiler Feeders. In the No. 28 Self-cleaning Duplex Feeder it is secured by the use of rotary self-cleaning valves. In the No. 30 Safety Feeder it is a result of ingenious simplicity and advanced design that isolates the feed valve from the hot water of the float chamber. Additional protection is offered for oil-fired and stoker fired jobs in the No. 31 Emergency Switch.

McDonnell No. 28 Self-Cleaning Duplex Feeder

This type of feeder is used on low pressure boilers requiring protection against excess return of condensation as well as low water. It prevents flooding by draining off surplus, just as effectually as it maintains the water line above the danger point by supplying make-up water as needed. The entire amount of feedwater for any boiler up to 20,000 ft. can be supplied by the M & M Self-cleaning Duplex Feeder at 30 lb. differential water pressure.



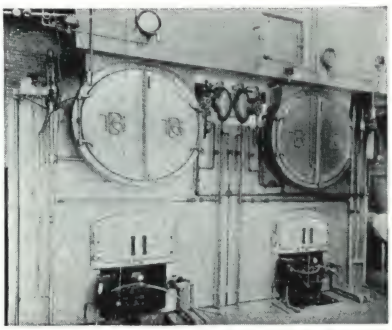
M & M Self-cleaning Duplex Feeder in Part Section Showing Interior Details

The bronze valve discs turn on monel seats, and this rotary action of the valves, as the float rises or falls, has a self-grinding effect that keeps the valves tight. There are no sliding parts and therefore no sticking parts.

The McDonnell Duplex Feeder is easily adjustable for water levels and valve differentials. The water line can be changed 1 in. higher or lower after installation, and the differential between supply level and overflow levels may be set at 1, 2, 3, 4 or 5 in. This greatly conserves the steamfitter's time.

Extra Large Capacity

The positive action of the supply valve puts the full city water pressure into the feed line. The construction of the valve cages to reduce turbulence, and the stream-line design of the water passages, including inlet and outlet, manifold, still further increases capacity and efficiency.



Two McDonnell & Miller Self-cleaning Duplex Feeders on Heating Boilers in John Marshall High School, Rochester, N. Y.

Typical Specifications McDonnell & Miller No. 28 Self-cleaning Duplex Boiler Feeders

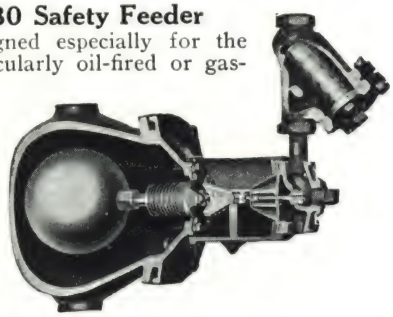
Furnish and install on each (low pressure heating) boiler, one McDonnell & Miller No. 28 Self-Cleaning Rotary Valve Duplex Boiler Feeder.

Rotary Valves to be adjustable to provide for a differential of from 1 to 5 in. between feed and overflow levels.

Self-cleaning Duplex Feeders to have sufficient capacity for furnishing the entire amount of feed water required by the boiler when all of the condensation is wasted to the sewer, and at .... lb. steam pressure and .... lb. city water pressure.

Installation to be made in accordance with diagrams and detailed instruction sheet furnished by the manufacturers.

The McDonnell No. 30 Safety Feeder



This Feeder is designed especially for the smaller size boiler—particularly oil-fired or gas-fired boilers in domestic use. It makes a most dependable and economical safety device for setting at the danger line. In this way it takes the place of the low-water cut-off and removes the disadvantages of a cut-off—the stopping of the burner with attendant danger of freezing the system or at least causing discomfort to the occupants of the house or building. In certain oil-fired or stoker-fired jobs where excessive priming is likely, the No. 30 Safety Feeder is combined with the No. 31 Emergency Switch which offers the advantages of a cut-off without the faults.

Features of Construction

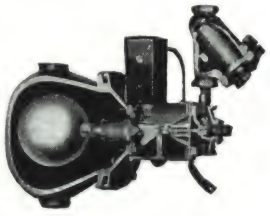
The McDonnell No. 30 Safety Feeder offers positive boiler insurance at an unsually low premium. Its simplified construction makes possible a compact unit that is inexpensive to install and trouble-free in operation. The feed valve is isolated from the hot water of the float chamber so that the feed valve is kept cool and scale is not precipitated on the valve seat. As a result, sticking is practically impossible.

Typical Specifications No. 30 Safety Feeder

Furnish and install on each (low pressure heating) boiler, one McDonnell No. 30 Safety Feeder.

Installation to be made in accordance with diagrams and detailed instruction sheet furnished by the manufacturers.

McDonnell No. 31 Emergency Switch



Particularly on oil-fired or stoker fired jobs where the particular boiler is subject to priming or foaming, the McDonnell No. 31 Emergency Switch when added to the No. 30 Safety Feeder offers the double protection of a feeder and low water cut-off at the lowest possible cost. The feeder takes care of all normal operation—opens when the boiler water level falls to a point one and one-half inches above the bottom of the gauge glass. If, however, a priming or foaming condition draws out water faster than the feeder can supply it, the switch stops the burner until the feeder catches up and then turns the control of the boiler back to the feeder.

McDonnell No. 29 Single Valve Self-cleaning Feeder

This type of feeder is adaptable where the boiler is constantly under a vacuum or where steam is used in process work.

It has the same general features and capacity as the self-cleaning duplex feeder, except that it has no overflow valve for draining off surplus.

Service and Information

The Engineering Department of McDONNELL & MILLER offers prompt advisory service to architects, engineers, contractors, and boiler owners, regarding special problems. Descriptive literature will be sent on request.

MINERAL FELT INSULATING COMPANY

EXECUTIVE OFFICES AND PLANT
TOLEDO, OHIO

AGENTS IN PRINCIPAL CITIES

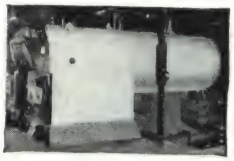
Minfelt Pipe Covering—Steel Clad

A convenient, easily installed insulation that combines the efficiency of mineral felt with the lasting beauty of a galvanized or duco finished metal housing. Comes in 18-in. sections ready to lock around the pipe. No cement or muslin required. No impairment of insulating efficiency at butts or seams. Longitudinal seams readily unlock for removal. The fine finish and appearance of Minfelt Steel Clad Coverings make them particularly desirable for interior use. Their sturdiness and weather-resisting qualities are of especial value on outside work.

Minfelt Pipe Covering—Standard

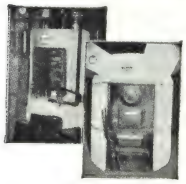
Provides commercially perfect insulation for both heat and cold. The insulating efficiency is very high. Comes in moulded sections 36 in. long, cloth covered, and split for application. Fits very closely around the pipe, and is held in position by metal bands over joints. May be used with Minfelt Cement on odd shapes and fittings. Is a most satisfactory and inexpensive pipe covering for heat, ice water, and refrigerating lines. Compares favorably in cost with 85% magnesia.

Pyrofelt Industrial Blocks



A heavy duty mineral felt fabrication for boilers, tanks, ducts, stills, breechings and any other application where highest possible insulating efficiency is desired. The standard 6x18-in. blocks are practically universal in their application as they can be easily bent and cut to fit curves or irregular surfaces. Pyrofelt forms an almost monolithic, cement free, crackless surface of great durability and efficiency. Thicknesses up to 3 in. available.

Minfelt Insulating Kits



A convenient and complete insulating outfit for small jobs, such as domestic furnaces, boilers, tanks, etc. No cement or wire are needed. Available in sizes from 18 to 34 sq. ft., and in thicknesses of ¾ and 1 in. A time and trouble saver for the small job.

Minfelt Insulating Cement

An improved product, easily applied, and requiring only water to prepare. Adheres to any clean metal surface, even glass. Very resilient and will not crack under expansion or vibration. Suitable for temperatures up to 1650° F. Packed in handy, one-man bags of 50 lb., each of which will cover 25 sq. ft. with a 1-in. layer. Minfelt Cement is so efficient that the net installed cost is the lowest possible.

Pyrocoat Wall Insulation

An extremely light, fireproof, wall and ceiling insulation that will not sag or settle, and has extremely high thermal efficiency. Heat loss through Pyrocoat is less than one-third that of asbestos mill board. A 2-in. layer has as much insulating capacity as 16 in. of lath and plaster, or 34 in. of brick. Ceiling insulation is especially recommended, as 65% of heat lost from upper rooms is through attic floor. Packed in handy one-man bags of 50 lb.

Mineral Felt

These insulating products have been developed from our basic product mineral felt, so they all possess approximately the same physical and thermal characteristics. Mineral felt is an exclusive product of the MINERAL FELT INSULATING COMPANY and is fully protected by process patents applied for. It combines an extraordinary thermal efficiency with a physical adaptability to insulating needs that has hitherto been unknown.

The forms and types listed are carried in stock for immediate delivery. Special requirements in any quantity gladly quoted.

Characteristics

Very high relative insulating efficiency.
Fireproof. Stable from 40° below zero to 1650° F.
Flexible and pliable, can be fitted to curved surfaces by hand.
Gives close bond on irregular insulated surfaces. Is free from convection currents and losses.
Elastic and resilient, unaffected by expansion and contraction,
Soft fibrous edges make tight seams and joints.
Vibrationproof—does not settle or sag with age.
Moisture free—no capillary attraction or "wicking" from wet footing.
Verminproof and mouldproof. No organic disintegration.
Chemically inert. Not affected by acids, alkalis or fumes.
Light in weight. Only 1¼ lb. per board foot.

COMPARATIVE EFFICIENCY

Insulation	K	D
Mineral felt	.282	15
Air cell asbestos	.500	8.8
Magnesia block, 85%	.508	19
Asbestos cement	1.666	50

Legends:
K—Thermal conductivity in B.t.u. per sq. ft. per degree F. per in. thickness per hr.
D—Density in lb. per cu. ft.

Note: This table applies to Pyrofelt, Pyrocoat, Minfelt Jackets and Minfelt Pipe Coverings.

PROPER THICKNESS OF COVERING
Cold Water and Ice Water Lines and Refrigeration

Type of line	Cold water	Ice water	Medium brine and ammonia	Standard brine and ammonia	Low temperature brine and ammonia
Temp., deg. F	50 to 60	40 to 50	25 to 40	0 to 25	Below zero
Covering, in.	1	1½	2	3	4

Note: You will observe that recommended thicknesses of mineral felt are identical with recommendations on good cork insulation.

PROPER THICKNESS OF COVERING
Steam and Hot Water Lines

Gauge pressure, lb.		Hot water	10	40 to 80	120	160	200	200 lb., 100° F. superheat	275 lb., 250° F. superheat
Temp., deg. F		180	239.4	326	350	370	387	487	664
Flat surfaces, in.		1	1½	2	2	2½	2½	3	4
Pipe size, in.	3	1	1	1½	1½	2	2½	2½	3
	6	1	1½	1½	1½	2	2½	2½	3
	12	1	1½	1½	1½	2	2½	2½	3
	24	1	1½	1½	1½	2	2½	2½	3

THE PHILIP CAREY COMPANY

Manufacturers of Heat Insulation

LOCKLAND, CINCINNATI, OHIO

BRANCHES AND DISTRIBUTORS IN PRINCIPAL CITIES

FACTORIES: LOCKLAND, OHIO, AND PLYMOUTH MEETING, PA.

Products

PIPE COVERING, BOILER INSULATION and REFRACTORY CEMENTS.

Also Miscellaneous Asbestos Products of all kinds.

For Waterproofing and Dampproofing Materials, see Manufacturers' Index.

For Built-up Roofing, see Manufacturers' Index.

For other Carey Products, see Manufacturers' Index.

Carey PRODUCTS

TRADE-MARK

Carey 85% Magnesia Covering (High Pressure Steam)

Consists of, approximately, 85% basis hydrated carbonate of magnesia and, approximately, 15% asbestos fiber. Furnished in sections 3 ft. long, canvas covered, with metal bands, for sizes up to and including 10 in.; for larger sizes, segmental blocks are furnished. It is particularly adapted for use on high pressure steam pipes.

Standard size of blocks, 6x36 in.; thickness ⅞ to 4 in., inclusive.

Technical Bulletin No. 104, furnished on request, contains full data on heat transmission and efficiencies of Carey 85% Magnesia Pipe Covering in various thicknesses and for various pipe sizes.

Carey Impervo Covering (To Prevent Sweating)

Composed of layers of high grade insulating felt and constructed in 2 layers, each layer having a lining of waterproof felt and a jacket of waterproof felt.

Furnished in standard sections 36 in. long, finished with canvas jacket and bands for applying for all pipe sizes. Specifically designed for use on cold water and ice water lines to prevent sweating and to maintain the low temperature of the liquid. It should always be applied in double layers to break all seams and joints to prevent air reaching the pipe.

Carey Carocel Covering (Heating Systems)

Consists of alternate layers of fine corrugated and flat sheets of asbestos paper. Furnished in standard 36-in. long sections, canvas jacketed with bands for applying for all pipe sizes. Specifically designed to give maximum insulating value on low and medium temperature steam pipes. Better adapted than any other type of covering for temperatures ranging from hot water up to 35 lb. steam pressure.

This covering is very firm with smooth cylindrical surface, making it very desirable for exposed heating system pipes. It has *8 layers* of corrugations per inch of thickness.

Technical Bulletin No. 102, furnished on request, shows comparative heat insulation values of Carocel and other insulations.

Carey Protecto Covering (To Prevent Freezing)

Consists of an inner layer of hair felt and an outer layer of wool felt.

Furnished in sections 36 in. long, finished with canvas jacket with bands for applying for all pipe sizes.

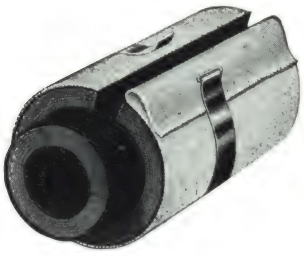
The insulating properties of these materials are well known and Protecto furnishes a combination resulting in high insulating value and neat appearance which is so often lacking when hair felt only is used.

Specifically designed to protect cold water and compressed air pipes from freezing.

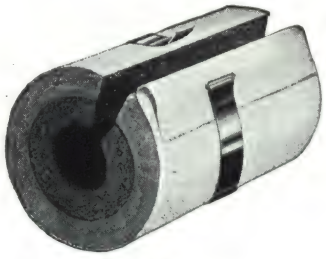
Specifications for Insulating Power Plants

Boilers—Cover all exposed boiler tops, combustion chambers and drums with Carey 85% Magnesia Blocks 2 in. thick, firmly wired on and finished with a ½-in. coat of Carey No. 100 Hard Finish Asbestos Cement, troweled smooth.

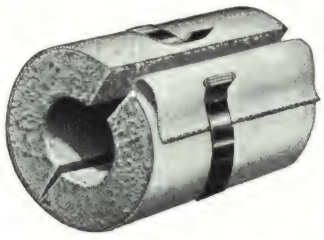
On connections from boiler to smokestack, apply V-rib expanded metal lath to provide an air space of, approximately,



Carey Impervo



Carey Protecto



Carey 85% Magnesia

Carey Carocel

MONETARY LOSSES RESULTING FROM HORIZONTAL BARE STEAM PIPE

Gage Press.	Hot Water			10 Lbs.			80 Lbs.			120 Lbs.			160 Lbs.			200 Lbs.		
Temp.	180° F.			239.4° F.			324.0° F.			350.0° F.			370.7° F.			387.9° F.		
Pipe size	Dollars loss	Pounds coal	B.T.U. per lineal ft. per ° F. diff. per hr.	Dollars loss	Pounds coal	B.T.U. per lineal ft. per ° F. diff. per hr.	Dollars loss	Pounds coal	B.T.U. per lineal ft. per ° F. diff. per hr.	Dollars loss	Pounds coal	B.T.U. per lineal ft. per ° F. diff. per hr.	Dollars loss	Pounds coal	B.T.U. per lineal ft. per ° F. diff. per hr.	Dollars loss	Pounds coal	B.T.U. per lineal ft per ° F. diff. per hr.
1"	1.91	763	.878	3.26	1305	.973	5.72	2290	1.138	6.25	2601	1.178	7.27	2910	1.242	8.07	3230	1.280
2"	3.24	1297	1.491	5.36	2142	1.600	9.78	3910	1.943	11.37	4549	2.052	12.75	5100	2.145	14.00	5600	2.220
3"	4.56	1824	2.100	8.24	3292	2.460	13.88	5550	2.760	16.14	6450	2.910	18.04	7210	3.030	19.84	7945	3.150
4"	5.78	2305	2.650	9.87	3950	2.950	17.70	7075	3.520	25.50	8200	3.700	22.85	9145	3.842	25.15	10060	3.981
6"	8.20	3280	3.775	14.21	5680	4.240	25.30	10110	5.024	29.30	11720	5.295	32.80	13120	5.522	36.00	14420	5.715
8"	11.00	4398	5.050	18.25	7300	5.460	32.60	13030	6.455	37.65	15050	6.840	42.40	16940	7.125	46.05	18420	7.300
10"	12.68	5065	5.925	22.05	8820	6.584	40.20	16100	8.010	46.70	18690	8.440	52.30	20910	8.805	57.75	23100	9.150
12"	15.00	6000	6.995	26.44	10580	7.890	47.40	18950	9.425	55.40	22120	10.00	61.76	24700	10.40	70.00	28010	11.14
14"	16.60	6635	7.625	28.90	11560	8.620	52.00	20800	10.34	60.50	24200	10.92	67.50	27000	11.36	74.10	29600	11.76
16"	18.82	7525	8.670	32.80	13120	9.790	58.76	23500	11.70	68.40	27320	12.34	76.10	30410	12.80	84.25	33700	13.35

Note: In these tables. coal has been figured at $4.00 per ton of 2000 lb.; 13,000 B.t.u. per lb. of coal; labor, boiler room expense, etc., taken at $1.00 per ton, making total value of coal fired at $5.00 per ton. Boiler efficiency taken at 70%. Air temperature 70° F. Experimental data obtained at the Mellon Institute.

Continued on next page

¾ in. Then apply Carey 85% Magnesia Blocks, 2 in. thick firmly laced in place and covered with hexagonal wire mesh, stretched tight and finished with a ½-in. coat of Carey No. 100 Hard Finish Asbestos Cement.

Apply a thin coating of Carey B. T. U. Cement over entire exposed brick boiler wall surface. Use from 45 to 50 lb. of cement per 100 sq. ft. of surface. Then apply a 2-in. coat of Carey 85% Magnesia Cement reinforced with wire mesh fastened to brickwork and finish with a coat of Carey No. 100 Hard Finish Asbestos Cement.

High Pressure Steam Piping—Cover all high pressure saturated steam pipes, 4-in. diam. and larger, with double standard thick 85% Magnesia Pipe Covering. Cover all high pressure steam pipes under 4-in. diam. and all high pressure drip pipes with 2-in. Carey 85% Magnesia Pipe Covering.

For superheated steam pipes use combination of the first layer Carey Hi-Temp Covering and outer layer Carey 85% Magnesia Covering as recommended in detail in Bulletin 101—High Temperature Heat Insulation.

Exhaust Steam Piping—Cover all exhaust pipes and mains within buildings with 1 layer of 1½-in. Carocel Asbestos Sectional Pipe Covering.

Feed Water Piping—Cover all feed water pipes with 1 layer of 1-in. Carocel Asbestos Sectional Pipe Covering.

Fittings—Cover all high pressure and exhaust steam fittings, valves and flanges with Carey 85% Magnesia Blocks and 85% Magnesia Cement, or all 85% Magnesia Cement, to a thickness corresponding to covering on adjacent pipe. Trowel smooth and finish with canvas jacket pasted on.

Finish—Over all pipe covering, apply a 16-lb. asbestos paper and an extra 8-oz. canvas jacket, tightly stretched and sewed on, approximately, 3 stitches to the inch. All canvas surfaces are to be sized and finished with 2 coats of lead and oil paint of color to be selected by architect.

Heaters, Receivers, Tanks, Traps, etc.—Cover all such appurtenances with Carey 85% Magnesia Blocks and Carey No. 100 Hard Finish Asbestos Cement to a minimum thickness of 1½ in., or with 1-in. Carocel Blocks and ½-in. Carey No. 100 Hard Finish Asbestos Cement. Wire blocks securely in place, cover with 2-in. hexagonal wire mesh, stretched tight, and apply Carey No. 100 Hard Finish Asbestos Cement, troweled smooth.

Finish with canvas jacket smoothly pasted on. Canvas jacket shall be of same weight as used on 85% Magnesia Pipe Coverings.

Method of Insulating Boilers, Heaters, Tanks, etc.

Specifications for Insulating Heating Systems

Boilers, Heaters, etc.—Cover all such appurtenances with Carey 85% Magnesia Blocks and Carey No. 100 Hard Finish Asbestos Cement to a minimum thickness of 1½ in., or with 1-in. thick Carocel Blocks and ½ in. thickness of Carey No. 100 Hard Finish Asbestos Cement. Wire blocks securely in place, cover with 2-in. hexagonal wire mesh, stretched tight, and finish with Carey No. 100 Hard Finish Asbestos Cement, troweled smooth.

Heating Pipes—Cover all mains, risers and returns (except horizontal radiator connections) with 1-in. thick Carocel Asbestos Sectional Pipe Covering.

Fittings—Cover all fittings and valves (except radiator valves) with asbestos cement approximately 1 in. thick, troweled smooth, and finish with canvas jacket smoothly pasted on. The canvas shall be the same weight as that used on the pipe covering.

Finish—All exposed canvas jackets shall be sized and painted with 2 coats of lead and oil paint of color selected by the architect. Pipe covering bands shall be applied on 18-in. centers.

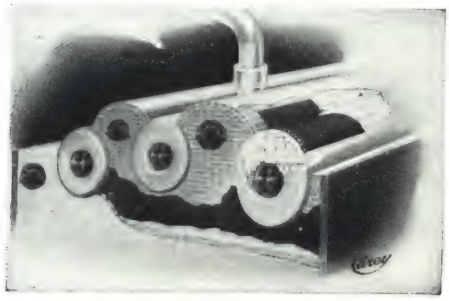
Specifications for Insulating Plumbing Systems

Hot Water Piping—Cover all hot water mains and piping with Carocel Asbestos Sectional Pipe Covering 1 in. thick.

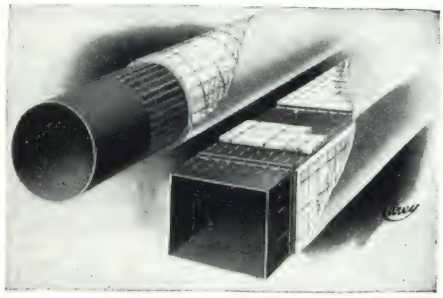
Cold Water Piping—Cover all cold water pipes within buildings, whether exposed or concealed, with Impervo Pipe Covering, in 2 layers, applied by the broken joint method, each layer being ½ in. thick. Cover all cold water pipes in entrances, areaways, unheated rooms or otherwise exposed to freezing, with Protecto Pipe Covering 1 in. thick.

Ice Water Piping—Cover all ice water pipes, whether exposed or concealed, with Impervo Pipe Covering, in 2 layers, applied by the broken joint method, each layer being ¾ in. thick.

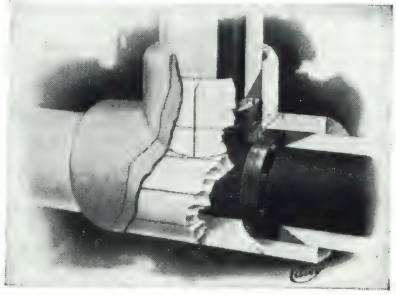
Finish—Same as for heating system.



Method of Insulating Boiler Tops, Ends and Walls



Methods of Insulating Boiler Breechings



Method of Insulating Fittings, Flanges, etc.

Carey Asbestos Cements

Besides a complete line of pipe covering and insulating material we offer the architect and engineer several grades of cements for insulating irregular surfaces, fittings, heating boilers, etc., also for filling in cracks between block insulation, and for finishing block insulation with a smooth surface. The cements are furnished in dry form in bags.

Carey No. 303 Asbestos Cement is the popular standard and requires no special knowledge or skill for application.

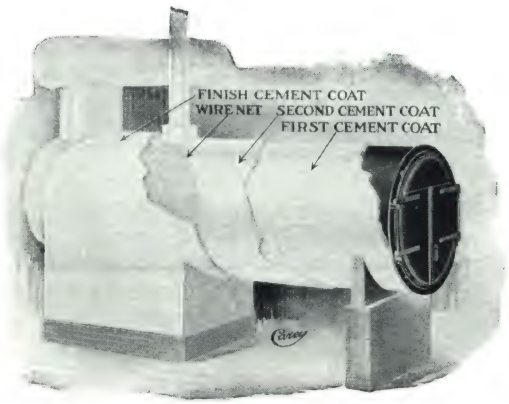
No. 707 contains longer fibre and has excellent insulating qualities.

No. 100 is a hard finish cement for final coating of boilers, tanks, etc.

To apply, mix with water to about the consistency of mortar and apply with a trowel in successive coatings approximately ½ in. thick, each coating being allowed to thoroughly dry before the next one is applied.

Covering Capacities—Covering capacities are approximately as follows:

Carey No. 303—16 to 18 sq. ft., 1 in. thick, per 100 lb.
Carey No. 100— 22 sq. ft., 1 in. thick, per 100 lb.
Carey No. 707—22 to 24 sq. ft., 1 in. thick, per 100 lb.



Application of Carey Asbestos Cements to Boiler Surfaces

JOHNS-MANVILLE

EXECUTIVE OFFICES
292 Madison Avenue, NEW YORK, N. Y.

For Branch Offices, see Section on Wall Tile

Products

JOHNS-MANVILLE INSULATIONS.

Also Packings for all purposes; Refractory Cements; Waterproofing and Dampproofing; Asbestos Ebony; Asbestos and Asphalt Roll-Roofing; Rotproof Roofs; Asbestos products of all kinds.

For the following Johns-Manville products, see Manufacturers' Index: Acoustical Treatment and Sound Isolation; Shingles; Built-up Roofing; Celite for concrete and mortar; Home Insulation; Insulating Board and Plaster Lath; Tile Flooring; Transite, Flat and Corrugated; Wall Tile.

JOHNS-MANVILLE INSULATIONS

General Information

An effort has been made to present to those engaged in writing insulation specifications or to those interested in any way in this subject, information which by virtue of its arrangement will lend itself to maximum economy of time and accuracy of reference.

The materials offered in these specifications have been suggested because of their recognized efficiency, durability and economy for the service for which they are indicated. We have endeavored where possible to include alternates, leaving the final selection of the material to be specified to those who, because of their intimacy with the problem at hand, are best able to make the proper decision.

In order that a general idea may be had of the temperatures associated with various classes of service or types of buildings, the following table gives the temperature range of the surfaces to be insulated:

TABULATION OF TEMPERATURE RANGES

Class of service	Temperature range
Hot air	75° to 300° F.
Hot water	100° to 200° F.
Steam	150° to 800° F.
Cold water lines	40° to 75° F.
Ice water lines	32° to 50° F.
Ammonia and brine lines	Below zero to 32° F.

Types of buildings	Temperature range
Small residences	100° to 225° F.
Apartments, office buildings, hospitals, hotels, etc.	100° to 800° F.
Central heating plants	150° to 800° F.
Manufacturing plants	150° to 800° F.

I. HEAT INSULATIONS

Improved Asbestocel

Temperature up to 300° F. In sectional pipe insulation it ranges in thickness from two to four plies, each ply being a full quarter inch thick. Asbestocel, having circumferential as well as longitudinal corrugations, is a reinforced air cell, making three-ply Improved Asbestocel equal in insulation value to four-ply commercial air cell. Improved Asbestocel is also furnished in sheets and blocks ranging from two to eight plies in thickness, and in flexible rolls one-ply thick.

85% Magnesia

Temperature up to 600° F. Furnished in sectional pipe insulation and blocks and in various thicknesses. 85% Magnesia is an efficient, economical insulation for general use.

Superex

Temperature 600° to 1600° F. Furnished in sectional pipe insulation and blocks in various thicknesses. Superex is a high temperature insulation used singly but more often in combination with 85% Magnesia or Asbesto-Sponge Felted Insulation.

Asbesto-Sponge Felted

Temperature up to 700° F. Furnished in sectional pipe insulation, sheets, and blocks in various thicknesses. Asbesto-Sponge Felted is of laminated construction and will withstand severe mechanical abuse.

Vitribestos

Temperature up to 700° F. Furnished in flat or curved sheets. A vitrified aircell sheet recommended for the lining of steel stacks to prevent corrosion.

Sil-O-Cel Natural Brick

Temperature up to 1600° F. Furnished in standard firebrick and special brick sizes. The most efficient insulating brick obtainable.

Sil-O-Cel C-22 Brick

Temperature up to 2000° F. Furnished in standard firebrick and special brick sizes. Used as a high temperature insulation.

Super Fire-Felt

Temperature up to 700° F. Furnished in sheets and blocks in various thicknesses. Super Fire-Felt is used as a lining for boiler tube doors.

Asbestos Millboard No. 101-S

A strong, fireproof and heat resisting sheet used for many purposes. Recommended in these specifications for finishing the insulation of boiler tube doors.

Economy Range Boiler Cover

Made in one, two or three layers of one-inch felt, covered with muslin and quilted.

Keystone Range Boiler Cover

Made in one thickness only. It consists of a lining of asbestos felt, a layer of insulating felt and a jacket of 8-oz. canvas with lacing hooks attached.

Underground Conduit System

Temperature up to 700° F. A complete system for the insulation of all underground heating pipes, consisting of a terra cotta underdrain, vitrified tile conduit, pipe supports and rollers, and Johns-Manville Waterproof Asbestos Conduit Filling.

Continued on next page

II. COLD INSULATIONS

Anti-Sweat

Temperatures 32° to 75° F. Furnished in sectional pipe insulation. Anti-Sweat is a double-layer broken joint insulation. The inner section has a lining and a jacket of waterproof felts; the outer layer is similarly waterproofed by a single layer of felt as a lining and two waterproof felts as a jacket. Anti-Sweat is used for cold water and ice water insulation.

Wool-Felt

Temperature 40° to 200° F. Furnished in sectional pipe insulation, asbestos paper or waterproof felt lines. Wool Felt is a single-layer cold or hot water pipe insulation.

Double-layer Wool-Felt is also made as an alternate to Anti-Sweat but with only a single waterproof felt used as a lining.

Built-up Hair Felt

Applied in two, three or four layer construction. Built-Up Hair Felt Insulation is used for protection against freezing of pipes in exterior walls or exposed places.

Ice Water Thickness Cork

Temperature 25° to 50° F. Furnished in sectional pipe insulation. Recommended for ice water and drinking water lines.

Brine Thickness Cork

Temperature 0° to 25° F. Furnished in sectional pipe insulation. Recommended for brine and ammonia lines.

Heavy Brine Thickness Cork

Temperature below zero to 0° F. Furnished in sectional pipe insulation. Recommended for use where extra thickness is required for low temperature lines.

Rubbercork

Rubbercork is a plastic insulation for cold pipe fittings that is applied after the sectional cork pipe insulation is in place.

Built-up Brine and Ammonia

Temperature below zero to plus 50° F. A built-up waterproof hair felt. Recommended for brine and ammonia lines, to withstand vibration and shock.

Rock Cork

Temperature below zero to plus 100° F. Furnished in large size sheets (18x36 in.), generally applied in two-layer construction. J-M Rock Cork is a low temperature insulation manufactured from Banroc, a loose rock wool, combined with a waterproof binding ingredient, which is then moulded and baked into sheets. Is suitable for all types of refrigerated construction and equipment.

Rock Cork Lagging

Temperature below zero to plus 100° F. An insulation for cylindrical tanks and other surfaces, furnished in various thicknesses.

Granulated Rock Cork

Temperature below zero to plus 100° F. Granulated Rock Cork is a loose filler type of insulation recommended for all types of refrigerated construction and equipment.

III. CEMENTS AND MISCELLANEOUS MATERIALS

85% Magnesia Cement

Temperature up to 600° F. A highly efficient cement for irregular surfaces.

No. 302 Cement

Temperature up to 1000° F. A long fibre asbestos cement for smooth, hard finishing work and for irregular surfaces.

No. 400 Cement

Temperature up to 700° F. An asbestos insulating and finishing cement for general use.

No. 319 Cement

Temperature up to 1600° F. A semi-refractory cement for finishing insulation in lining work.

No. 450 Cement

Temperature up to 1200° F. An insulating cement for use where sheet or block insulation is not practical.

Sil-O-Cel C-3 Concrete

Temperature up to 1800° F. An insulating concrete. It may be cast monolithic in forms for the insulation of tube doors, baffles, dampers, etc.

Insulkote

Insulkote is a durable, plastic waterproof coating for finishing insulated surfaces exposed to weather conditions.

Double Coated Flexstone Weatherproof Jacket

A weatherproof jacket made from asbestos waterproofing felts, used to weatherproof insulated pipes exposed to moisture conditions.

Insulated Filling Materials

Temperature up to 2000° F. A variety of insulating filling materials for special requirements.

Note: As the principal use of cement is for finishing block and sheet insulation, we do not recommend any of the above cements for insulation alone except where sheets and blocks are impracticable. Our engineering service is available to those who have any unusual conditions to meet.

Continued on next page

SHORT FORM SPECIFICATIONS
FOR FURNISHING AND APPLYING JOHNS-MANVILLE INSULATIONS
Heating and Ventilating Section

General Paragraphs

(Where applicable, the specification writer shall copy the general paragraphs. The general paragraphs shall be followed by the specifications relating to the specific equipment to be insulated.)

(1) Materials and Workmanship

All insulating materials shall be those furnished by Johns-Manville and all work executed under this contract shall be performed by them or their approved contractor, in strict accordance with their Detailed Specifications.

(2) Application

All Double Standard thick 85% Magnesia and all other insulation 3 in. thick and over, excepting insulating brick, shall be applied in two layers with all joints broken. All block and sheet insulation, unless otherwise noted, shall be finished with ½-in. thick hard finish Asbestos Cement reinforced with hexagonal mesh galvanized wire.

(3) Canvas

All insulation on pipes, fittings, valves and flanges located indoors and exposed to view (or in tunnels or accessible pipe chambers) shall be finished as follows:

Piping and screw fittings *(state weight—usually 4, 6 or 8 oz.)* ounce canvas sewed on over resin-sized paper.

Flanges, flanged fittings and valves *(state weight—usually 4, 6 or 8 oz.)* ounce canvas pasted on.

(4) Painting

All insulation which has been re-canvased shall be painted with one coat of glue sizing and two coats of first quality lead and oil paint of color selected. This work shall be done by *(state whether to be done by "this contractor" or if "as specified under" state where specified).*

(5) Fireproof Reinforced Asbestos Jacket

All insulation on piping in main pipe shaft or other locations indicated on plans, where a combustible finished insulation would constitute a fire hazard, shall be finished with a Fireproof Reinforced Asbestos Jacket.

Equipment Specifications

(The specification writer shall copy from these specifications the ones pertaining to the particular equipment to be insulated.) See also foregoing general paragraphs.

(6) Boiler Insulation

(A) Hot Air Furnace Insulation—The casing shall be insulated with Asbestos Cement to a total thickness of 1 in. applied in two coats, reinforced with 2-in. hexagonal mesh galvanized wire and finished hard and smooth.

Note: *The above specification is designed for small dwellings and for the general run of fuel such as coal, oil, natural gas, etc. However, where manufactured gas is used as fuel, the furnace should be insulated with 85% Magnesia Blocks and Asbestos Cement to a total thickness of not less than 1½ in.*

(B) Round Boiler Insulation—The boiler shall be insulated with Asbestos Cement to a total thickness of 1 in. applied in two coats reinforced with 2-in. hexagonal mesh galvanized wire and finished hard and smooth.

Note: *The above specification is designed for small dwellings and for the general run of fuel such as coal, oil, natural gas, etc. However, where manufactured gas is used as fuel, boiler should be insulated with 85% Magnesia Blocks and Asbestos Cement to a total thickness of not less than 1½ in.*

(C) Sectional Boiler Insulation—The boiler shall be insulated with 1½ in. thick 85% Magnesia Blocks.

Note: *This specification should be used where highest type of insulation is desired.*

Alternate: The boiler shall be insulated with 4-ply Improved Asbestocel Blocks.

Note: *This alternate may be used where it is necessary to consider initial cost but must not be used where surface temperature exceeds 300° F.*

(D) Fire-Tube Boiler Insulation—*(I) Boiler Shell*— The exposed steam and water surfaces of boiler shall be insulated with *(state thickness, see Note)* thick 85% Magnesia Block Insulation.

Note: *Steam pressures up to 99 lbs., use 1½-in. thickness. Steam pressures from 100 to 199 lbs. use 2-in. thickness.*

(II) Boiler Walls or Settings—The outer 4½ in. of brick shall be a veneer of Sil-O-Cel C-22 brick.

(E) Water Tube Boiler Insulation—*(I) Drums and Drum Heads*—The exposed steam and water surfaces of boiler including drums and drum heads shall be insulated with *(state thickness, see Note)* thick 85% Magnesia Block Insulation.

Note: *Steam pressures up to 99 lbs. use 1½-in. thickness. Steam pressures from 100 to 199 lbs. use 2-in. thickness. Steam pressures 200 lbs. and over, use 2½-in. thickness.*

(II) Boiler Wall or Setting Insulation—*(a) Solid Fire Brick Walls*—The exposed surfaces of boiler setting shall be insulated with 3-in. thick Superex-85% Magnesia Combination Block Insulation on portions opposite the furnace and 1½-in. thick 85% Magnesia Blocks on the remainder of the setting. The insulation shall be finished with ⅜-in. thick Transite Asbestos Wood Casing.

Note: *This specification should be used where highest type of insulation is desired.*

Alternate: The insulation shall consist of a 4½-in. thick veneer course of Sil-O-Cel C-22 Brick.

Note: *This alternate may be used where it is necessary to consider initial cost.*

(b) Air-Cooled Walls—

Note: *Air-Cooled boiler walls should be insulated. Recommendations vary with type of wall used. Details and recommendations may be obtained upon request.*

(c) Water-Cooled Walls—

Note: *Recommendations vary with type of wall used. Details and recommendations may be obtained upon request.*

(III) Boiler Tube Door Insulation—The tube doors shall be lined with 2-in. thick Super Fire-Felt Sheets and finished with ¼-in. thick No. 101-S Asbestos Millboard.

Note: *This specification may be used regardless of whether the boiler tube door has been hung or not.*

Alternate: The inner recessed portion of the tube doors shall be completely filled with Sil-O-Cel C-3 Concrete. Reinforcement shall be provided for the Concrete.

Note: *Inasmuch as this material is tamped in place, the foregoing alternate can be used only before the door is hung and when it can be laid in a horizontal position.*

(7) Smoke Flue and Up-take Insulation

(A) External Insulation—The smoke flue, including uptake, shall be insulated with 2-in. thick *(state type of insulation, see Note)* Block Insulation applied over an air space.

Note: *Temperatures up to 600° F. use 2-in. thick 85% Magnesia. Temperatures 600° to 1000° F. use 2-in. thick Superex.*

(B) Internal Insulation—The smoke flue and up-take shall be lined with 2-in. thick Superex Block Insulation held securely in place and finished with ½-in. thick No. 319 Cement. On the inside surface to be insulated, suitable angle supports shall be furnished by *(state by whom—usually the Steel Contractor)* as specified under *(state where specified).*

Note: *This specification should not be used over 1000° F. as this represents the temperature limit of the wire reinforcement.*

(8) Steel Stack Insulation

(A) Internal Insulation—The stack shall be lined with Sil-O-Cel Natural Brick 2½ in. thick, and finished with No. 319 Cement ½ in. thick.

Angle rings shall be placed in the stack by *(state by whom—usually the Steel Contractor)* as specified under *(state where specified).*

(They shall be placed on 37-in. centers vertically, with the outstanding leg punched with ¼-in. holes on 12-in. centers.)

(B) External Insulation—The stack shall be insulated on the outside with 2-in. thick *(state insulation to be used, see Note).*

Angle rings shall be placed on the stack by *(state by whom—usually the Steel Contractor)* as specified under *(state where specified).*

Continued on next page

(They shall be placed on 37-in. centers vertically, with the outstanding leg punched with ¼-in. holes on 12-in. centers.)

Note: *Temperatures up to 600° F. use 85% Magnesia Blocks. Temperatures 600° to 1000° F. use Superex Blocks.*

(9) Brick Stack Insulation

The stack shall be insulated on the outside with 2-in. thick 85% Magnesia Blocks. Bolts shall be set in the brick work by *(state by whom)* as specified under *(state where specified)*. (They shall be set in vertical rows 36½ in. on center and shall be spaced 12 in. apart.)

(10) Ceiling Insulation

The ceiling of the boiler and engine rooms shall be insulated with 2-in. thick 85% Magnesia Blocks finished with *(state finish, see Note)*.

Note: *The above insulation may be finished with hard finish Asbestos Cement or Transite Asbestos Wood. Specify type of finish desired. Supports for the insulation are required. These shall be provided by others. Refer to detail specification for this work.*

(11) Domestic Hot Water Range Boiler Insulation

The hot water range boiler shall be insulated with Johns-Manville *(state type, see Note)* Range Boiler Cover. The Range Boiler Cover shall be applied in a neat and workmanlike manner with all joints butted and tightly laced.

Note: *Where hot water is heated by a coal-fired heater or an ordinary intermittent gas heater, "Keystone" type should be specified. Where water is heated by a gas heater controlled by a thermostat, "1-ply Economy" type should be specified. Where water is heated by electricity, "2-ply Economy" type should be specified.*

(12) Hot Water Heater and Hot Water Storage Tank Insulation

The hot water heater and hot water storage tank shall be insulated with 1½-in. thick 85% Magnesia Block Insulation.

Note: *This specification should be used where highest type of insulation is desired.*

Alternate: The hot water heater and hot water storage tank shall be insulated with Asbestos Cement applied in two coats to a total thickness of 1-in., reinforced with 2-in. hexagonal galvanized mesh wire and finished hard and smooth.

Note: *This alternate is designed for small dwellings and for the general run of fuel such as coal, oil, natural gas, etc. However, where manufactured gas is used as a fuel, this alternate specification should not be used.*

(13) Feed Water Heater Insulation

The feed water heater shall be insulated with 1½-in. thick 85% Magnesia Block Insulation.

(14) Hot Air Heater, Ducts and Heater Casing Insulation

All heater casings, fan housings and warm air ducts and flues shall be insulated with 1½-in. thick 85% Magnesia Blocks.

Note: *This specification should be used where highest type of insulation is desired.*

Alternate: All heater casings, fan housings and warm air ducts and flues shall be insulated with 4-ply Improved Asbestocel Sheets.

Note: *This alternate may be used for all ordinary conditions.*

(15) Steam Pump Insulation

The steam and hot water cylinders and chests of all pumps are to be insulated with 2-in. thick 85% Magnesia Blocks filled out with Asbestos Cement. On heads and chests, this insulation shall be made removable and replaceable.

A suitable Russia iron jacket to be furnished by *(state by whom—usually the owner)* shall be used to finish the insulation.

(16) Auxiliary Turbine Insulation

The casings of auxiliary turbine shall be insulated with 2-in. thick 85% Magnesia Blocks filled out with Asbestos Cement.

(17) Main Turbine Insulation

All main steam turbines shall be insulated with *(state thickness and type of insulation, see Notes)* Block Insulation. Before applying this insulation, all cavities and irregular parts shall be filled out with blocks and cement so that the finished insulation will present a smooth exterior surface.

Note:

Condition	Temperature	Insulation
Low and medium pressure steam	Up to 299° F. use 1½ in.	85% Magnesia
High pressure saturated steam	300° to 399° F. use 2 in.	85% Magnesia
Superheated steam	400° to 599° F. use 3 in.	85% Magnesia
Highly superheated steam	600° to 800° F. use 3 in.	Superex-85% Magnesia Combination

Note: *This applies only to turbines up to 10,000 kw. On turbines 10,000 kw. and over, removable and replaceable Asbestos Blanket Insulation of the same thickness as the adjacent block insulation is recommended for the following parts of the turbine:*
Top and bottom bonnets of throttle and control valves.
Control valve strainer bonnet.
Horizontal flange between upper and lower halves of turbine shell.

(18) Hot Air Pipe Insulation

All hot air piping shall be insulated with two layers of 1-ply Asbestocel in flexible roll form, wired on, and all joints sealed with a 3-in. wide strip of Asbestos Paper pasted on.

Note: *This specification is designed for a small dwelling and for the general run of fuels such as coal, oil, natural gas, etc. However, where manufactured gas is used as the fuel, three layers of 1-ply Asbestocel is recommended.*

(19) Hot Water Pipe Insulation

All hot water piping shall be insulated with Standard Thick 85% Magnesia Pipe Insulation.

Note: *This specification should be used where highest type of insulation is required.*

Alternate: All hot water piping shall be insulated with 4-ply Improved Asbestocel Pipe Insulation.

Note: *This alternate may be used where it is necessary to consider initial cost.*

Alternate: All hot water piping shall be insulated with 3-ply Improved Asbestocel Pipe Insulation.

Note: *This alternate is designed for a small dwelling and for the general run of fuels such as coal, oil, natural gas, etc. However, it should not be used where manufactured gas is used as the fuel.*

(20) Steam Pipe Insulation—Indoors

Temperature up to 600° F.

All steam piping shall be insulated with 85% Magnesia Pipe Insulation according to the following table:

Pressure or condition	Temperature range	Thickness: Pipes larger than 4 in.	Thickness: Pipes 2 in. to 4 in.	Thickness: Pipes smaller than 2 in.
Up to 24 lbs.	212° to 265° F.	Std.	Std.	Std.
25 lbs. to 99 lbs.	266° to 337° F.	1½ in.	Std.	Std.
100 lbs. to 200 lbs.	338° to 388° F.	2 in.	1½ in.	Std.
Low superheat	389° to 499° F.	Dbl. std.	2 in.	1½ in.
Superheat	500° to 599° F.	3 in.	Dbl. std.	2 in.

Note: *Asbestos-Sponge Felted Insulation may be specified for the above service where extra mechanical strength is desired. The thicknesses may be taken from the above table; Standard Thick in table to be specified as 1 in., Double Standard as 2½ in.*

Alternate: All steam piping shall be insulated with 4-ply Improved Asbestocel.

Note: *This alternate may be used where it is necessary to consider initial cost but must not be used on piping carrying steam over 300° F.*

(21) Steam Pipe Insulation—Indoors

Temperature 600° to 800° F.

All steam pipes, 600° to 800° F., shall be insulated with Superex-85% Magnesia Combination Insulation according to the following table:

Condition	Temperature range	Thickness: Pipes larger than 4 in.	Thickness: Pipes 2 in. to 4 in.	Thickness: Pipes smaller than 2 in.
Superheat	600° to 699° F.	3½ in.	3 in.	2 in. (see Note A)
Superheat	700° to 800° F.	4 in.	3½ in.	2 in. (see Note A)

Note A: *On pipes smaller than 2 in., the entire insulation shall consist of one layer of Superex. On pipes 2 in. and*

Continued on next page

larger, the insulation shall consist of an inner layer of Superex, approximately *1½ in. thick, and an outer layer of 85% Magnesia, either 1½ in. or 2 in. thick, to make up the total thickness as specified.*

Note B: *Asbesto-Sponge Felted Insulation may be specified for the above service where extra mechanical strength is desired. In this case, for temperatures up to 700° F., Asbesto-Sponge Felted Insulation shall be specified for the entire total thickness; and for temperatures, 700° to 800° F., Asbesto-Sponge Felted Insulation shall be specified only for the outer layer, in place of the 85% Magnesia Insulation.*

(22) Heating Returns and Radiator Branch Insulation

All heating returns, runouts and concealed radiator branches shall be insulated with 3-ply Improved Asbestocel.

(23) Fittings and Valve Insulation

All fittings smaller than 4 in. shall be insulated with hard finish Asbestos Cement to a thickness equal to that of the adjacent insulation. All bodies of fittings and valves, 4 in. and larger, shall be insulated with block insulation of the same material and to a total thickness equal to the adjacent pipe insulation.

(24) Flange Insulation

(A) Permanent Type—All flanges shall be insulated with block insulation of the same material and to the same total thickness as adjacent pipe insulation, extending over the adjacent pipe insulation at least 2 in. The space between the flange insulation and the pipe insulation shall be filled with Asbestos Cement.

All flanges on piping smaller than 4 in. shall be insulated with hard finish Asbestos Cement to the same thickness as the adjacent pipe insulation.

(B) Removable and Replaceable Type—All flanges shall be insulated with block insulation, removable and replaceable, and Contractor shall submit sample to the *(state to whom—Architect or Consulting Engineer)* for approval. The flange insulation shall be of the same total thickness as the adjacent pipe insulation, extending over the adjacent pipe insulation at least 2 in. The space between the flange insulation and the pipe insulation shall be filled with Asbestos Cement.

(25) Overhead Outdoor Insulation

All hot piping, or surfaces, located outdoors and above ground, shall be insulated with the same materials as specified for indoor lines, or surfaces, but shall be ½ in. greater in thickness.

Insulation on piping shall be protected from the weather by means of a Double-coated Flexstone Weatherproof Jacket. Insulation on fittings and surfaces other than piping shall be weatherproofed by the application of ¼-in. thick Insulkote applied over ¼-in. thick Asbestos Cement.

Note: *Asbesto-Sponge Felted Insulation with an Integral Weatherproof Jacket may be used for the above service where extra mechanical strength of the insulation is necessary. The thickness specified should be the same as would be required for 85% Magnesia under the same conditions.*

(26) Underground Pipe Insulation Within Building

All underground steam and hot water lines within buildings, such as unexcavated spaces or pipe trenches, shall be insulated with Asbesto-Sponge Felted Insulation with Integral Waterproof Jacket to a thickness not less than that specified for the same line in the building.

(27) Underground Pipe Insulation Outdoors

All steam and hot water lines running underground outside of building shall be installed in Johns-Manville System of Underground Insulation in strict accordance with manufacturers' specifications.

Alternate: All underground heating pipes to garages, etc., shall be insulated with 1½-in. thick Asbesto-Sponge Felted Pipe Insulation with Integral Weatherproof Jacket, wired on, and sealed with lap cement. The insulation shall be further waterproofed by a Double-coated Flexstone Weatherproof Jacket wired on. The pipe shall be surrounded with enough broken stone to provide proper drainage.

Note: *This alternate is designed for small dwellings where short runs of steam or hot water piping go to a service building.*

(28) Cold Water Service Pipe Insulation

All cold water service piping shall be insulated with 1-in. thick double-layer Anti-Sweat Insulation applied with all joints broken. Fittings and valves and flanges in this piping shall be insulated with hair felt and hard finish Asbestos Cement to a total thickness of 1 in.

Note: *The foregoing specification should be used where the finest type of insulation and waterproofing is desired.*

Alternate: All cold water service piping shall be insulated with 1-in. thick waterproof felt-lined double-layer Wool Felt Pipe Insulation applied with all joints broken. Fittings and valves and flanges in this piping are to be insulated with hair felt and hard finish Asbestos Cement to a total thickness of 1 in.

Note: *This alternate may be used where first cost is an important factor. Double-layer Wool Felt, however, does not have the waterproofing properties of Anti-Sweat. It should not be used under conditions of high humidity.*

Alternate: All cold water service piping shall be insulated with 1-in. thick waterproof felt-lined Wool Felt Pipe Insulation. Fittings and valves and flanges in this piping are to be insulated with hair felt and hard finish Asbestos Cement to a total thickness of 1 in.

Note: *This alternate is designed for small dwellings, or where cost does not permit the use of a better type of insulation.*

SHORT FORM SPECIFICATIONS
FOR FURNISHING AND APPLYING JOHNS-MANVILLE INSULATIONS
Plumbing and Refrigeration Section

General Paragraphs

(Where applicable, the specification writer shall copy the general paragraphs. The general paragraphs shall be followed by the specifications relating to the specific equipment to be insulated.)

(29) Materials and Workmanship

All insulating materials shall be those furnished by Johns-Manville and all work executed under this contract shall be performed by them or their approved contractor, in strict accordance with their Detailed Specifications.

(30) Application

All block and sheet insulation, unless otherwise noted, shall be finished hard and smooth with ½-in. thick hard finish Asbestos Cement reinforced with hexagonal mesh galvanized wire.

(31) Canvas

All insulation on pipes (except cork), valves and flanges, located indoors and exposed to view (or in tunnels or accessible pipe chambers) shall be finished as follows:

Piping and screw fittings *(state weight—usually 4, 6 or 8 oz.)* ounce canvas sewed on over resin-sized paper.

Flanges, flanged fittings and valves *(state weight—usually 4, 6 or 8 oz.)* ounce canvas pasted on.

(32) Painting

All insulation which has been re-canvased shall be painted with one coat of glue sizing and two coats of first quality lead and oil paint of color selected. This work shall be done by *(state whether to be done by "this contractor" or if "as specified under" state where specified).*

(33) Fireproof Reinforced Asbestos Jacket

All insulation on piping in main pipe shaft or other locations indicated on plans, where a combustible finished insulation would constitute a fire hazard, shall be finished with a Fireproof Reinforced Asbestos Jacket.

Continued on next page

Equipment Specifications

(The specification writer shall copy from these specifications the ones pertaining to the particular equipment to be insulated.) See also foregoing general paragraphs.

(34) Hot Water Heater and Storage Tank Insulation

The hot water heaters and storage tanks shall be insulated with 1½-in. thick 85% Magnesia Block Insulation.

Note: *This specification should be used where highest type of insulation is desired.*

Alternate: The hot water heaters and storage tanks shall be insulated with Asbestos Insulating Cement to a total thickness of 1 in., applied in two coats, reinforced with 2-in. hexagonal mesh galvanized wire and finished hard and smooth.

Note: *The above alternate is designed for small dwellings and for the general run of fuel such as coal, oil, natural gas, etc. However, where manufactured gas is used as a fuel, this alternate should not be used.*

(35) Domestic Hot Water Range Boiler Insulation

The hot water range boiler shall be insulated with Johns Manville *(state type, see Note).*

Range Boiler Cover—The Range Boiler Cover shall be applied in a neat and workmanlike manner with all joints butted and tightly laced.

Note: *Where hot water is heated by a coal-fired heater or an ordinary intermittent gas heater, "Keystone" type should be specified. Where water is heated by a gas heater controlled by a thermostat, "1-ply Economy" type should be specified. Where water is heated by electricity, "2-ply Economy" type should be specified.*

(36) Hot Water Pipe Insulation

All hot water piping shall be insulated with Standard Thick 85% Magnesia Pipe Insulation. All fittings shall be insulated with hard finish Asbestos Cement to a thickness equal to the adjacent pipe insulation.

Note: *This specification should be used where highest type of insulation is required.*

Alternate: All hot water piping shall be insulated with 4-ply Improved Asbestocel Pipe Insulation. All fittings shall be insulated with hard finish Asbestos Cement to a thickness equal to the adjacent pipe insulation.

Note: *This alternate may be used where it is necessary to consider initial cost.*

Alternate: All hot water piping shall be insulated with 3-ply Improved Asbestocel Pipe Insulation. All fittings shall be insulated with hard finish Asbestos Cement to a thickness equal

Note: *This alternate is designed for a small dwelling and for the general run of fuels such as coal, oil, natural gas, etc. However, where manufactured gas is used as the fuel, this alternate should not be used.*

(37) Cold Water Pipe Insulation

All cold water piping shall be insulated with 1 in. thick double-layer Anti-Sweat Insulation applied with all joints broken. Fittings and valves in this piping are to be insulated with hair felt and hard finish Asbestos Cement to a total thickness of 1 in.

Note: *This specification should be used where the highest type of insulation and waterproofing is desired.*

Alternate: All cold water piping shall be insulated with 1 in. thick waterproof felt-lined double-layer Wool Felt Pipe Insulation applied with all joints broken. Fittings and valves in this piping are to be insulated with hair felt and hard finish Asbestos Cement to a total thickness of 1 in.

Note: *This alternate may be used where first cost is an important factor. Double-layer Wool Felt, however, does not have the waterproofing properties of Anti-Sweat. It should not be used under conditions of high humidity.*

Alternate: All cold water piping shall be insulated with 1 in. thick waterproof felt-lined Wool Felt Insulation. Fittings and valves in this piping shall be insulated with hair felt and hard finish Asbestos Cement to a total thickness of 1 in.

Note: *This alternate is designed for small dwellings or where cost does not permit the use of a better type of insulation.*

(38) Iced or Drinking Water Pipe Insulation

All piping carrying cooled drinking water shall be insulated with Ice Water Thickness Cork Insulation of 1½-in. thick double-layer Anti-Sweat applied with all joints broken. Fittings and valves on pipes insulated with Anti-Sweat shall be insulated with hair felt and waterproof membrane to a total thickness equal to the adjacent pipe insulation. If Cork Insulation is used, fittings and valves shall be insulated with Rubbercork to a thickness ½ in. greater than the adjacent pipe insulation.

(39) Insulation of Cold Pipes Exposed to Freezing

Wherever cold water, soil, or waste pipes are exposed to freezing and is so designated on the plans, they shall be insulated with three (or more) layers of Built-up Hair Felt Insulation. Fittings and valves shall be insulated in the same manner as the adjacent piping. (Recommendations may be obtained upon request.)

Note: *Where pipes are in exposed locations and likely to be subjected to freezing, care should be taken to indicate these locations upon the plans.*

(40) Insulation for Pipes Carrying Liquids or Gases at Low Temperatures

All pipes carrying brine, ammonia or other liquids or gases at low temperatures, shall be insulated with Cork or Built-up Brine and Ammonia Insulation according to the following table:

Temperature range	Thickness	
	Cork	Built-up brine and ammonia
24° to 15° F.	Brine	2-layer
14° to 0° F.	Brine	3-layer
Minus 1° to minus 10° F.	Heavy brine	3-layer
Minus 11° to minus 20° F.	Heavy brine	4-layer

On cork insulated pipes, the fittings, valves and flanges shall be insulated with Moulded Cork Insulation to a thickness equal to that of the adjacent pipe insulation. On pipes covered with Built-up Brine and Ammonia Insulation, the fittnigs, valves and flanges shall be insulated in the same manner as the adjacent piping.

(41) Cylindrical Tank Lagging for Cold Liquids

All cylindrical tanks such as Brine Coolers, Accumulators, Cold Water Storage Tanks, etc., shall be lagged with J-M Rock Cork, cemented to the tank with hot asphaltic cement and finished with plastic asphalt.

Thicknesses shall be according to the following table:

Temperature range	Thickness
15° to 24° F.	12 in.
25° to 39° F.	10 in.
40° to 50° F.	6 in.
Above 50° F.	3 in.

(42) Cold Room and Equipment Insulation

All floors, walls and ceiling areas in cold rooms, and all surfaces of cold equipment, shall be insulated with J-M Rock Cork applied in one or more layers, breaking all joints. Thicknesses shall be according to the following table:

Temperature range	Thickness	Number of layers
Minus 25° to minus 16° F.	8 in.	2 or 3
Minus 15° to minus 1° F.	7 in.	2 or 3
0° to plus 14° F.	6 in.	2 or 3
15° to 24° F.	5 in.	2
25° to 39° F.	4 in.	2
40° to 50° F.	3 in.	1
Above 50° F.	2 in.	1

Note: *Where the deal load on the insulation is excessive, consult nearest Johns-Manville office for detailed specifications.*

Alternate: All types of construction and equipment requiring a loose filler type of insulation, shall be insulated with J-M Granulated Rock Cork, packed to a density of 14 lb. per cu. ft. Thicknesses shall be according to the following table:

Temperature range	Thickness
15° to 24° F.	12 in.
25° to 39° F.	10 in.
40° to 50° F.	6 in.
Above 50° F.	3 in.

Note: *Provision for proper waterproofing should always be made in the application of this material.*

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Products

PIPE COVERING and BLOCKS:

"Featherweight" 85% Magnesia Sectional Covering and Blocks; Ambler High Temperature Covering and Blocks; Ambler Asbestos Air Cell Covering for low pressure steam.

AMBLER ASBESTOS INSULATING and FINISHING CEMENTS.

Ambler Asbestos Air Cell Board.
Ambler Asbestos Paper.
Ambler Asbestos Corrugated Paper.

Textiles:

Ambler Asbestos Clothing; Ambler Asbestos Selvage Edge Tape; Ambler Asbestos Braided Sleeving or Tubing.

PACKINGS and GASKETS:

Ambler Asbestos Wick Packings; Ambler Asbestos Twisted Rope Packing; Ambler Asbestos Braided Packing; Ambler Asbestos Valve Stem Packing; Ambler Asbestos Ring Packing; Ambler Asbestos Air Pump Packing; Ambler Asbestos Gaskets; Ambler Woven Asbestos Sheet Packing; "Amblerite" Asbestos Compressed Sheet Packing.

Also Asbestos Millboard, Sound Absorbing Plaster, Theater Curtains, and all other asbestos products.

Contract Work

Ambler is equipped through its various branches to supply and install on contract basis a complete insulation job.

Company's Source of Asbestos

As KEASBEY & MATTISON COMPANY controls its source of crude asbestos, owning the Bell Asbestos Mines at Thetford Mines, P. Q., Canada, one of the world's most productive mines of high grade Chrysotile Asbestos, this company is assured of a constant supply of long-fibred asbestos so necessary in making a thoroughly efficient insulation.

K & M "Featherweight" 85% Magnesia Sectional Coverings and Blocks

KEASBEY & MATTISON COMPANY were the originators of 85% Magnesia Covering, so called because it is composed of about 85% basic carbonate of magnesia and 15% of asbestos fibre. The magnesia is bound together with the long-fibred asbestos, giving it the necessary structural strength. K & M "Featherweight" 85% Magnesia is very light in weight, fireproof and extremely durable. It will not injure piping and has a very high insulation value. Impartial expert engineering tests showing its superiority will gladly be sent upon request.

K & M "Featherweight" 85% Magnesia Sectional Coverings are canvas-jacketed and 36 in. long per section. They are made in all standard and double standard thicknesses, 1½ in. thick, 2 in. thick and 3-in. broken joint construction, and also in combination with Ambler High Temperature Insulation.

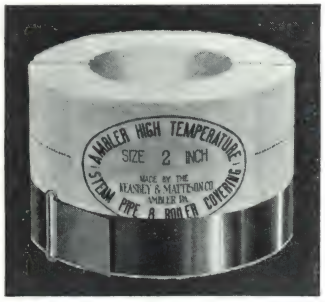
K & M "Featherweight" 85% Magnesia is also made in sectional blocks for coverng steam radiators, boilers and similar hot surfaces. Blocks are easy to apply and remove, and are very effective in saving heat by preventing radiation from all heated surfaces. Thicknesses range from ½ to 3 in.

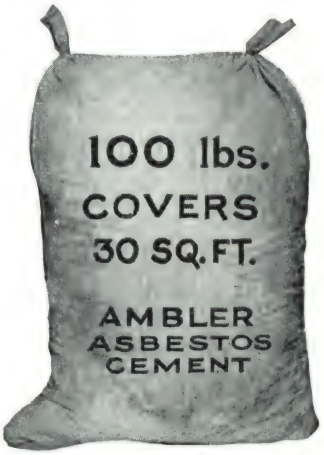
85% Magnesia is also available as a cement in plastic form for troweling. Furnished in bags of 60 lb. each. Coverage, approximately 40 sq. ft., 1 in. thick.

Ambler High Temperature Sectional Covering and Blocks

Recommended for temperatures in excess of 700° F.

These coverings have a high insulating value and will withstand temperatures up to 1400° F. Furnished in same moulded shapes and thicknesses as 85% Magnesia Coverings and Blocks.





Ambler High Temperature Insulating Cement

Has a covering capacity of 35 sq. ft. 1 in. thick per bag. Furnished in 100-lb. bags.

Ambler Asbestos Cement

For use on low pressure boilers and other heating equipment. Composed of a finely divided insulating material with an asbestos fibre binder. Surpassed only by 85% Magnesia Cement.

Catalogues

Ambler has just prepared separate catalogues on its heat insulation and textile products, the latter including packings and gaskets demanded for various types of engineering practice. Copies of either will be sent to any engineer requesting them.

ESTABLISHED 1910

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Underground Conduit Systems for Heating Pipes

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Products

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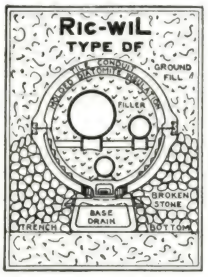


Ric-wiL Interlocking Conduit

Ric-wiL Conduit is first quality, standard weight, vitrified salt glazed tile of the bell and spigot type.

It is shipped on the job in full round sections and split into top and bottom halves as used. When installed, bell and special Loc-liP side joints are sealed with portland cement. Loc-liP joint (see illustrations below) is shaped so that cement locks top and bottom halves permanently together in all directions, giving conduit extraordinary rigidity and strength. Leakage is practically impossible. Top and bottom halves are interchangeable (foolproof) and numbered in pairs so that companion pieces may be kept together.

Sections are all in 2-ft. lengths, sizes from 4 to 24-in. inside diameter. Every sixth section of conduit has an opening in the bottom half through which a pipe support of the roller type projects to carry the steam, hot water or oil pipes, thus making the pipe supports independent of the conduit itself, a desirable feature for this class of work.

Ric-wiL Interlocking Base Drain Foundation

Ric-wiL Base Drain Foundation is first quality vitrified salt glazed tile of such design that it is both a base for supporting and lining up the conduit and drain for carrying away any water which might otherwise accumulate around the conduit. The base drain foundation also provides two points of support for conduit, adding 35% to the ground load which the conduit will carry safely, as compared to the same conduit placed on flat ground or broken stone. The top of the base drain foundation has a slot in it into which the bell of conduit fits, making sections of conduit and base drain stagger with each other so that a strong interlocking construction results.

No concrete foundation is necessary in solid ground. Free drainage area of the base drain is large and ample for every practical condition. Three sizes are made: No. 1 for 4 and 6-in. conduit, No. 2 for 8 to 15-in. conduit, inclusive, and No. 3 for larger sizes. We will furnish ordinary drain tile instead of base drain, if desired, but the base drain foundation will save more than its extra cost in labor, and makes a far better job.

Cast Iron Ric-wiL Conduit

For extra heavy duty under railroads or where conduit is subject to very heavy loads, Ric-wiL is made of cast iron. Has Loc-liP Joint and "interlox" with tile Ric-wil—made for all 4 types described in next column. A special heavy duty tile base drain or a cast iron base drain is provided for use with Ric-wil Cast Iron Conduit.

4 Insulations to Meet All Conditions

Ric-wiL Conduit for underground pipe is of four types to meet varying service requirements.

Type F System—For steam heating and power pipes and for superheated steam. A conduit that assures super-efficiency when insulated with Dry-paC (description below), or Ric-wiL No. 1 Filler, packed around pipes in closed construction.

Type SPC System—For steam heating and power pipes and for superheated steam. Insulation is applied to pipes direct and consists of any standard make of sectional pipe covering, the kind and thickness depending upon the service to be rendered. Double drainage is provided in this type.

Type DA System—For hot water, oil transmission and condensation returns. Tile and insulation in one, the latter moulded inside the tile and keyed in. Consists of a diatomaceous earth (Sil-O-Cel) mixture, light in weight and of high insulating quality; will not deteriorate. This type insulates the pipes from surrounding ground but not from each other, making it specially adapted to carry oil and steam pipes together for oil transmission. Exceptionally easy to install.

Type DF System—For steam heating and power pipes and for superheated steam. This is Type DA with the addition of Ric-wiL Asbestos Conduit Filler to be packed around the pipes at a density specified by the manufacturer. The filler is a good non-conductor which will not corrode the pipes nor shrink. Dry-paC (description below) can be furnished when specified.

Dry-paC Waterproof Conduit Filler

An absolutely waterproof, insulating filler, permanently impervious to water.

Of unusually high efficiency and great natural strength, it will not slump down away from pipes and is non-corrosive.

Sample of Dry-paC will gladly be sent for testing.

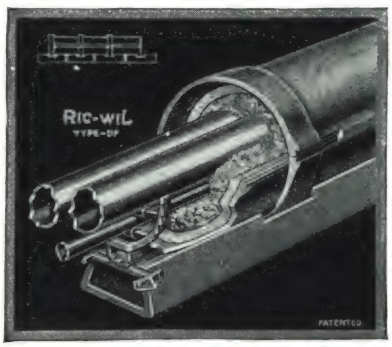
Ric-wiL Pipe Supports

The pipe supports are planned to carry from one to five or more pipes and are ordinarily spaced 12 ft. apart. They are strong, made of cast iron, rustproofed, and interlock with the base drain foundation, imposing no load on the conduit itself. Once in place, no movement of the pipes can disturb them. Ric-wiL pedestal pipe supports also furnished when specified, to set in concrete for carrying extra large pipes.

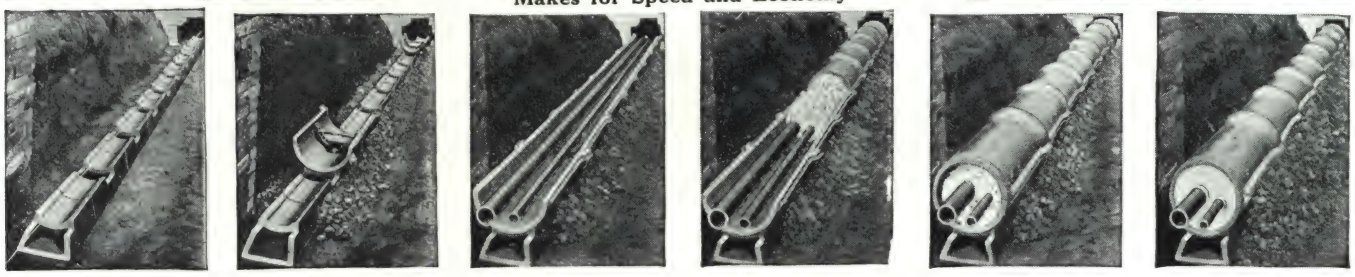
Engineering Service

Preliminary studies and reports; assistance with plans and layouts; complete service details and installation instructions; installation supervision where desired or complete contracts, by Ric-wiL Construction Department.

Catalogues, test reports and other information promptly on request.



Ric-wiL Conduit System Installation Step by Step Showing How Sound Engineering Makes for Speed and Economy



HEAT DISTRIBUTION AND VENTILATION

Adams Brothers Mfg. Co., Inc. D5288
Aerofin Corp. D5353
Airmaster Corp. D5719
Air-Way Electric Appliance Corp. D5298–5299
American Air Filter Co., Inc. D5751
American Blower Corp. D5720
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American Metal Products Corp. D5376–5377
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Bame, H. A. D5290
Barber-Colman Co. D5711
Bayley Blower Co. D5721
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Bomar Mfg. Co. D5375
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Cincinnati Victor Co. D5723
Clow, James B., & Sons D5292–5293
Crown Metal Products Co., Inc. D5378
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Gowing, D. H. D5294
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  Heating Specialties D5531–5552
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  Pipe Hangers D5389–5436
  Unit Heaters D5311–5352
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Hart & Hutchinson Co. D5354–5355
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Ilg Electric Ventilating Co. D5730
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Independent Register & Mfg. Co. D5787
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Johnson Service Co. D5712–5713
Johnson, W. H., & Son Co. D5380–5381
Knowles Mushroom Ventilator Co. D5802
Knowles Pipe Sleeve Co. D5388
Little Giant Mfg. Co. D5374
Marsh, Jas. P., & Co. D5601–5690
McAlear Mfg. Co. D5600
McQuay Radiator Corp. D5358–5359
Metalace Corp. D5788–5791
Minneapolis-Honeywell Regulator Co. D5714
Modine Mfg. Co. D5360–5361
Mueller, L. J., Furnace Co.—
  Air Conditioners D5739
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Nesbitt, John J., Inc.—
  Concealed Radiators D5362–5363
  Unit Heaters D5302–5305
Newman Mfg. Co. D5798–5801
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Penn Electric Switch Co. D5715
Powers Regulator Co. D5716–5717
Pryne & Co., Inc. D5732
Radiant Steel Products Co. D5382–5383
Raymond, F. I., Co. D5718
Reznor Mfg. Co. D5295
Rome Brass Radiator Corp. D5369–5371
Sarco Co., Inc. D5691
Schleicher, Inc. D5384–5385
Shepler, F. W., Stove Co. D5296
Skinner Bros. Mfg. Co., Inc. D5306–5307
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Tallmadge, Webster, & Co., Inc. D5693
Trane Co. D5372
Tuttle & Bailey Mfg. Co.—
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Watts Regulator Co. D5694
Webster, Warren, & Co. D5695–5710
Westinghouse Electric & Mfg. Co.—
  Air Heaters D5297
  Fans D5738
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Wilcolator Co. D5748–5749
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Zephyr Washed Air Co. D5750

ESTABLISHED 1898

ADAMS BROTHERS MFG. CO., INC.

Manufacturers of Adams Cheerful Heating Appliances

1500 W. North Avenue, PITTSBURGH, PA.

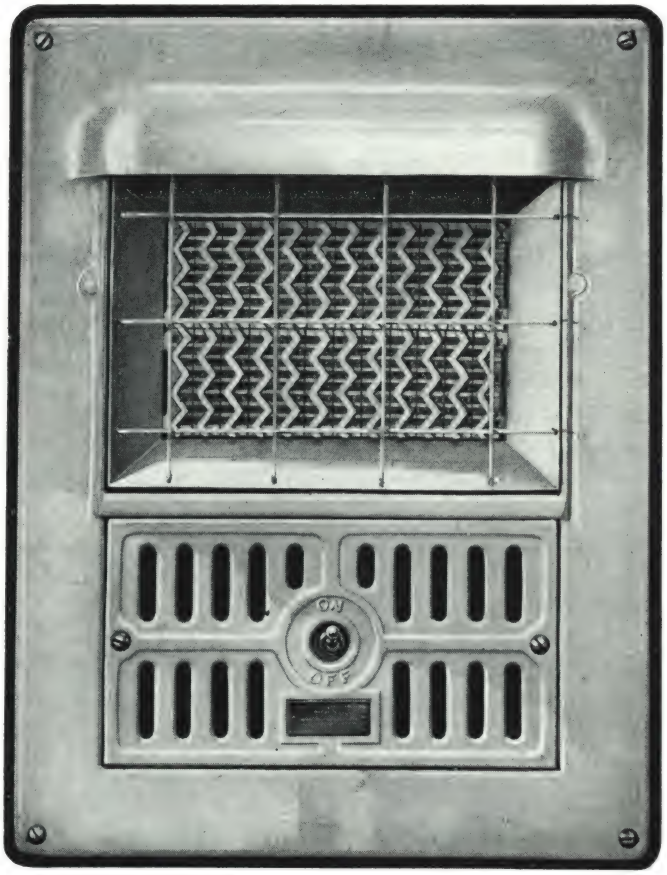
Products

ADAMS CHEERFUL RADIANT HEATERS; ADAMS CHEERFUL BUILT-IN FIREPLACE GRATES; ADAMS CHEERFUL WALL TYPE GAS HEATERS; ADAMS CHEERFUL ELECTRIC WALL TYPE HEATERS.

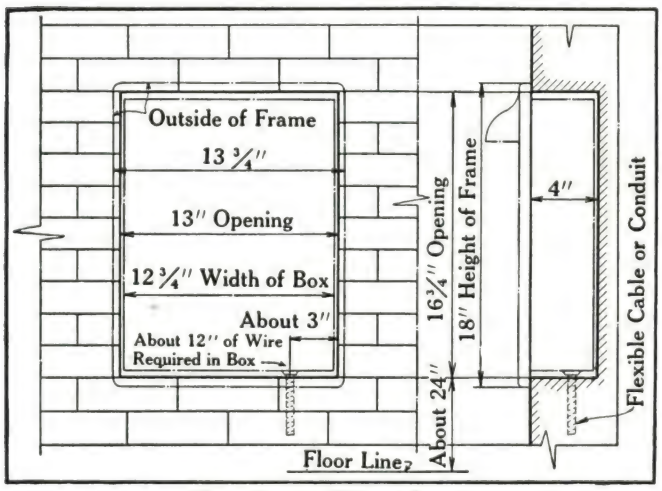
Adams CHEERFUL Radiant Heaters

GAS RADIANT HEATERS, designed for use with manufactured or natural gas. Seventeen styles in 5, 7, 10, 12 and 14 Radiant sizes.

ELECTRIC WALL HEATERS are one size. Several finishes. Catalogue on request.



Approved by National Board of Fire Underwriters File No. E6403



Roughing-in Dimensions

Description of Adams Cheerful Electric Heater

The Adams Cheerful Electric Heater is a practical, durable and highly efficient, built-in appliance for occasional auxiliary heat in bathrooms, bedrooms, or any room where occasional extra heat is desired. It combines the convenience and comfort of instantaneous *cheerful* heat with safety and cleanliness. Because of its short periods of use, the cost of operation is only a few cents a day.

The *cheerful* radiant heat obtained instantly at the flip of a switch adds much to the attractiveness and comfort of a room.

Capacity is 1300 watts for 110-120 volt service. Heater sets flush with tile. Element, unit and switch are easily accessible and removable from the front of the heater without removing the frame. Element of coiled, highest quality resistance wire is uniformly supported in grooves of patented design of high refractory porcelain and will not sag or break, due to expansion, contraction and unsupported weight of wire. Element does not lose its efficiency with use.

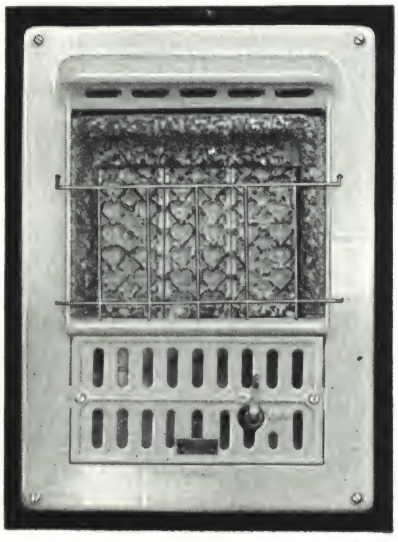
Water splashed on the heater will not affect its operation.

Standard Finishes—Vitreous porcelain enamel in white, black, gray-green, horizon blue, orchid, canary, autumn brown and old ivory. Electroplated in two-tone brass or bronze.

Specifications for Electric Heaters

Contractor to furnish and install Adams Cheerful Electric Wall Heaters No. 13 (1300 watts, 110-120 volts) finished in (*specify color*) as manufactured by ADAMS BROTHERS MFG. CO., INC., Pittsburgh, Pa.

Heaters to be installed in accordance with manufacturer's printed instructions.



Gas Radiant Heaters

Gas wall heaters No. 5D are furnished in the same finishes.

Send for catalogue giving detailed information on complete line of built-in fireplace and room heaters.

AUTOMATIC GAS-STEAM RADIATOR CO.

Manufacturers of "Pittsburgh Automatic" Gas-Steam Radiators and Industrial Gas Unit Heaters

301 Brushton Avenue, PITTSBURGH, PA.

REPRESENTATIVES IN PRINCIPAL CITIES

"Pittsburgh Automatic" Gas-steam Radiators

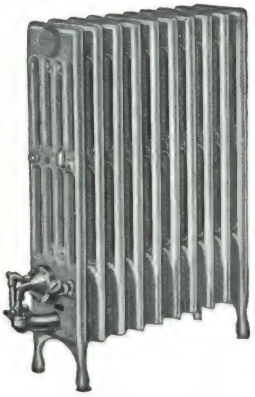
Steam heat—no boiler, no waste, no labor.

Our patented automatic steam pressure regulator insures a steam pressure between 2 and 6 lb. at all times. This regulator has proved itself over a period of years to function properly at all times. The service calls on "Automatics" are negligible.

Our New Vented Filling Cup is another patented feature found only on "Automatics." It enables the radiator to be filled quicker and does not require a funnel or other apparatus for this operation.

"Automatics" are approved by the American Gas Association and listed as standard by the National Board of Fire Underwriters.

Vented Type

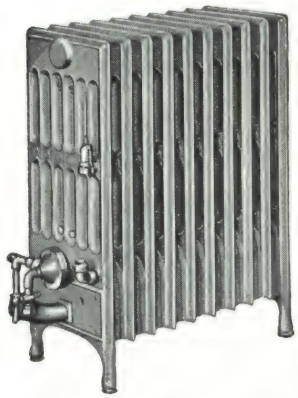


Unvented Type

The "Pittsburgh Automatic" consists of a cast iron radiator of standard appearance. Steam is generated separately in each radiator by gas (automatically controlled) making each radiator a complete low-cost steam heating plant.

It allows as much heat as wanted, whenever wanted. Houses and apartments, offices or stores, churches or schools may have a radiator for each room in the usual way, but the "Pittsburgh Automatic" can be operated separately. Individual requirements, to the maximum or minimum of heat may be supplied day and night.

Maximum Heat with Minimum Gas Consumption—Construction gives maximum heat with minimum gas consumption. Directly beneath the radiating surface is a water chamber into which a small quantity of water is poured through a filling cup. This is sufficient for from 2 to 4 weeks' operation. Just below the water in the radiator is a gas burner of the improved Bunsen type. This burner is so designed that it will give a blue sootless flame that will not vitiate the air or cause odors. It takes only a few minutes for this burner to generate 5 lbs. of steam in the radiator, at which time the "Automatic" regulator (through which the gas must pass) reduces the gas supply to maintain the amount of heat required.



Seven-tube Unvented
32 inches high

Absolute Safety—"Automatic" radiators are tested to a cold water pressure of 100 lb. to the square inch before leaving the factory. As an additional factor of safety, each steam radiator is equipped with a safety valve to automatically release any pressure higher than 20 lb. No part of the system can become overheated either through accident or carelessness.

Used in Combination with Boiler Plant—"Automatic" radiators can be connected with central plant or boiler supplying regular steam radiators and operated in the usual way. When boiler is not fired the "Automatic" can be used separately under its own steam generated within the radiator. This combination makes a very flexible system and can be used in mild weather before boiler is started.

"Pittsburgh Automatic" Sizes—The complete line of "Automatic" Gas-steam Radiators consists of four different heights, in any length to suit conditions.

The Vented Type is manufactured in 26-in. and 38-in. high radiators.

The Unvented Type is manufactured in 22 in., 26 in. and 38 in. in the five-tube design and 32 in. high in the seven-tube radiators.

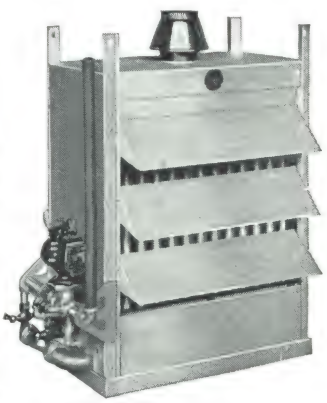
Pittsburgh Industrial Gas Unit Heater

Designed for ceiling suspension for use in buildings of large cubical content and high ceilings—especially recomended for factories, garages, stores, etc.

Capacity 100,000 B.t.u. per hour or equivalent to about 400 ft. direct cast iron radiation.

An automatic electric gas valve shuts off the gas when the fan is not running, thus the unit cannot become overheated. Thermostatic control can be attached.

Important—When ordering be sure to specify voltage and current desired. Standard equipment is 110 volts, alternating current, 60 cycles.



Gas Unit Heater

MAGICOAL AND MAGICLOG ELECTRIC FIRES

H. A. BAME
(MAGICOAL ELECTRIC FIRE CO.)

TELEPHONE
CALEDONIA 1613, 1614

OFFICES AND SHOWROOMS
Architects' Building, 101 Park Avenue
NEW YORK, N. Y.

Products

MAGICOAL and MAGICLOG ELECTRIC FIRES with and without Heater—manufactured by Berry's Electric, Ltd.

BAME PORTABLE FIREPLACES, MANTELS and HEARTHS, furnished complete with fireplace interior facing and hearths.

Wrought Iron Andirons, Fireplace Accessories, Antique Brass Goods.

MAGICOAL
MAGICLOG

REGISTERED NAMES AND TRADE-MARKS
U. S. Patent Office, H. H. Berry
World Patents

The Magicoal Electric Fire

Magicoal is the original electric fire. The coals used are not just pieces of colored glass, but specially prepared material representing coal in the various stages of combustion. At the turn of a switch the coals appear to glow and flicker—so closely does Magicoal resemble a bright, flaming coal fire that it is extremely difficult to detect the difference.

Designs, Sizes, etc.—The grates are reproductions of period designs, manufactured in various finishes, sizes and styles to harmonize with mantels of any design or period.

Models without Heater—The fire effect is produced by illuminators (specially constructed lamps), 40 watts each; the number varying from 2 to 5, according to size of grate required.

Operates on the ordinary lighting circuit at a negligible operating cost.

Models with Fireback Heater—Magicoal equipped with heat gives instantaneous radiant heat.

The Fireback Heater is built on lines of extreme efficiency, heat being reflected in the form of parallel radiation directed fan-shaped out into the room where it is most desired.

The cost of operation depends on the wattage required and the cost of electricity per kilowatt hour in any given locality.

Note: It is impossible to calculate accurately the heat required for a given room, as so many arbitrary factors and varying conditions must be taken into consideration. A good rule to follow is to allow approximately 1 watt per cubic foot of air space. It is always better to provide a little more heat than normally necessary, as it can be lowered readily when not required.

Heating Units—The Fireback Heater can be equipped with any single or double combination of the following units: 600, 1000, 1500 watts; in either 110 or 220 volts a-c. or d-c.

Wiring—Under 1000 watts, the ordinary lighting circuit may be utilized; but from 1000 to 3000 watts, it is necessary to run a special power line from the meter to an outlet in the fireplace.

Outlets—In order to avoid visible wires, outlets should preferably be placed in center of rear fireplace wall, about 4 in. from base.

Switches—Switches are provided on grates, which enables the use of the fire effect with or without the heat. Heat can be increased or reduced as desired.

Depth of Fireplace—If Magicoal with Fireback Heater is required, the depth of the fireplace should be 16 in.; without heater 10 in.

Distinctive Features—No flues required; practical; convenient; requires no service.

Easy to install in any fireplace.

Saves the enormous cost of building real fireplaces that are hardly ever used to burn logs, due to the resulting dirt, dust, smoke and ruined draperies.

Magiclog Electric Fire

A remarkably realistic reproduction of a log fire complete with a glowing, flickering flame effect.

With or without heat.

Suitable to fit any fireplace opening from 24 in. up.

Depth of fireplace should be at least 12 in.

When ordering state width of fireplace opening.

Bame Portable Fireplaces, Mantels and Hearths

The Bame Portable Fireplace Mantel and Hearth satisfies the desire for a fireplace where:

(1) A permanent fireplace is not feasible, due to construction difficulties or the expense and trouble of installation and redecoration.

(2) It is desired to remove the frigid bareness in a bedroom, den, dining room or elsewhere in a home, yet the expense or absence of a chimney flue makes the building of a permanent one impossible.

Colonial Mantel with Magicoal and Andirons

(3) One would not care to install a permanent fireplace which could not be removed, as in a rented house or apartment.

Bame Fireplaces are quality built, using the best materials and the finest workmanship.

Installation—Like a piano, radio or other piece of furniture the Bame Portable Fireplace, Mantel and Hearth can be installed instantly and as quickly removed. No chimney or flue is required; no alteration in the walls or redecorating.

Just set the fireplace in position, connect the Magicoal Electric Fire to the nearest base plug or light socket, turn a switch and a brightly burning, flickering coal fire is instantly alight.

Styles—Can be supplied to harmonize with any room setting or style of furniture. They are finished in natural woods or to exactly resemble marble or stone. Particularly adapted for use with Magicoal Electric Fires without heating element.

Literature

Booklets covering complete line of portable fireplace and Magicoal or Magiclog Fires will be gladly furnished on request.

A Few Recent Outstanding Installations

Mayflower Hotel, Washington, D. C.; Roosevelt Hotel, Ritz Carlton Hotel, Plaza Hotel, Park Lane Hotel, Arkwright Club, Engineers' Club, Art & Metal Club and Savoy-Plaza, New York, N. Y.

S. S. Leviathan, Carmania, Lancastria, Olympic, Aquitania, Celtic, Homeric, H. F. Alexander; President Pierce, Presidents Taft, Jackson, Cleveland, Grant and Jefferson.

Magicoal is well represented in the majority of better homes and apartments, theatres, executive offices, board rooms and yachts.

EDISON GENERAL ELECTRIC APPLIANCE CO., INC.

5600 West Taylor Street, CHICAGO, ILL.

For Branches and Factory Service Stations, see our pages on Commercial Cooking Equipment

Products

HOTPOINT BUILT-IN and PORTABLE ELECTRIC HEATERS. Architect's hand book on request.

Also manufacturers of Hotpoint Electric Household Appliances.

For Edison Electric Commercial Cooking and Baking Equipment, Hotpoint Electric Water Heaters and Electric Ranges see Manufacturers' Index.

A GENERAL ELECTRIC ORGANIZATION

Hotpoint

Distinctive Features

Hotpoint Room Heaters are made in two distinct types—Radiant and Convection—each of which has a definite field of use. The convection heater is used in places where with steam or hot water heating, radiators are used. For continuous heating the convection heater is paramount; for intermittent heating of small rooms, such as bathrooms, or for cool days during the off heating season, radiant heaters are desirable and give instant heat.

(1) **Cleanliness**—Definite deflection of heated air away from the wall, and low intensity radiation no dust is burned nor is dust or soot deposited on walls.

(2) **Low Intensity Radiation**—Quicker and more uniform room heating results from reduction of the "chimney effect" which the ordinary radiator produces. Due to re-circulation the floor is comfortably warmed and less heat is lost to cold walls.

(3) **Definitely Controlled Heat**—Tumbler switches furnished on A35, A38, and A39 heaters give one, two, and three heats, thus giving great flexibility. A direct acting thermostat—TC150—can be furnished to provide automatic, thermostatic control under any conditions.

Types

A35 Wall Type Convection Heater—For permanent location and connection to provide continuous heat. Finished in statuary bronze and decorated with cast brass trimmings. For other information see A38.

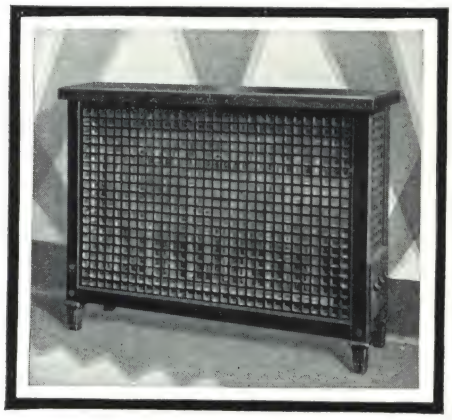
A-38 Portable Room Heater—Each heater provided with 6 ft. of heater cord. Since these heaters take from 2000 to 5000 watts they *cannot be connected to lighting circuits*—we recommend standard 30-ampere heavy duty plug and receptacle. A location directly under a window will permit the heated air to rise from the heater and mix with the colder air column always prevalent at this location and prevent drafts. Standard finish—baked brown mahogany enamel with gold stripe outlining top. Special two-tone finishes (tan-red) (green-red) (blue-gold) are available. Also furnished with brackets for wall mounting.

A-39 Built-in Bathroom Heater—Tested and listed as standard by National Board of Fire Underwriters to be permanently built-in. Furnished with wall box to fit into 4-in. partition walls of standard construction. Recommended location about knee high, preferably, so that space directly in front of heater is clear of obstructions or doors. Where possible, locate under windows for reasons explained under Type A-38. Switches self-contained.

Standard finish—white, green or orchid vitreous enamel.

A-43 Portable Radiant Heater—For home, apartment or office use. May be used in a fireplace, or is light enough to be moved anywhere. Finished in statuary bronze and rich brown enamel in two-tone effect. Has two tumbler switches and safety switch.

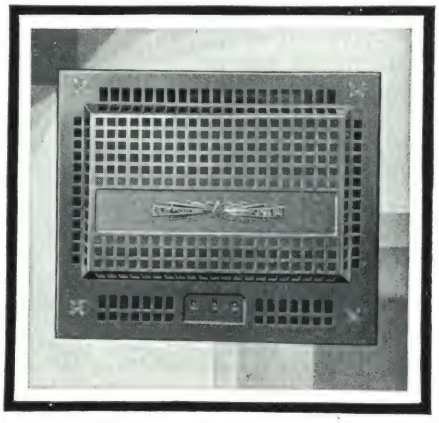
These heaters solve the apartment problem of varying temperatures to suit tenant needs.



Type A-38

Type A-43

Cat. No.	Length, in.	Height, in.	Depth, in.	Watts	Voltage
122 A43	15⅝	19¼	10	2000	115-230
123 A43	19⅝	19¼	10	3000	115-230



Type A-35

Cat. No.	Watts	Voltages	*Wall box dimensions, in.
332 A35	2000	115,230	18½ long
333 A35	3000	115,230	25½ long
334 A35	4000	115,230	32½ long
335 A35	5000	115,230	39½ long
336 A35	6000	115,230	45½ long

*Height in each case 20⅝ in. Depth 3¾ in.

Note: Wall boxes and units with covers will be boxed and shipped separately, permitting the builder and contractor to order and install the equipment as required.

Short Method for Estimating Heater Sizes

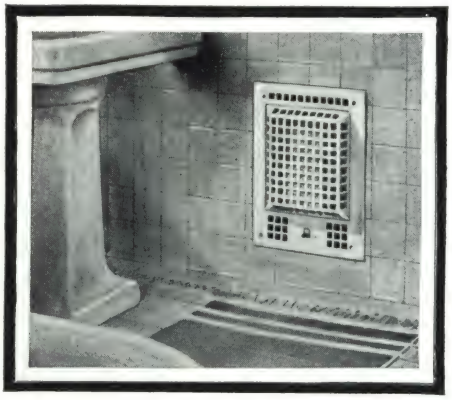
The data given below may be used to roughly estimate the heater capacity required. The values are based on average residence construction with 70° F. inside and zero outside temperatures. Approx. 30° F. rise per hr. may be expected.

(1) Interior rooms with little or no outside exposure—0.75 to 1.25 watts per cubic foot.

(2) Average rooms with moderate window and door space, and not having extreme exposure to prevailing winds—1.25 to 1.75 watts per cubic foot.

(3) Rooms with severe exposure or very great window area—2.0 to 4.0 watts per cubic foot.

(4) Isolated rooms, such as cabins, watch houses and similarly exposed buildings—3.0 to 6.0 watts per cubic foot.



Type A-39

Cat. No.	Wide, in.	High, in.	Watts	Voltage
211 A39	15	19¼	1200	115-230
212 A39	19	19¼	2000	115-230

TYPE A-38—SIZES

Cat. No. with legs	Length, in.	Height, in.	Width, in.	Voltage
232 A38	20½	22¼	9¾	2000
233 A38	27¼	22¼	9¾	3000
235 A38	41⅛	22¼	9¾	5000

115-230 volts. 235 A38 230 volts only.

JAMES B. CLOW & SONS

Manufacturers of Gasteam Radiators

209 North Talman Avenue

CHICAGO, ILL.

SALES OFFICES

NEW YORK	SAN FRANCISCO	ST. LOUIS	MILWAUKEE	KANSAS CITY
BOSTON	BALTIMORE	COLUMBUS	HUNTINGTON	BIRMINGHAM
PHILADELPHIA	BUFFALO	LOUISVILLE	CHARLESTON	NEW ORLEANS
HOUSTON	PITTSBURGH	LEXINGTON	JACKSONVILLE	SHREVEPORT
TULSA	DALLAS	SAN ANTONIO	FORT WORTH	OKLAHOMA CITY
MINNEAPOLIS	LITTLE ROCK	TOLEDO	DETROIT	CHICAGO
		LOS ANGELES		

WORKS

BIRMINGHAM, ALA. CHICAGO, ILL. COSHOCTON, OHIO NEWCOMERSTOWN, OHIO

Products

CLOW GASTEAM RADIATORS.

CLOW "VENTUM" OVAL STACK PIPE and FITTINGS.

Catalogues

(Sent free upon request.)

Clow Gasteam Heating Systems.

Installation and Adjustment of Clow Gasteam Radiators.

Clow Gasteam Radiators

Have a record of nearly thirty years of satisfactory service.

Are approved by the American Gas Association, the National Board of Fire Underwriters' Laboratories, and by health departments throughout the United States.

Are manufactured by a concern with a record of more than fifty years of business life.

Are sold from coast to coast through Clow distributing companies and through local gas companies in nearly every city in the United States.

Are satisfactorily furnishing steam heat to thousands of residences, apartment buildings, schools, stores, hospitals, offices, factories, warehouses, churches, theatres, and public buildings.

The Seal of Distinction

This Seal is a guarantee that this appliance conforms to high standards of safety, efficiency and durability established by specialists of the U. S. Bureau of Mines, U.S. Public Health Service, U. S. Bureau of Standards and the American Gas Association

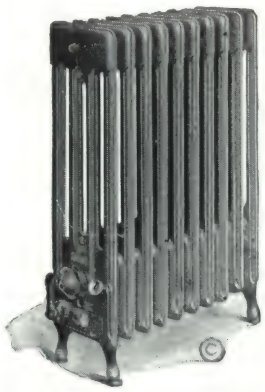
Description—Clow Gasteam Radiators are complete or auxiliary heating systems using gas for fuel and delivering steam heat. No central heating plant or steam piping is necessary. *No basement is required for their installation.* Each radiator is a complete steam plant within itself, and operates independently from all other radiators. Each radiator burns its own fuel and generates its own steam heat. Thus, only those radiators need be operated in the rooms where heat is required.

Construction—Clow Gasteam Radiators are made of cast iron. In appearance they are much like ordinary steam radiators. The sections are so designed that the upper part forms a steam radiating surface of 3, 4, and 6 columns. Directly beneath the radiating surface is a water chamber made to hold a body of water 1 in. deep. The water chamber need not be refilled more often than once in two or three weeks when the radiator is in use. Water is supplied through a filling cup at the end of the radiator.

A cast iron combustion chamber encloses the gas burner. The combustion chamber is directly beneath the water and is an integral part of each radiator section.

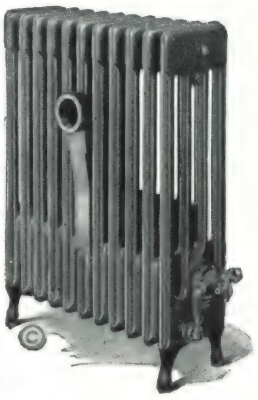
Each radiator is equipped with a steam pressure regulator, water filling cup, air vent valve and safety valve. All sections and other parts are metal, making a permanent and practically indestructible appliance.

Automatic Steam Pressure Regulation—When heat is required the gas is lighted. Steam is raised in a very few minutes. The steam pressure regulator automatically controls the size of the gas flame so that a steam pressure of between five and eight pounds is uniformly maintained as long as the radiator is in operation.



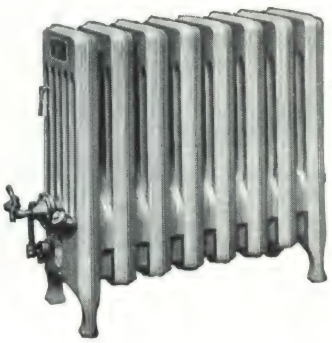
COLONIAL FOUR-COLUMN GASTEAM RADIATOR

Height, in.	Number of sections	Equivalent in sq. ft. steam radiation	Price
38	4	32	$ 46.00
38	6	48	60.00
38	8	64	72.00
38	10	80	84.00
38	12	96	96.00
38	15	120	115.00
26	4	20	40.00
26	6	30	49.00
26	8	40	58.00
26	10	50	67.00
26	12	60	76.00
26	15	75	93.00
22	4	12	38.00
22	6	18	47.00
22	8	24	56.00
22	10	30	65.00
22	12	36	74.00
22	15	45	86.00



COLONIAL GASTEAM RADIATOR WITH VENT

Height, in.	Number of sections	Equivalent in sq. ft. steam radiation	Price
38	5	28	$ 56.00
38	7	39	69.00
38	9	50	82.00
38	11	61	95.00
38	13	72	108.00
38	15	83	121.00
38	20	110	153.50
38	25	137	186.00
26	5	15	50.00
26	7	21	59.00
26	9	27	69.00
26	11	33	79.00
26	13	39	89.00
26	15	45	97.00
26	20	60	120.50
26	25	75	144.00

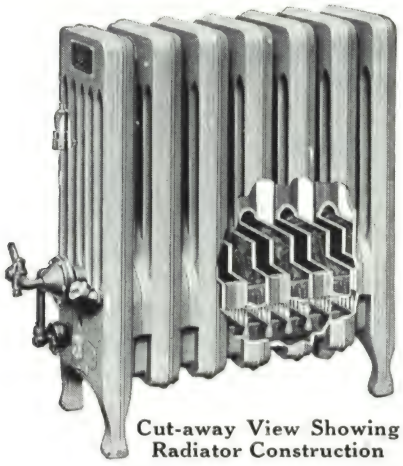


GOTHIC SIX-COLUMN GASTEAM RADIATOR

Height, in.	Number of sections	Equivalent in sq. ft. steam radiation	Price
26	2	10	$35.00
26	3	13¾	41.50
26	4	17½	48.00
26	5	21¼	54.50
26	6	25	61.00
26	7	28¾	67.50
26	8	32½	74.00
26	9	36¼	80.50
26	10	40	87.00
22	2	17	33.00
22	3	23	39.00
22	4	30	45.00
22	5	37	51.00
22	6	44	57.00
22	7	50	63.00
22	8	57	69.00
22	9	63	75.00
22	10	70	81.00

Continued on next page

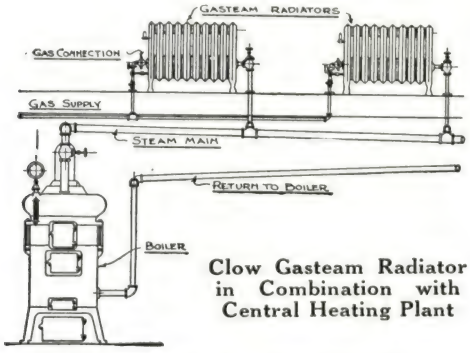
Different Types for Varying Requirements—***Use of Unvented Gasteam Radiation***—Unvented Clow Gasteam Radiators give the most healthful kind of heat in dry climates. Proper humidity (moisture in the air) is essential to health and is a part of proper heating. When gas burns, water vapor is given off, and with Unvented Gasteam Radiators this moisture



Cut-away View Showing Radiator Construction

is delivered directly into the air. Thus, Clow Unvented Gasteam Radiators assure comfortable and healthful heat with maximum economy.

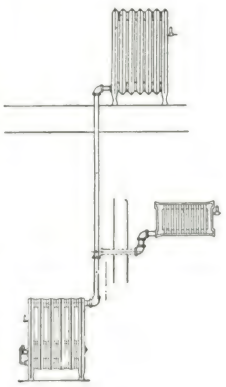
Use of Vented Gasteam Radiators—The Clow Vented Gasteam Radiators should be installed in damp or cold climates. When the air already contains the proper amount of humidity, additional moisture is not desirable. Furthermore, when air is cold, it cannot absorb much moisture. Under either of these conditions it is preferable to eliminate water vapor produced by the burning of gas. This is best accomplished by using Vented Radiators. With this type of radiator the moisture produced is carried to the outside by vent connection. This vent may be connected to a convenient chimney, or to a stack constructed in the wall. Generally it is not necessary to vent all the radiators in an installation. The air will always absorb some moisture when it is heated.



Clow Gasteam Radiator in Combination with Central Heating Plant

Two Heating Systems in One—***Gasteam, in Combination with Central Plants***—Clow Gasteam Radiators may be installed in place of ordinary radiators in a central steam heating system. To be installed in this way they may be used as ordinary steam radiators, or may be operated entirely independently of the central system. Closing the steam valve and lighting the gas at the radiator permits the heating of any room or part of the building. This avoids the necessity of operating the entire heating plant, especially in the fall and spring when heat is required only in parts of the building.

Gasteam Connected to Ordinary Radiators—In small rooms, such as bathrooms, small offices and closets where it is desirable to use wall radiation, steam may be supplied from a Clow Gasteam Radiator in an adjoining room. Thus connected a Clow Gasteam Radiator will supply heat to two rooms, and valuable floor space is saved in this way.



Gasteam Connected to Ordinary Radiators

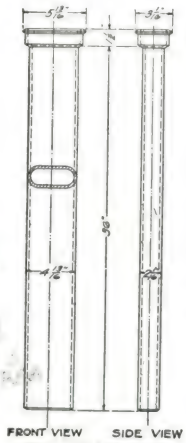
"Ventum" Oval Stack Pipe and Fittings

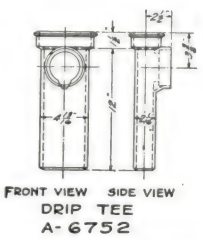
To be concealed in 2x4-in. stud wall.

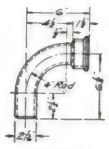
Designed primarily for use with the Clow Vented Gasteam Radiator but have become quite popular for many other uses. As the name indicates, both the pipe and fittings are oval in shape, making it possible to conceal the vent stack in a 2x4-in. stud wall without cutting the lath. The capacity is somewhat greater than the ordinary 3-inch soil pipe and can be connected up with such pipe by means of our A-6762 Oval to Round fitting.

Our catalogue Clow Gasteam Vented Heating Systems shows complete details on installing proper vents for gas burning appliances.

The wide variation in requirements of building codes in cities throughout the country makes it advisable to consult local requirements in building vent stacks.



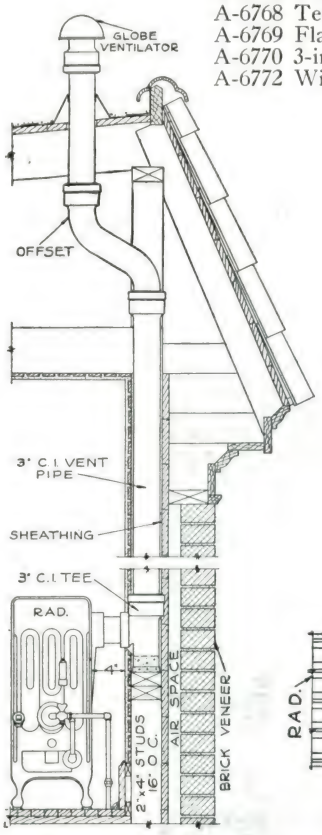




Installation of "Ventum" Oval Stacks

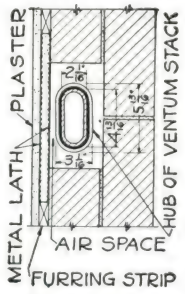
Other "Ventum" Oval Fittings

A-6750 Ventum pipe
A-6752 Drip tee
A-6754 Vent collar
A-6755 Vent bushing
A-6756 Vent cap
A-6758 90° ell
A-6760 45° ell
A-6762 Oval to round connection
A-6764 Oval offset
A-6765 Tee, side outlet only
A-6766 Tee, front and right-side outlet
A-6768 Tee, front and left-side outlet
A-6769 Flat 90° ell
A-6770 3-in. round offset damper
A-6772 Without damper



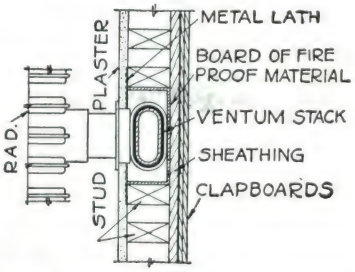
Section of Wall and Roof at Stack

Connection of radiator to stack, drip tee, and method of going through roof



Plan of Brick Wall

Installation of "Ventum" Stack and double thickness of metal lath and plaster



Plan of "Ventum" Stack in Frame, Brick-veneer or Stucco-frame Construction

D. H. GOWING

Electric Wall Heaters

15 Harwood Street
ROCHESTER, N. Y.

"Ideal" Electric Heaters

The "Ideal" circulates the heat. It furnishes instant heat. There are no hot spots, no cold corners. It will not burn out like ordinary types of heaters. The first cost provides for years of satisfactory service.

It has been listed by the Underwriters' Laboratories, Inc. It consumes a minimum amount of electric current, yet does the work of higher priced heaters. It is 100% efficient.

Ideal
TRADE-MARK

Type B "Ideal" Bathroom Heater

Easy to Install

It is only necessary to fit it into place and connect it to a number 16 wire line, single circuit. Fasten it with screws that come with the heater, and from then on, it is at your service whenever needed.

Type B—size over all: width 14⅛ in.; height 15 in.; depth 3½ in.; width between screw centers 12¾ in.; height between screw centers 13⅝ in.

Features

The *new* heating element is *exclusive* to the "Ideal," using only 990 watts; the "Ideal" construction proves an efficiency of outstanding merit in the electrical field.

Six vertical elements, scientifically mounted, generate uniform heat flow, accentuated by a new type of reflector which *throws* the heat from 4 to 6 ft. into the room. This is made possible by ample air circulation between the heating elements and the reflector.

Finishes

The "Ideal" electric heater is regularly finished in white or ivory. It also can be finished to match as close as practical any color submitted; or in chrome nickel, bright polish or pewter finish.

Specification Suggestion

We recommend that the bathroom heater specification be placed through the tile contractor in order to assure correct matching of color.

Type A "Ideal" Heater

Tile Fronts for Type B

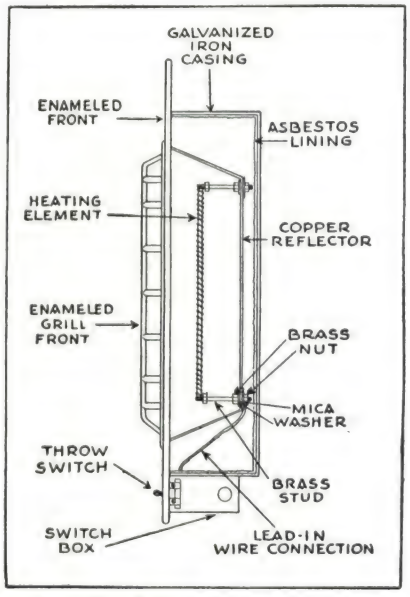
The "Ideal" electric heater can be furnished with tile fronts made by the following:

S. A. Weller Co., Zanesville, Ohio
A. E. Hull Pottery Co., Crooksville, Ohio
Flint Faience & Tile Co., Flint, Mich.

Type A Heater

For mother's or wife's dressing room; for an enclosed porch or for heating the motor or radiator while the car is in the garage—or any other place where *safe, sure, dependable heat is desired,* this moderate priced heater will answer every need.

Size over all: width 17½ in.; height 16$\frac{11}{16}$ in.; width between screw centers 15½ in.; height between screw centers 14½ in. Will fit standard wall studding.



Details of the "Ideal" Heaters

REZNOR MANUFACTURING CO.

Manufacturers of Gas Fired Unit Heaters, Scientifically Designed to Meet Every Heating Requirement

MERCER, PA., U. S. A.

Products

REZNOR ORNAMENTAL GAS FIRED FORCED AIR HEATING and VENTILATING UNITS. TYPE 1-UR.

REZNOR GAS FIRED MULTIUNIT FORCED AIR HEATERS for factory and general large space application: TYPE V.

Also Reznor Orthoray Ornamental Radiant Type Fireplace Heaters for the home; Reznor Circulating Heaters; Reznor Garage Heaters for private garage; Reznor Wall Heaters for bathrooms, etc.; Reznor Portable Luminous, Asbestos-back and Radiant Type Heaters.

Reznor Gas Fired Warm Air Heating and Ventilating Unit

Type 1-UR, is a high grade scientifically developed appliance for stores, halls, auditoriums, lodgerooms, clubs, hotels, depots, offices, schools, churches, theaters, post offices, telephone exchanges, etc.

1-UR Data—A.G.A. rated input 60,000 B.t.u. per hour. Delivered capacity 50,000 per hour. Air circulated 40,000 cu. ft. per hour. Height, 58½ in.; width, 36 in.; depth, 15 in. Distance from wall to front of heater 23½ in. Flue in middle of back. Chimney hole not less than 61½ in. above floor. 4-in. flue outlet. Gas supply, ¾ in. Fan, 83 watts, 110 volts, 60 cycles. Weight, 750 lbs.

Patents pending.

Application—This heater is installed in the room or space heated—one or more being installed as required. In design it appears like a piece of cabinet furniture and does not impose itself as a heater, stove or furnace. In design and finish it is consistent with any surroundings. In new or old buildings, in expansions, in places without basement, on upper floors, in groups of rooms—to furnish entire heat or to keep a central plant down except in severe weather—this heater is installed at minimum cost, quickly and without building changes.

Construction—Base and legs cast iron, supporting cast iron combustion chamber and heating surfaces in one casting without joints, and with large total area effectively arranged. Cast iron burner and mixer tube. No sheet metal in combustion elements. Casing, double wall electrically welded steel. Motor, heavy duty induction type, dustproof, no brushes, large bearings and oilwells. Fan, 12-blade aluminum propeller type, remarkably quiet. Control, mercoid thermostat and electric gas valve mounted on heater. All connecting wiring in rigid metal conduit on back of heater.

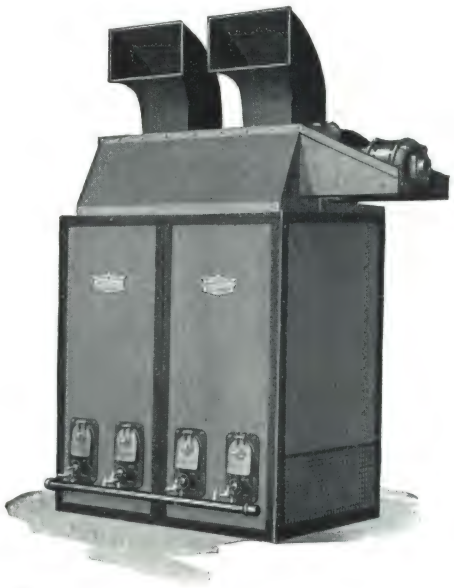
Operation—Entirely automatic without complication, governed by room temperature. Burner and fan turn on and off simultaneously.

Performance—An exceptionally high degree of dependability, permanency, complete distribution of warmth, absence of hot zone near heater and over-all efficiency.

Finish—Maroon Egyptian lacquer with bronze trim.

Reznor Type V Heaters

Multiunit gas fired heaters up to 400,000 B.t.u. delivery. Forced or natural circulation, flexibly meeting any requirement. Automatic control. Complete literature on Reznor Heaters on request.



F. W. SHEPLER STOVE CO.

Manufacturers of Gas and Electric Heaters

1308-1310 Sheffield Street, PITTSBURGH, PA.

Products

RADIA WALL INSERT ELECTRIC HEATERS.

RADIA FIREPLACE ELECTRIC LOGS.

RADIA GAS HEATERS.

Also Radia Portable Electric Heaters, Radia Reflector Gas Heaters, Radia Garage Gas Heaters and Fireplace Equipment.

RADIA Gas and Electric HEATERS

Capacities Recommended for Auxiliary Heating

660-watt heaters for rooms up to 400 cu. ft.

1000-watt heaters for rooms of 400 to 750 cu. ft.

1500-watt heaters for rooms of 750 to 1200 cu. ft.

1980-watt heaters for rooms up to 1700 cu. ft.

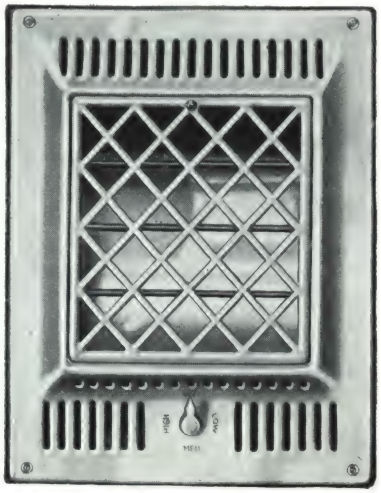
The latter capacity is found only in our No. 1350 series, having the three-heat feature, which makes it practical for any size room. Turned on full, this heater will quickly bring a room to the desired temperature, which can then be maintained by turning the switch to a point requiring less current consumption.

Wall Insert Type (Series 1000)

The heater that made the Radia reputation. Adapted to the finest bathrooms. Wall opening required: 14x14x3½ in. Face plate: H—15½ in., W—16½ in.

Cat. No.	Watts	Volts, a-c. or d-c.	Price
660	660	110	$17.50
1000	1000	110	21.00
1020	1000	220	21.00
1500	1500	110	23.00
1520	1500	220	23.00

Price in colors $2.50 extra.
Write for color chart.



Wall Insert Type (Series 1350)

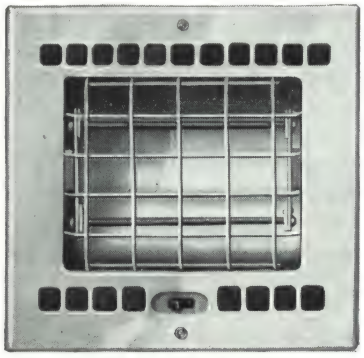
3-Heat

Low 660-watts; Medium 1320-watts; High 1980-watts

A beautiful heater. Current consumption can be regulated to produce practically any desired temperature. Wall opening required: 13½x19x3½ in. Face plate: H—21 in., W—15½ in.

Cat. No.	Watts	Volts, a-c. or d-c.	Price
1350	1980	110	$35.00
1352	1980	220	35.00

Price in colors $4.00 extra.
Write for color chart.



Wall Insert Type (Series 1100)

Compact size. Supplies building trade demand for a low priced electric heater for use in competitive developments, and where wall space is limited. Wall opening required: 11½x11½x2½ in. Face plate: H—13½ in., W—13½ in.

Cat. No.	Watts	Volts, a-c. or d-c.	Price
1110	660	110	$12.50
1112	660	220	15.00
1120	1000	110	15.00
1122	1000	220	15.00

Price in colors $1.50 extra.
Write for color chart.

Portable Wall Type

For Surface Mounting

Ideal for use in the marine field, elevators, offices, homes, etc. where it is not practical or desirable to use the wall insert type. Attaches permanently to wall or suspends on hook. Finished in genuine vitreous enamel. Fully guaranteed. Size: 13 in. wide, 14 in. high, 3 in. deep.

Cat. No.	Watts	Volts a-c. or d-c.	Price
1210	660	110	$17.50
1212	660	220	20.00
1220	1000	110	20.00
1222	1000	220	20.00

In colors $2.00 extra.
Write for color chart.

Radia Fireplace Electric Log

A practical and ornamental "log" fireplace unit. Closely resembles natural hewn oak. Two flame colored bulbs together with two mechanical fans, mounted within the log, provide the illusion of a cozy log fire. Andirons and artificial ash-slab, part of the regular equipment, supply the finishing touch. Globar heating element, either 660 watts or 1000 watts.

Complete catalogue upon request.

A Few Prominent and Typical Installations of "Radia" Heaters

Co-Operative Apartment, 960 Fifth Avenue, New York, N. Y.—Warren & Wetmore, Rosario Candela, Associate Architects; Anthony Campagna, Builder—6 to 11 Radia Heaters in each suite.

S. S. "Pennsylvania," Panama Pacific Liner—World's largest electric-propelled vessel; Newport News Shipbuilding & Dry Dock Co., Builders—Over 300 Radia Heaters used in staterooms and bathrooms.

Ward Liners—"Morro Castle" and "Oriente"—also equipped with Radia Heaters.

Flatbush Centre Development, Brooklyn, N. Y.—Realty Associates, Inc., Builders—2700 residences with a Radia Heater in the bathroom of each.

Shaker Heights, Cleveland, Ohio—Over 200 Radia Heaters used to date by Clarence Mack, Keyes & Treuhaft Co., Raymond D. Hummer, Nelson D. Cann and Walter Smith.

Beverly-Wilshire Apartments, Los Angeles, Calif.—80 Radia Electric Logs used in fireplaces.

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

WESTINGHOUSE ELECTRIC SOLAR GLOW HEATERS

With the increasing demand of prospective builders for the latest refinements and conveniences in their homes, it devolves upon the architect to advise his clients on the installation of electrical devices.

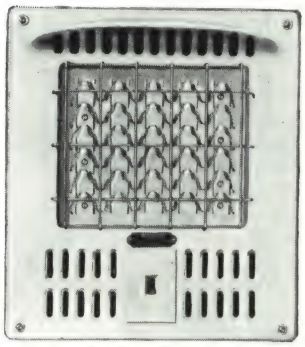
The cleanliness, safety and efficiency of electric heat particularly adapt it to the modern home as is evidenced by the number of electric room heaters now in use and giving satisfactory service. Electric heat is absolutely clean and safe; it heats without producing soot, fumes or gases and does not take any oxygen from the air. The air it heats is simply changed from cold air to warm air without any change in its chemical state. The construction of electric heaters makes them easily adapted for installation in any room or any type of building.

Solar Glow—Bathroom Type

The most ideal application of electric air heating is in the bathroom, where an auxiliary heater is desired that will combine the characteristics of both the radiant type and the convection type, throwing a beam of heat out from the element as soon as it is turned on and at the same time starting convection currents that gradually bring the whole room to a comfortable temperature. Westinghouse Solar Glow does this.

The Solar Glow is designed not to subject parts in contact with wood, plaster or studding to more than 194° F., which is 400° below the point where ignition is possible. A vent forces the hot air away from the wall, preventing damage to tile or plaster.

When home builders desire a heater done in color to match a colored tile in bathroom, Westinghouse makes arrangements to have the Solar Glow supplied with a tiled front to match any tiling.

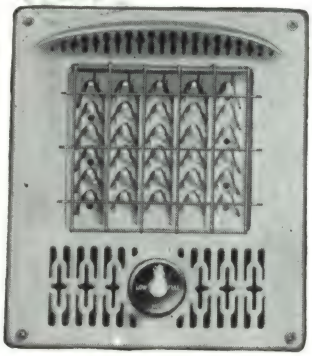


Single White Enamel, 1-Heat

Total Maximum Input: 1200 watts.
Heat Control: Single heat.
Over-all Dimensions. 15 in. wide, 17½ in. high, 4⅛ in. deep.

COMPLETE HEATERS
(Style Numbers)

395759	110 volts
395760	220 volts



Single White Enamel, 3-Heat

Total Maximum Input: 1500 or 1750 watts.
Over-all Dimensions: 15 in. wide, 17½ in. high, 4⅛ in. deep.

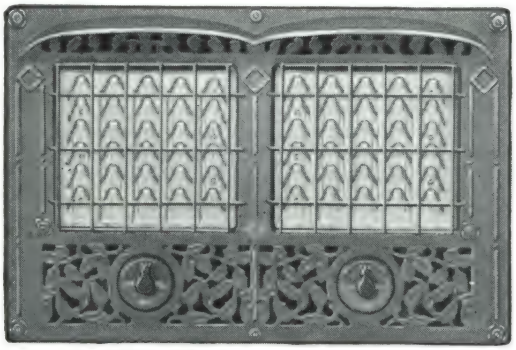
HEATER UNIT WITH SWITCH
(Style Numbers)

Wattage	110 volt	220 volt
1500	470820	470821
1750	470822	470823

Sheet metal wall box.....497480
Frame complete.....497483

Solar Glow—Other Types

The Westinghouse Solar Glow line includes, in addition to the bathroom and floor types, styles designed for the bed and living rooms, finished in antique bronze and carrying a decorative leaf design. The construction, except the front casting, is the same as the bathroom types; the box and heating unit can be used interchangeably with either type of heater. The hot air currents set up by the passage of air through the grates and over the back of the heating unit carry the heat to all parts of the room and thus raise the average temperature. In addition, radiant heat is thrown directly to the front from the porcelain brick.



Double Bronze, 3-Heat

Total Maximum Input: 3000 or 3500 watts.
Heat Control: 3-heat switch on each unit.
Over-all Dimensions: 26¼ in. wide, 17½ in. high, 4⅛ in. deep.

	Number req.	Wattage	Style Nos. 110 volt	Style Nos. 220 volt
Heater unit complete.....	2	1500	470820	470821
Heater unit complete.....	2	1750	470822	470823
Sheet metal wall box.....	.....	.....	.....	497481
Frame	.....	.....	.....	497486

The Solar Glow can be controlled from a switch any distance from the heater.

Westinghouse also makes a floor type Solar Glow for fireplaces or for use where the installation of wall type is not desired.

Installation

For the convenience of contractors, Solar Glows are made in three units, the sheet metal box, the porcelain brick, element and switch, and the front frame casting. Each of these units is packed in a separate box so that it can be handled individually as it is needed.

Similarly, the method of installing the Solar Glow eliminates the danger of injuring or damaging the porcelain brick and heating element, and keeps the front frame from being defaced in the course of building construction. At the time the rough work is being done, the sheet-metal box is inserted in an opening in the wall, this opening being regulated by the dimensions of the heater. At this time, the wiring is pulled into the box. Then, when fixtures and other electrical equipment are being installed, the heater unit can be slipped into place, the connections made, and the frame screwed to the wall box. Complete instructions for installing are provided with each heater.

CALCULATING HEATER CAPACITIES FOR BATHROOMS

In estimating heater capacity from table below a comfortable inside temperature is usually about 75° F.

Size of bathroom, cu. ft.	Location of bathroom	Watts req. at difference in deg. F. between inside and outside temperature when other heating system is going on cold winter days: 10° F.	35° F.	60° F.	90° F.
400	Protected	1200	1200	1200	1200
	Not protected	1200	1200	1200	1500
700	Protected	1200	1200	1200	1500
	Not protected	1200	1200	1200	1750
1000	Protected	1200	1200	1500	3000
	Not protected	1200	1200	1750	3500

If a bathroom has more than one side exposed to outside temperature it is considered as being "not protected."

Example:

Size of bathroom	700 cu. ft.
Location of bathroom	Not protected
Temperature desired in bathroom	75° F.
Average low outside temperature	15° F.
Difference in degrees	60° F
Capacity of heater required	1200 watts

AIR-WAY ELECTRIC APPLIANCE CORPORATION

Manufacturers of Air-Way Heating Systems—Electric, Steam and Hot Water

2101 Auburn Avenue, TOLEDO, OHIO

BRANCH OFFICES

ALBANY, N. Y., 887 Myrtle Ave.
ATLANTA, GA., 152 Nassau St.
BALTIMORE, MD., 215 Hearst Tower Bldg.
BIRMINGHAM, ALA., 8010 First Ave.
BOSTON, MASS., 45 Bromfield St.
BUTTE, MONT., 951 Caledonia St.
CANTON, OHIO, 1302 Fulton Rd. N. W.
CHARLOTTE, N. C., 304 Builders Bldg.
CHATTANOOGA, TENN., Volunteer Bldg.
CHICAGO, ILL., 500 No. Dearborn St.
CINCINNATI, OHIO, 919 Provident Bank
CLEVELAND, OHIO, 2341 Carnegie Ave.
COLUMBUS, OHIO, 539 Huntington Bank
DAYTON, OHIO, 1211 U. B. Bldg.
DETROIT, MICH., 405 Curtis Bldg.
ERIE, PA., 507 Cherry St.
JACKSONVILLE, FLA., 662 College St.
LOS ANGELES, 210 No. Los Angeles St.
LYNCHBURG, VA., J. E. Cleland Co.
MAMARONECK, N. Y., 13 W. Boston Post Road
MILWAUKEE, WIS., 610 Michigan Ave.
MONTGOMERY, ALA., 208 Sheperd Bldg.
MONTREAL, QUE., Keefer Bldg.
NEW ROCHELLE, N. Y., 16 Risley Place
NEW YORK, N. Y., 101 Park Ave.
PITTSBURGH, PA., 4 Smithfield St.
PROVIDENCE, R. I., Box 124
ST. LOUIS, MO., 3636 Arsenal St.
SAN DIEGO, CAL., Ray Wakerman
SAN FRANCISCO, CAL., 61 Fremont St.
SEATTLE, WASH., 326 Columbia St.
SYRACUSE, N. Y., 168 Lincoln Ave.
TOLEDO, OHIO, 2101 Auburn Ave.
TORONTO, ONT., 510 King St.
VANCOUVER, B. C., 1220 Vancouver Block

THE AIR-WAY AERIET

Description

This is a new development in the heating of fine homes, offices, apartments and small areas. Available for either *steam, vapor, hot water,* or *electricity.* Built into each unit is a quiet operating small motor and fan assembly—employing the same principle of mechanical air circulation utilized in Air-Way Unit Heaters.

The unit is concealed in the wall. The accompanying illustration shows all the essential details. Any usual wall treatment may be used.

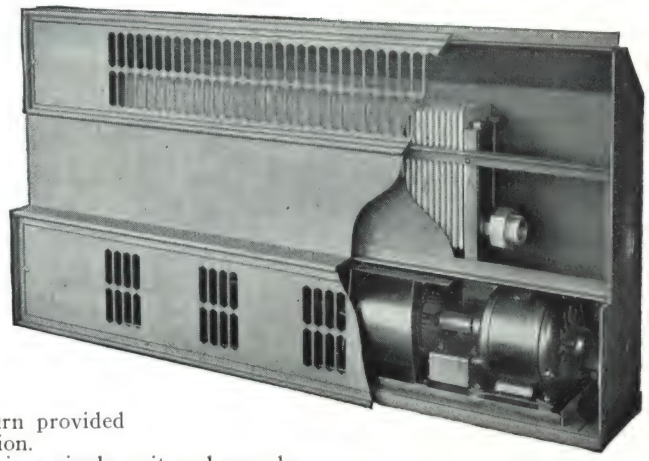
Construction

The Aeriet consists of a sheet metal cabinet, the heating element, the motor and fan assembly, switches and the outlet and inlet grilles.

Cabinets are 18-gauge sheet metal, with 16-gauge end plates, painted with a special heat-proof paint. The heating element for steam, vapor and hot water is of the cast-fin type. It is integrally cast of silicon aluminum. There are no welds, gaskets, joints, flanges, brazed or soldered connections to leak. The heating element is secured to brackets on the cabinet by U-bolts.

Supply unions are ¾-in. return provided with cooling leg for ½-in. connection.

The fan and motor assembly is a single unit and may be easily removed by removing the intake grille. Inlet and outlet grilles are of 16-gauge stamped steel. The Steam Aeriet is available in three sizes and in two types—the Flush type, requiring a total recess of $5\frac{9}{16}$ in. and the Offset type, requiring a recess of $4\frac{5}{16}$ in. from the face of the finished wall. Details and dimensions of the two types and three sizes are shown in the accompanying drawing.



Advantages

(1) Requires approximately one-fourth of the wall space as the same capacity concealed heating element. Wall smudge is avoided.

(2) Warm air is delivered knee height out into room, instead of rising directly to ceiling, giving better heat diffusion and more uniform temperature.

(3) The temperature differential between floor and ceiling is less than one degree per foot.

(4) On normal operating speeds, the current consumption on all units, except the electric, is less than a 15-watt lamp.

(5) The Aeriet method of heat distribution usually results in a 20% fuel saving.

(6) As motors may be operated at variable speeds, approximately 800, 1100 and 1700 r.p.m., Aeriet has advantage of a variable size radiator.

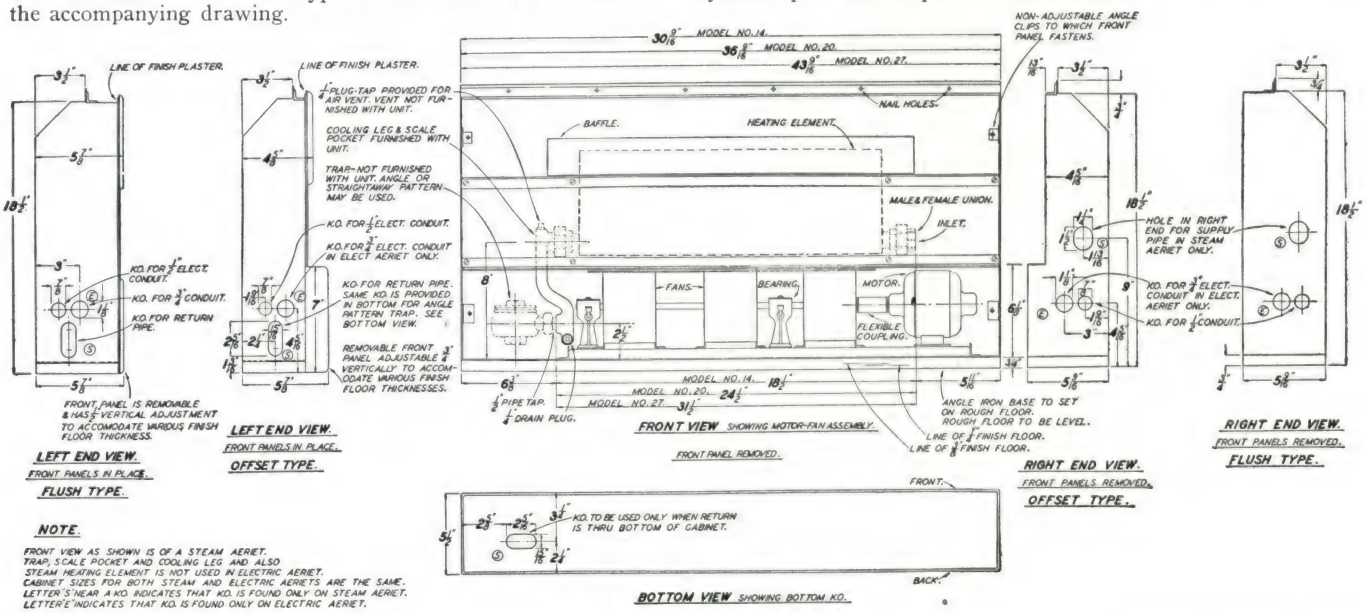
(7) Operation at low speed is positively noiseless. At intermediate speed, operation of the motor and fans is not noticeable. At high speed, used for warming up the room or in severely cold weather, there is a slight air noise.

(8) Room temperatures may, if desired, be controlled to meet varying conditions or personal preference by a simple electric thermostat.

(9) Fans may be used in summer to circulate air with cooling effect.

Operation

Steam Aeriets can be operated on any two-pipe vacuum system carrying subatmospheric pressure or on any two-pipe system up to 150 lb. pressure at the unit.



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Sizes and Capacities

The Steam Aeriet is made in Models 14, 20 and 27. Capacities are given below at the three operating speeds in the equivalent of square feet of direct radiation. These capacities are based on 240 B.t.u. delivery per hour per sq. ft. of equivalent direct radiation.

AERIET CAPACITIES—STEAM

Model No.	Cu. ft. per min.	Equiv. direct radiation, sq. ft.		
		Low	Intermediate	High
14	140	25	30	40
20	200	38	45	60
27	270	52	60	80

Note: Aeriets (steam) are available with motors wound for 110-220 volts, 60-cycle, single-phase, or 110-220 volts, 25 cycle, single phase, or 115-230 d-c.

Electric Aeriets

The electric wall type Aeriet is identical in principle and very similar in construction to the Steam Aeriet. The heating unit is a low temperature non-glowing element. The motors operate at a constant speed of approximately 1650 r.p.m. Separate switch control block assembly is provided with 5 ft. of wiring connection. A 3-gang toggle switch is used, making it possible to turn on the fan only, the fan and half the heating element, or the fan and the full capacity of the unit.

The Underwriters Laboratories, Inc. have listed the Air-Way Electric Aeriet. The wall type Aeriet is available in the following sizes:

WALL AERIET CAPACITIES

Model No.	Type	Kw.	Voltage	B.t.u. output	Equiv. direct radiation, sq. ft.	
					Steam	Hot water
14E	Plaster (flush only)	1.7	110–220	5805.5	29	43½
20E	Panel (flush and Offset)	3	220	10245	51	76.8
20E	Panel (flush only)	4	220	13660	68.3	102.4
27E	Panel (flush only)	5¼	220	17928.75	89.6	134.4

E.D.R. (steam) equivalent heating capacity expressed in terms of direct steam radiation, based on 240 B.t.u. per hour delivery per sq. ft.
E.D.R. (hot water) equivalent heating capacity expressed in terms of direct steam radiation, based on 160 B.t.u. per hour delivery per sq. ft.
Note: Due to the greater diffusion and more uniform temperatures obtained by positive mechanical air circulation E.D.R., unlike the rating for the Steam Aeriet, is rated at 20% higher than the usual calculation.

The cabinet sizes of Models 14E, 20E and 27E are exactly the same, except for the knockouts for electrical conduit, as Models 14, 20 and 27 of the Steam Aeriet. See detailed drawing.

Service to Architects

There is available to Architects more complete data on Air-Way Heating Systems in the form of a loose leaf catalogue contained in an A.I.A. File Folder, 30d-11. If this is not in your file, we would be pleased to send a copy upon request.

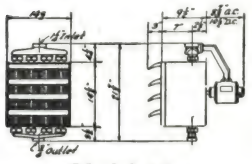
The Air-Way Engineering Department would be glad to consider without any obligation, any specific heating problem and make recommendations for the most effective use of Air-Way Heating Systems. Plans with complete construction detail will assist in making these recommendations most accurate.

AIR-WAY UNIT HEATERS

Outstanding Features of Air-Way Unit Heaters

Specific attention is called to the following features of Air-Way Unit Heaters: (1) the large volume of heated air delivered per B.t.u. of fuel consumed; (2) the high velocity and the low temperature of the warmed air at the outlet with (3) subsequent rapidity and extent of diffusion; (4) the integrally cast silicon aluminum heating element; (5) aluminum construction of louvers and fans, preventing rusting of cabinets and louvers and resulting in a light weight, sturdy and compact unit.

Motors used are of a special design and wholly enclosed. The motor frame for each model takes windings including 550, 440, 220 and 110 volts; 25, 33, 40, 50 and 60 cycles. The electric fan is of 4-blade aluminum construction. All Air-Way Unit Heaters are unconditionally guaranteed.



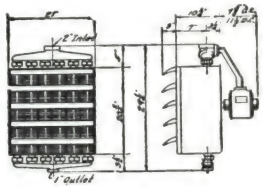
Model 14

Heater Capacity Tables

E. D. R.—Equivalent direct radiation, based on 1 sq. ft. of cast iron radiation when supplied with steam at 5 lb. pressure and exposed in still air at 70 deg. F., having a heat transmission of 240 B.t.u. per hr.

B. T. U.—Output per hour in British thermal units.

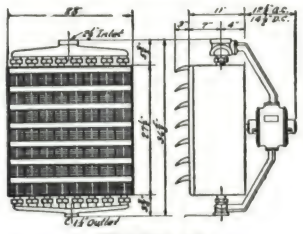
F. T.—Average final temperature of air leaving unit in degrees Fahrenheit.



Model 20

MODEL 14

Steam pressure and temperature		60-cycle 1740 r.p.m., standard fan Air delivery 1550 c.f.m. at 70°				60-cycle 1150 r.p.m., standard fan Air delivery 1020 c.f.m. at 70°			
		Intake air temperatures				Intake air temperatures			
		Zero	50° F.	60° F.	70° F.	Zero	50° F.	60° F.	70° F.
5 lb. 227°	E.D.R.	338	263	250	233	258	202	191	179
	B.t.u.	81100	63250	60000	56000	62000	48400	45900	42800
	F.T.	55.5	89	96.5	103.5	65	95.5	102.5	109
100 lb. 338°	E.D.R.	504	426	413	399	384	325	315	305
	B.t.u.	120900	102200	99000	95800	92300	78200	75600	73200
	F.T.	83	113.5	120	127	96.5	124	130	136.5



MODEL 27

Steam pressure and temperature		60-cycle 1150 r.p.m., standard fan 25-cycle 1425 r.p.m. No. 25 fan Air delivery 6000 c.f.m. at 70°				60-cycle 850 r.p.m. standard fan Air delivery 4450 c.f.m. at 70°			
		Intake air temperatures				Intake air temperatures			
		Zero	50° F.	60° F.	70° F.	Zero	50° F.	60° F.	70° F.
5 lb. 227°	E.D.R.	1595	1243	1179	1100	1320	1032	978	913
	B.t.u.	382700	298500	283200	264000	317000	247500	234500	219000
	F.T.	71.5	100	107	112.5	78.5	105.5	111	117
100 lb. 338°	E.D.R.	2375	2010	1945	1883	1970	1664	1613	1560
	B.t.u.	571000	483000	467000	452000	473000	399500	387000	374500
	F.T.	106.5	131	137	143	117	139	145	150.5

MODEL 20

Steam pressure and temperature		60-cycle 1150 r.p.m., standard fan 25-cycle 1425 r.p.m., No. 25 fan Air delivery 3000 c.f.m. at 70°				60-cycle 850 r.p.m., standard fan Air delivery 2270 c.f.m. at 70°			
		Intake air temperatures				Intake air temperatures			
		Zero	50° F.	60° F.	70° F.	Zero	50° F.	60° F.	70° F.
5 lb. 227°	E.D.R.	853	664	630	588	704	548	521	473
	B.t.u.	204500	159600	151200	141300	169000	131800	125000	116600
	F.T.	73	101	107.5	113.5	79	105.5	111.5	117.5
100 lb. 338°	E.D.R.	1270	1075	1038	1005	1048	888	858	830
	B.t.u.	305000	258000	249500	241600	242000	213000	206000	199300
	F.T.	108	132	138.5	144.5	118	140	145	151

What Air-Way Unit Heaters Will Accomplish

They may be applied to cooling, process drying, dehydrating and to every heating problem.

Process Drying

Air-Way Unit Heaters can frequently be installed to save time, space, labor and expense in removing moisture.

Drafts can be corrected, gases and fumes removed and steam dissipated.

Heater Performance and Ease in Installation

Air-Way Unit Heaters, where used to replace pipe coils, will effect at least a 25% fuel saving.

This saving is guaranteed. Fuel savings frequently run as high as 40%.

Installation of Air-Way Unit Heaters is easy. Simply connect the heater to existing steam or hot water lines in place of the coils or radiators.

THE BUCKEYE BLOWER COMPANY

COLUMBUS, OHIO

BUCKEYE HEATOVENT HEATING AND VENTILATING UNITS

Buckeye Heatovent Units take fresh outside air, filter it, warm it, if necessary, to the required temperature and diffuse it without draft throughout each room individually. To heat up a room quickly and economically, room air may be recirculated until the desired temperature is reached and then outside air may be supplied.

The unit essentially consists of a combined intake and mixing damper, an adhesive type filter, two Buckeye Multiblade Fans, one mounted on the shaft extension on each side of an electric motor, and a Buckeye Copper Tube Radiator, all housed in a 14 gauge metal cabinet finished in baked-on crystalline green.

The 100 Series Unit—This accomplishes control of outlet temperature by means of a by-pass, and a combined by-pass and mixing damper mechanism which allows all, any part, or none of the fan driven air to pass through the heated radiator. This damper mechanism may be manually controlled at each unit, or automatically controlled by any approved standard temperature control system through the room thermostat.

Buckeye Heatovent, Series 100 Damper Type Unit

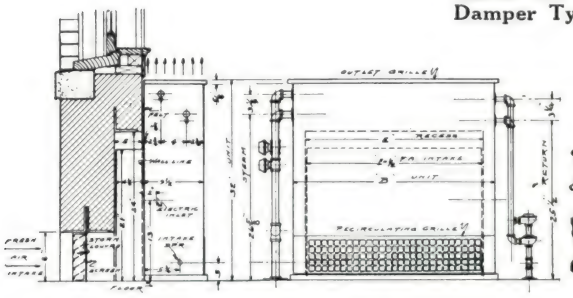
The 900 Series Unit—This is designed especially for automatic control. It has sufficient heating capacity to perform its full heating duty even in severe sub-zero temperatures and yet does not overheat in mild weather. Cold draft difficulties are eliminated.

The 900 Series Unit has no by-pass or mixing dampers. It accomplishes control of outlet temperature by means of the Buckeye Copper Tube Sectional Radiator and a gradual acting sylphon valve on each of the two radiator sections, operated by the room thermostat of any approved standard temperature control system.

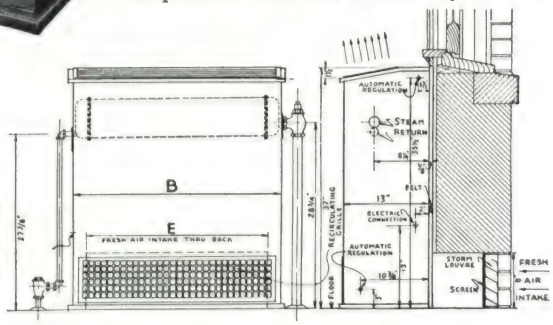
These gradual acting valves are automatically controlled by the room thermostat in such a way that as the room temperature rises to the setting on the thermostat, the valve on the top radiator section gradually closes, followed by the throttling down, if necessary, of the valve controlling the bottom radiator section. Then, as the room temperature stops rising and begins to go down, the valve on the bottom radiator section gradually opens to allow steam into the bottom section. If the room temperature still has a tendency to fall, this progressive action continues until the bottom radiator section valve is fully open, and if necessary the top radiator section valve gradually opens.

All this action takes place within a range of two or three degrees and keeps a constant balance.

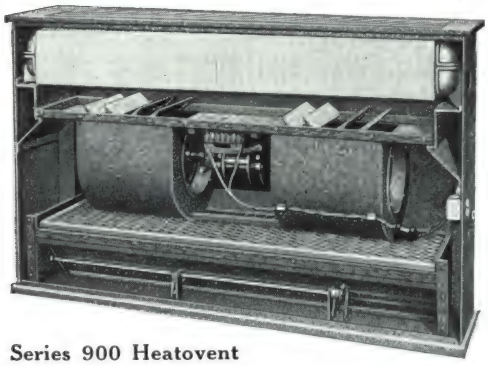
A very accurate and dependable control within a very close range of temperature is assured. The radiator cannot freeze so long as there is a steam supply. Should steam supply fail and the radiator freeze, this freezing does not harm the Buckeye Copper Tube Radiator. The 900 Series Unit projects only 9½ in. into the aisle and is only 32 in. high.



900 Series Installation



Type C, 100 Series Installation



Series 900 Heatovent

DIMENSIONS OF 100 SERIES UNITS

Unit No.	C.f.m.	B	E	Steam, in.	Return, in.
126 to 129	600	26	22	1½	1
136 to 139	750	32	28	1½	1
146 to 149	1000	40	36	1½	1
156 to 159	1200	50	46	2	1¼
166 to 169	1500	60	56	2	1¼

DIMENSIONS OF 900 SERIES UNITS

Unit No.	C.f.m.	B	E	Steam	Return
926 to 929	600	26	22	2–1 in.	2– ¾ in.
936 to 939	750	32	28	2–1 in.	2– ¾ in.
946 to 949	1000	40	36	2–1 in.	2– ¾ in.
956 to 959	1200	50	46	2–1¼ in.	2–1 in.
966 to 969	1500	60	56	2–1¼ in.	2–1 in.

ENGINEERING DATA ON 100 SERIES AND 900 SERIES BUCKEYE HEATOVENTS

Room Temperature 70 degrees Fahr. — Steam at five pounds gauge pressure

Entering Air		−20°F.			−10°F			0°F			+10°F			+20°F			+30°F			+40°F			+50°F			+60°F			+70°F		
Unit No.	C.F.M. Air	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.	Final Temp.	Total E.D.R. Sq. Ft.	Excess Heat Sq. Ft.
126-926	600	68	242		74	227	11	80	214	27	85	199	40	90	184	53	96	172	68	101	157	80	106	143	92	112	131	106	117	118	118
127-927	600	85	278	40	90	263	53	95	247	65	99	234	76	104	215	87	108	199	97	123	184	108	117	168	118	122	154	129	126	138	138
128-928	600	100	311	78	104	293	87	107	273	94	111	259	105	115	239	113	119	222	122	123	205	131	126	187	138	130	171	147	134	156	156
129-929	600	111	332	104	115	315	113	118	295	120	121	281	134	125	259	136	128	241	143	131	222	149	134	202	154	138	188	164	141	171	171
136-936	750	68	302		74	284	13	80	268	34	85	248	50	90	230	67	96	215	85	101	196	100	106	178	114	112	164	132	117	147	147
137-937	750	85	348	50	90	329	66	95	309	81	99	293	95	104	269	109	103	248	121	113	230	135	117	209	147	122	192	161	126	173	173
138-938	750	100	388	97	104	366	109	107	341	118	111	324	132	115	299	142	119	278	153	123	256	163	126	234	172	130	212	182	134	194	194
139-939	750	111	415	130	115	393	141	118	368	150	121	351	161	125	322	169	128	301	178	131	278	186	134	255	194	138	235	205	141	213	213
146-946	1000	68	402		74	378	18	80	357	45	85	331	61	90	307	88	96	286	113	101	261	132	106	238	153	112	219	177	117	196	196
147-947	1000	85	463	66	90	438	88	95	412	108	99	390	127	104	359	145	108	331	161	113	307	181	117	279	196	122	256	215	126	230	230
148-948	1000	100	517	129	104	488	146	107	455	157	111	432	175	115	399	189	119	371	204	123	342	218	126	312	230	130	286	245	134	259	259
149-949	1000	111	554	173	115	525	189	118	491	200	121	468	215	125	432	226	128	402	238	131	371	249	134	340	259	138	314	274	141	284	284
156-956	1250	68	503		74	473	22	80	446	56	85	414	83	90	384	110	96	357	141	101	326	166	106	297	191	112	274	222	117	245	245
157-957	1250	85	579	83	90	527	105	95	515	136	99	488	159	104	449	182	108	413	201	113	384	226	117	349	245	122	319	267	126	288	288
158-958	1250	100	646	162	104	610	182	107	569	197	111	530	215	115	499	236	119	463	255	123	427	272	126	390	288	130	357	306	134	324	324
159-959	1250	111	692	216	115	655	236	118	614	250	121	586	269	125	540	283	128	502	297	131	463	311	134	426	324	138	393	342	141	355	355
166-966	1500	68	604		74	568	27	80	535	67	85	497	99	90	460	131	96	428	169	101	392	199	106	356	229	112	329	266	117	292	292
167-967	1500	85	696	100	90	657	132	95	617	162	99	585	191	104	538	216	108	496	242	113	460	271	117	419	294	122	384	322	126	345	345
168-968	1500	100	775	194	104	731	218	107	682	236	111	647	263	115	599	284	119	555	305	123	512	327	126	458	345	130	428	368	134	388	388
169-969	1500	111	830	259	115	786	283	118	736	293	121	703	323	125	648	340	128	602	356	131	557	373	134	511	389	138	472	411	141	426	426

Continued on next page

BUCKEYE THERMOVENT UNIT HEATER AND VENTILATOR

For Stores, Salesrooms, Auditoriums, Lodge Rooms, Gymnasiums, Garages, Churches, Banks and Arenas

Description—The Thermovent is designed to heat and ventilate large rooms by taking advantage of natural laws. With most heating systems the temperature of the room near the ceiling is unbearable when the air near the floor is too cold for comfort. The Thermovent unit blows the heated air downward with sufficient force to reach the floor, thereby heating the part of the room that is occupied. The air is so thoroughly diffused that a very even temperature is maintained in all parts of the room. The Thermovent Unit System also ventilates by keeping the air constantly moving.

Most rooms have a continuous infiltration of fresh air through cracks and at doors and windows. In many instances this infiltration is enough to supply all the fresh air needed. The Thermovent Unit, by constantly recirculating and mixing all of the air in the room, makes this ventilation effective.

Where an extra supply of fresh air is needed, as in auditoriums, or garages with noxious fumes, Thermovent may be arranged to take in fresh air through ducts from the outside instead of recirculating the room air. These ducts are supplied with dampers, so that the unit may be used for supplying either fresh air or recirculated air, as the conditions warrant, or any proportion of both. Indeed, the steam pressure may be turned off and Thermovent used for its ventilating efficiency alone at such times as heat is not needed. Thermovent thus provides both perfect heating and perfect ventilation in the same unit.

The Thermovent is a combination of all copper, steam blast radiator, blowers and motor for direct installation in room to be heated. It is especially efficient in its conversion of radiant heat into convection currents for wide diffusion and even heating in rooms of large area. Thermovent is particularly suited for heating and ventilating factories, garages and other industrial buildings as well as churches, theaters, auditoriums, gymnasiums and similar assembly rooms. Its usual location is directly under the ceiling, or in some unoccupied room, with outlet through or over a partition. It therefore takes up no useful floor or wall space, and as it is extremely compact, and quiet in operation, it successfully disposes of many otherwise bothersome problems in heating and ventilating installations.

In the old type of steam heating system the heat of the steam in the coils or radiators is transferred by direct contact to the metal of the coil. The metal in turn heats the air which comes in contact with it on the outside. This is called heating by direct radiation and is a very slow and inefficient process.

Convection currents from direct radiation lack momentum to quickly and thoroughly mix with the cooler air.

Convection currents from the Thermovent Unit are quickly impelled by the efficient Buckeye Multiblade Fans to all parts of the room. When the convection currents are evenly and rapidly mixed with the cool air, as is accomplished with the Thermovent System, instead of being allowed to accumulate under the ceiling, as in the case of direct radiation, there is accomplished an actual economy of fuel as well as an increase in comfort.

Ease of Installation—The Thermovent is very easily installed, as it is shipped completely assembled ready for suspension from ceiling, or mounting on floor stands. After placing Thermovent in position, simply make the steam, return and electrical connections and it is ready for operation.

Cross Section of Type "E" Thermovent

Small Space Required—Thermovents have heights varying from 18 to 34 in., and depths from 38 to 55 in., and widths from 40 to 60 in., depending on type, air volume, and final temperature desired.

They are regularly designed for ceiling suspension, as this method eliminates the necessity of using floor space which can be used to better advantage. However, where desired, they can be furnished on floor mounting or supported on iron wall brackets or floor legs.

Radiators for direct radiation systems occupy approximately fourteen times the space required by the radiator in a Thermovent Unit of the same heating capacity. The entire Thermovent—fans, motor and all—occupies about three-fifths the space required for direct radiation. And it must not be forgotten that direct radiators always occupy floor or wall space that might otherwise be useful.

Design and Construction—The most important factors to consider in designing any mechanical device should be simplicity, durability, and efficiency.

The Thermovent Radiator is manufactured for steam pressures up to 20 lb. per sq. in. It is made entirely of non-corrosive metals; nonferrous copper tubing, headers and tube sheets. This radiator construction has caused a revolution in indirect heating practice during the past few years, as it has reduced the weight of a radiator as much as ninety percent under the cast iron or pipe coil radiator, with even more heat efficiency.

This radiator design and construction makes the Thermovent possible, as it reduces the weight, increases the efficiency, and decreases the overall size. Every Thermovent Radiator is guaranteed against defects in materials or workmanship for a period of five years after installation.

The two Buckeye Multiblade Fan wheels draw the air into the fan housings and discharge same into a stream-lined plenum chamber, thus eliminating wasteful eddies and distributing the air equally over the radiator.

As the air is forced through the radiator, it is quickly heated and discharged into the space to be heated at an even outlet temperature.

The slow speed motor is mounted on a specially designed spring base, which is a refinement found only in Buckeye Units. This spring motor mounting absorbs all magnetic motor noise and vibration, and has the additional advantage of being absolutely stable and durable.

Felt, cork and other insulating materials are not dependable, as they will compress and deteriorate with use and require frequent renewal. The entire power unit is an assembly of real merit and represents the latest engineering design and practice.

The Thermovent Cabinet is built of 14 gauge metal, enclosing heating element as well as forming plenum chamber.

The entire cabinet, with fan and motor assembly, is mounted on a wood base provided with channels drilled for hanger rods for suspension from ceiling.

Methods of Installing—(1) Standard unit hung from ceiling, heating and ventilating the air in the room.

(2) Standard unit with outdoor, fresh air intake—with outlet into space to be heated and ventilated.

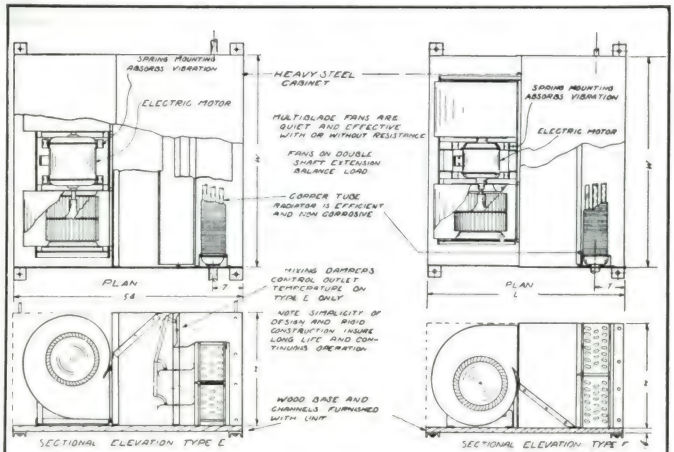
(3) Damper type unit to heat and ventilate with either fresh outdoor air or with recirculated room air.

(4) Standard unit with recirculating duct to the floor for rooms over 14 ft. in height or where a very even temperature is required.

Type "E" Thermovent is especially designed for installation in churches, auditoriums, banks and other similar buildings where quiet operation is essential.

This type Thermovent is designed and constructed to deliver from 2000 to 4000 cu.. ft. of air per minute with a maximum fan tip speed of 1800 ft. per minute, thus insuring quiet operation.

Type "F" Thermovent is designed for stores, garages, factories, gymnasiums, etc., where extreme quietness is not as essential as high outlet velocity.



ENGINEERING DATA TYPE E

Unit No.	Cubic Ft of Air Per Min	Heating and Ventilating									Heating Only					
		Entering Air -10°F			Entering Air 0°F			Entering Air +10°F			+50°		+60°		+70°	
		Final Temp	Total Cap	Htg. Cap.	Final Temp	Total Cap.	Htg. Cap.	Final Temp	Total Cap.	Htg. Cap.	Final Temp	Htg. Cap.	Final Temp	Htg. Cap.	Final Temp	Htg. Cap.
200-E	2000	105	975	295	110	926	336	116	877	379	134	675	138	626	142	577
300-E	3000	105	1460	442	110	1390	503	116	1317	569	134	1012	138	940	142	867
400-E	4000	105	1950	590	110	1852	671	116	1754	768	134	1350	138	1252	142	1154

ENGINEERING DATA TYPE F

1200-F	2000	90	875	260	97	835	320	103	790	365	126	625	132	585	137	540
1250-F	2500	90	1090	325	97	1045	400	103	990	460	126	780	132	730	137	675
1350-F	3500	90	1525	460	97	1465	560	103	1365	640	126	1090	132	1020	137	940
1225-F	2200	90	960	285	97	920	350	103	870	405	126	685	132	645	137	590
1305-F	3000	90	1310	390	97	1250	480	103	1190	550	126	935	132	875	137	810
1405-F	4000	90	1745	520	97	1670	640	103	1585	735	126	1245	132	1170	137	1075
2500-F	5000	90	2180	655	97	2145	795	103	1980	905	126	1555	132	1460	137	1345

All capacities in terms of equivalent direct radiation. To change capacities to B.T.U. multiply by 240.

The above capacities are for steam at 227°F. If steam is at higher temperature, the capacities are increased and vice versa.

Thermovents Type S-F are for single phase alternating current only. All other Thermovents are for either polyphase alternating current or direct current.

Details and Engineering Data on Buckeye Thermovent Unit Heater and Ventilator

ESTABLISHED 1894

JOHN J. NESBITT, INC.

Manufacturers of Universal Heating and Ventilating Unit

State Road and Rhawn Street, Holmesburg, PHILADELPHIA, PA.

BRANCH OFFICE, 11 Park Place, NEW YORK, N. Y.

Nationwide Sales and Service through Offices of American Blower Company
Offices in Principal Cities, see Telephone Directory

Products

UNIVERSAL HEATING and VENTILATING UNIT.
UNIVERSAL UNIT HEATERS.
Also Universal Air Filters.
For Nesbitt Concealed Radiators, see Manufacturers' Index.

Engineering Service

Services of the engineers of JOHN J. NESBITT, INC., are freely available to architects and engineers contemplating installation of the Universal System. Increased efficiency and maximum economy will be accomplished by discussing your problems with these experts.

UNIVERSAL HEATING AND VENTILATING UNIT

Description of the System

The Universal Unit is designed to provide a mechanical system of ventilating by taking fresh air directly from outdoors, warming it to the proper temperature and discharging it into the room without creating drafts.

The Universal Unit
The Standard by Which All Other Makes Are Measured
TRADE-MARK
Reg. U. S. Pat. Off.

The Universal Unit

Cabinet — Finished in olive green duco, the same process as used for automobile body work, the Universal Unit is attractive in appearance, in addition to being of excellent design. The recirculating and inlet grilles are in harmony with the cabinet construction, pleasing to the eye and very substantial, and constructed with openings small enough to prevent foreign matter being thrown into the cabinet.

When manual control of dampers is used the control handles are placed on either side of the cabinet, with indexes indicating the direction of operation.

All parts of the Universal Unit are accessible for cleaning, and the one-piece front gives complete access to the elements of the cabinet.

Fans—The fans used in the Universal quiet operating units are of the Sirocco multiblade design and are recognized among fan engineers as the most efficient type of fan known to the art. The fans are mounted on double extended ends of the motor shaft.

Motors—The motors used in the Universal quiet operating units can be mounted for any character of current and are of the condenser, transformer, induction type with three-way switch speed control. These motors have oversize bronze bearings with wool packed oiling system requiring oil only once per heating season.

Three-point Lead Mounting—The motor and fan assembly of the Universal Unit is mounted in the cabinet on three steel ball points. These points rest on lead liners, supported by angles from side of the casing.

This three-point lead mounting has made possible the use of alternating-current motors with a permanent rigid supporting device.

Radiator—Standard Universal Units are supplied with a radiator which consists of horizontal seamless copper tubes, the ends of which are connected to a cast iron header by means of ground union joints. Over these tubes are hydraulically pressed thin copper plates properly spaced. Positive contact between tubes and plates insures absolute heat transfer from tube to plate, making the whole a highly efficient unit. Tested at 125 lb. per sq. in.

This type is particularly sturdy and rigid and will stand freezing without breaking.

Temperature Control Damper—The Universal Unit is provided with a temperature control damper, which can be manually or thermostatically operated to regulate the temperature of air from Unit.

Inlet and Recirculating Damper—Each Universal Unit is arranged so that air can be brought from outdoors, warmed, if desired, and circulated in the room, or can be recirculated and reheated within the room, as desired. This feature is optional.

This is accomplished by means of a circular roll damper of aluminum. This damper can be manually controlled at the cabinet, or pneumatically controlled from some remote point.

Wall Box and Grille—All Universal quiet operating units are equipped with the Bronzeline grille of beautiful design and permanent construction. It consists of a 1 in. wide by ¼ in. thick bronze frame, supporting heavy brass rods. The wall box is made of a heavy gauge steel with steel, storm-proof louvers, and is completely galvanized after fabrication. It is securely fastened to the grille with brass screws.

DIMENSIONS—UNIVERSAL COMBINED HEATING AND VENTILATING UNITS

Capacity, c.f.m.	Over-all dimensions, in.		
	Height	Length	Depth
Up to 750	32	34	14
751-1260	32	43	14
1261-1560	32	56	14
1561-2000	48	43	22
2001-3000	48	56	22
3001-4000	48	60	22

Continued on next page

Eleven Points of Excellence

(1) High velocity, vertical discharge outlet grille, heavy in construction, neat in design. Uniform air movement over entire area.

(2) Multiform radiator, entire air heating element of copper. Rugged, capable of standing 125 lb. pressure, free from soldered, brazed, welded or packed joints. A radiator that will outlast the building.

(3) By-pass chamber parallel to heating chamber. So located to guide column of cool air across currents of warm air when mixing, and guide cool air away from room occupants when completely by-passing.

(4) Large space permits equal distribution of air, resulting in uniform heating over entire area of radiator.

(5) Aluminum temperature control damper operating over wide area results in fine control of temperature and graduated action of damper. Operates on solid brass hinge.

(6) Variable speed motor mounted on heavy steel board with three steel ball points of contact between board and unit casing results in rigid metal to metal contact, responsible for the enduring use of alternating current motors.

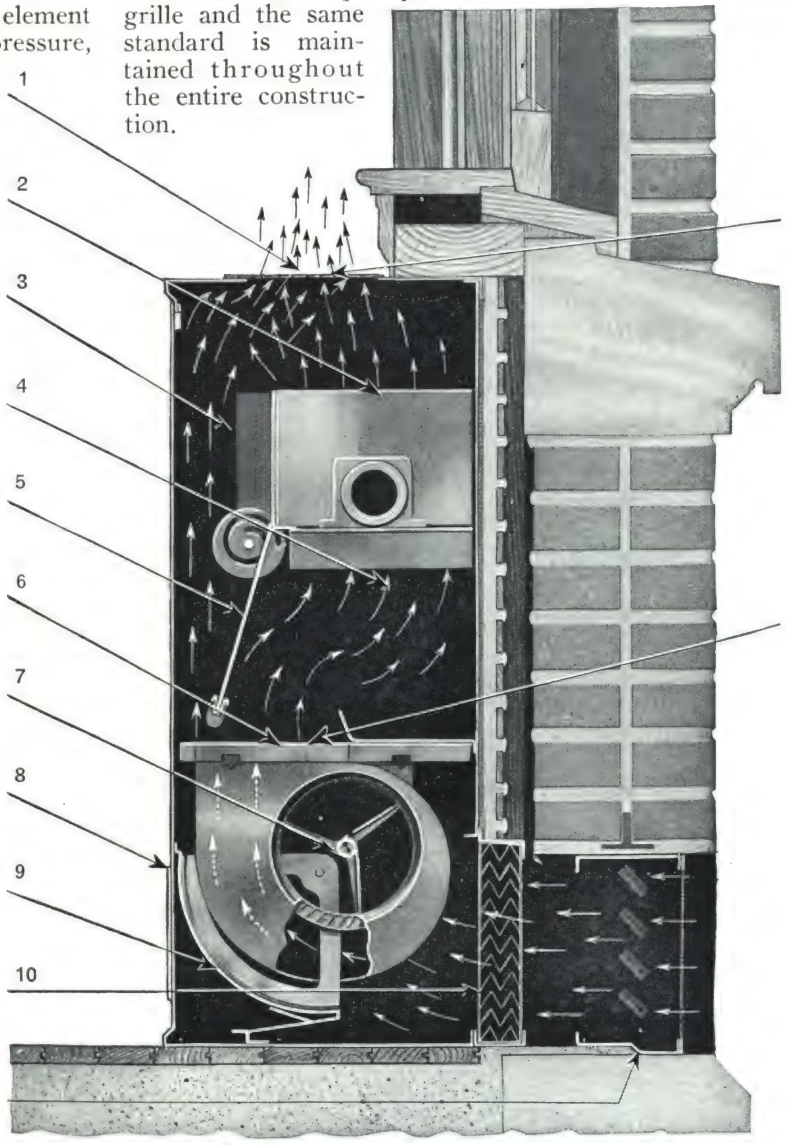
(7) Sirocco type multiblade, double inlet fans—no greater efficiency known. Low velocity at cut-off point results in quiet operation.

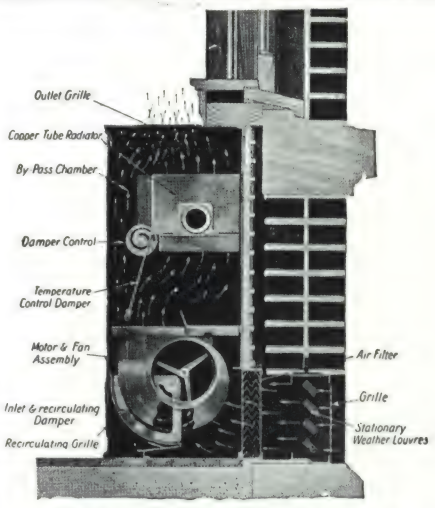
(8) Recirculating grille near floor line results in quick heating, requiring less than one hour to warm average classroom from 30° to 70° F. Air circulates through unit by gravity when fans are not being operated.

(9) One-piece aluminum inlet and recirculating damper with felt damper stops reduce possibility of air leakage by reducing number of parts. It is possible to recirculate in a unit only 14 in. wide.

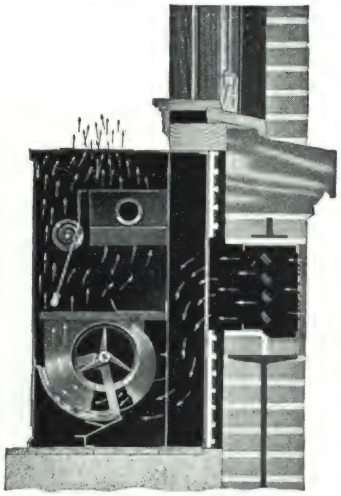
(10) Air filter cleans air before entering unit. Velocity of air uniform at this point, imposing equal amount of work throughout entire area. Requires less frequent cleaning. Easily removable through front of cabinet.

(11) Bronzeline fresh air inlet grille, stationary stormproof louvers in heavy gauge galvanized iron wall box. Universal quality starts with the bronze inlet grille and the same standard is maintained throughout the entire construction.

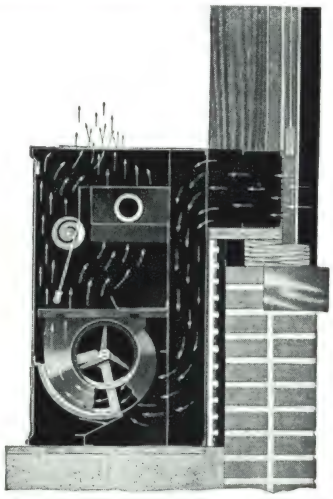




Wall Box and Grille at Floor Line Series No. 14



Wall Box and Grille Above Floor Line, Series No. 18



Inlet Over Top of Window Sill Series No. W-18

TYPICAL METHODS OF INSTALLATION

Continued on next page

Capacities of Universal Heating and Ventilating Units

The Universal units here described are manufactured in eighteen different cabinet sizes with nine different air gauges, as indicated in the table of capacities, and shown by dimensions as listed below. Two different radiator sizes are available for each cabinet size; the figures indicated in table No. 1 are for the Blast system where high outlet temperatures are desired or in cases where no direct radiation is provided in the classroom, while the figures in table No. 2 are for cases where the unit is for use in combination with direct radiation.

Capacities and dimensions series W-18 same as series 18.

Heating capacities of units given in equivalent feet of direct radiation. For B.t.u. capacity multiply figures as given by 240.

The last number in each series of mnemonic symbols indicates the capacities of the unit in cubic feet per minute; for example, series No. 14-32-43-12 is a 14-in. wide cabinet, 32 in. high, 43 in. long with capacity of 1260 cu. ft. of air per minute. All air deliveries are based on heated air measured with standard 4-in. anemometer to be used as described in the code of the American Society of Heating and Ventilating Engineers, with the instrument held 2 in. above the outlet grille, the volume being the product of the average velocity and the gross area of the grille.

Tables are based on steam of 218° F. By means of our three-way switch on the Universal quiet operating motor, you are able to obtain three speeds: The first speed is for new school buildings not pupilled to capacity; the second, normal operating speed; the third provides for reserve capacity.

CAPACITIES OF UNIVERSAL UNITS

Inlet temp., degrees Fahr.	Delivering 1560 c.f.m.				Delivering 1260 c.f.m.				Delivering 1000 c.f.m.				Delivering 750 c.f.m.				Delivering 600 c.f.m.				Delivering 450 c.f.m.			
	Outlet temp. deg. F.	Series C-3256-15 14-3256-15 18-3256-15			Outlet temp. deg. F.	Series C-3243-12 14-3243-12 18-3243-12			Outlet temp. deg. F.	Series C-3243-10 14-3243-10 18-3243-10			Outlet temp. deg. F.	Series C-3234-7½ 14-3234-7½ 18-3234-7½			Outlet temp. deg. F.	Series C-3234-6 14-3234-6 18-3234-6			Outlet temp. deg. F.	Series C-3234-4½ 14-3234-4½ 18-3234-4½		
		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat
Table No. 1—Blast System or No Direct Radiation																								
—30	90	811	702	109	93	668	567	101	102	560	450	110	92	394	337	57	98	328	270	58	103	253	202	51
—20	95	770	632	138	98	634	510	124	107	534	405	111	97	375	304	71	103	313	243	70	108	241	182	59
—10	100	730	562	168	103	602	454	148	112	509	360	140	102	356	270	86	108	297	216	81	113	230	162	68
0	106	696	491	205	109	575	397	178	119	491	315	176	107	337	236	101	112	280	189	91	120	222	142	80
10	112	664	421	243	115	548	340	208	125	468	270	198	114	324	202	122	118	267	162	105	126	212	121	91
20	119	636	351	215	120	518	283	235	131	448	224	240	120	308	169	139	124	254	135	119	131	201	101	100
30	125	604	281	323	126	491	227	264	137	428	180	248	126	293	135	158	130	242	108	134	137	193	81	112
40	131	572	211	361	132	466	170	296	143	406	135	271	132	278	101	177	136	230	81	149	143	183	61	122
50	137	541	140	401	138	442	113	329	149	388	90	298	138	263	67	196	142	218	54	164	149	175	40	135
60	143	512	70	442	144	417	57	360	155	368	45	323	144	248	34	214	148	207	27	180	155	166	20	146
Table No. 2—For Use in Connection with Direct Radiation																								
—30	68	691	702	—11	70	567	567	0	80	486	450	36	70	337	337	0	73	277	270	7	81	220	202	18
—20	73	649	632	17	76	538	510	28	85	459	405	38	75	318	304	14	79	262	243	19	86	208	182	26
—10	78	609	562	47	81	505	454	51	90	433	360	65	80	298	270	28	84	247	216	31	91	197	162	35
0	84	574	491	83	87	477	397	80	97	416	315	101	85	279	236	43	90	234	189	45	98	188	142	46
10	90	540	421	119	93	440	340	100	103	394	270	124	92	266	202	64	96	221	162	59	104	178	121	57
20	97	514	351	163	98	419	283	136	109	373	224	163	98	250	169	81	102	208	135	73	109	168	101	67
30	103	482	281	201	104	394	227	167	115	352	180	172	104	234	135	99	108	197	108	89	115	158	81	77
40	109	451	211	240	110	368	170	198	121	332	135	197	110	219	101	118	114	185	81	104	121	150	61	89
50	115	420	140	280	116	344	113	231	127	313	90	223	116	205	67	138	120	173	54	119	127	141	40	101
60	121	390	70	320	122	320	57	263	133	293	45	248	122	191	34	157	126	161	27	134	133	132	20	112

Total heat, heat for air and surplus heat figures given in *equivalent sq. ft. of direct radiation.*

For Larger Rooms

For rooms other than standard classrooms, specify Universal units series No. 22. This series is constructed in capacities from 2000 to 4000 c.fm.; temperature rises for various cubic feet minutes are shown in capacities listed below. The same high standard quality incorporated into the smaller capacity units is maintained in the

CAPACITIES OF LARGER UNIVERSAL UNITS

Inlet temp., deg. Fahr.	Delivering 4000 c.f.m.				Delivering 3000 c.f.m.				Delivering 2000 c.f.m.			
	Outlet temp. deg. F.	Series C-22-4866-40 22-4866-40 30-4866-40			Outlet temp. deg. F.	Series C-22-4856-30 22-4856-30 30-4856-30			Outlet temp. deg. F.	Series C-22-4843-20 22-4843-20 30-4843-20		
		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat		Total heat	Heat for air	Surplus heat
Table No. 1—Blast System or No Direct Radiation												
—30	72	1831	1800	31	72	1371	1350	21	72	914	900	14
—20	78	1738	1620	118	78	1303	1215	88	78	869	810	59
—10	84	1649	1440	209	84	1236	1080	156	84	824	720	104
0	90	1560	1260	300	90	1170	945	225	90	780	630	150
10	96	1476	1080	396	96	1105	810	295	96	737	540	197
20	102	1395	900	495	102	1043	675	368	102	696	450	246
30	108	1310	720	590	108	982	540	442	108	655	360	295
40	114	1231	540	691	114	921	405	516	114	614	270	344
50	120	1151	360	791	120	863	270	593	120	575	180	395
60	126	1074	180	894	126	805	135	670	126	537	90	447
Table No. 2—For Use in Connection with Direct Radiation												
—30	54	1558	1800	—242	54	1169	1350	—181	54	779	900	—221
—20	60	1467	1620	—153	60	1100	1215	—115	60	733	810	— 77
—10	66	1379	1440	— 61	66	1024	1080	— 56	66	689	720	— 31
0	72	1293	1260	33	72	968	945	23	72	645	630	15
10	78	1206	1080	126	78	905	810	95	78	602	540	62
20	84	1123	900	223	84	841	675	166	84	561	450	111
30	90	1040	720	320	90	780	540	240	90	520	360	160
40	96	961	540	421	96	720	405	315	96	480	270	210
50	102	882	360	522	102	662	270	392	102	441	180	261
60	108	806	180	626	108	604	135	469	108	403	90	313

Continued on next page

construction of the larger units. The Universal condenser, transformer, induction and variable speed motors are also used in these larger units. Motors are provided with three-speed switches. Series No. 22-48-43-20 and C-22-48-43-20 are each equipped with one slow speed motor operating with two fans to provide proper distribution and maintain uniform velocity throughout the cabinet. Series No. 22-48-56 and 66 as well as No. C-22-48-56 and 66 are each equipped with two motors and fan assemblies, each motor holding two fans.

These capacity Universal units are designed especially for use in auditoriums, study halls or other larger rooms where quiet operation is essential.

Caution—Where galvanized iron ducts are connected with the inlet or outlet, proper allowance must be made for drop in capacity. Our sales engineers should be consulted for capacities when duct work is added.

UNIVERSAL UNIT HEATERS

Description

The phenomenal success of the Universal Heating and Ventilating Unit in over 20,000 schoolrooms and other public buildings, over a period of sixteen years, created a demand for a heating unit embodying the features of the Universal Ventilating Unit for large rooms and beautiful interiors—banking rooms, showrooms, salesrooms, offices, assemblies, churches and the like.

This demand has been met by the Universal Unit Heater, a heating unit built expressly to solve the difficult heating problems of such rooms.

The Universal Unit Heater maintains a uniform temperature in the room, ceiling and floor alike (and it does this to the satisfaction of the heating engineer). It is also sufficiently attractive to meet the exacting requirements of the architect, and so quiet in operation as not to annoy those in the room.

The Universal Unit Heater, in embodying these many well-known advantages and overcoming the heretofore existing limitations on the use of unit heating, is highly efficient, economical and attractive, and sufficiently quiet for installing in churches.

Sizes of Heaters—Heaters are built in two cabinet sizes.

The larger cabinet is known as Type L, and its heating capacity varies from 432 sq. ft. of equivalant direct radiation when circulating 1500 cu. ft. of air per minute, to 312 sq. ft. when circulating 900 cu. ft. of air per minute.

The smaller cabinet is known as Type S, and its heating capacity varies from 216 sq. ft. when circulating 750 cu. ft. of air per minute to 156 sq. ft. when circulating 450 cu. ft. of air per minute.

The Unit

Radiators—The radiator used in both types of units is constructed with seamless copper pipes over which copper plates are pressed at 3200 lb. pressure, assuring absolute thermal contact. The radiator is so substantially constructed that it will stand an operating pressure of 125 lb. and a test pressure of 200 lb.

Notwithstanding this unusual strength the radiator is tremendously efficient due to the high rate of conductivity of the copper plates used, which are in absolute thermal contact with tubes. There are no soldered, brazed, welded or packed joints used in the construction of this radiator, and it can be truly classed as an "everlasting" radiator.

Cabinets—The casing of both heaters is constructed of No. 14 gauge, first quality furniture stock steel, with ½-in. lattice recirculating grille and outlet grille.

The cabinets are finished in duco and are available in two colors, either French gray or olive green. Where other finishes are desired, priming coat only is applied at factory.

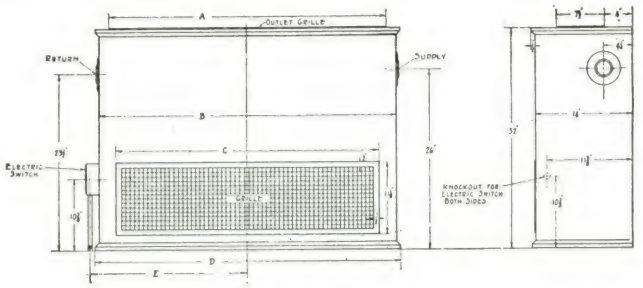
Steam Systems—Universal Unit Heaters can be used on any system of steam circulation. A 2-in. steam inlet is provided on the feed end and a 1-in. outlet on the return end of both types. Where the system of steam circulation justifies smaller connections, the openings should be bushed by the purchaser.

If heaters are to be connected to a one-pipe system of steam circulation, this information should be supplied at the time order is entered, so that proper provisions for draining and venting can be made at the factory.

Temperature Control—The most economical method of controlling the temperature of a room with Universal Unit Heaters is through the operation of the motor. Mercoid thermostats have been successfully used in controlling the motor of the Universal Unit so that when the room reaches the desired temperature the mercoid thermostat stops the motor by breaking contact in the electric line, and when the temperature of the room drops, the mercoid thermostat again makes contact in the electric line, causing the motor to operate.

It is generally recommended that not more than three Universal Heaters be placed under the control of one switch if close regulation is desired, and in no case more than five.

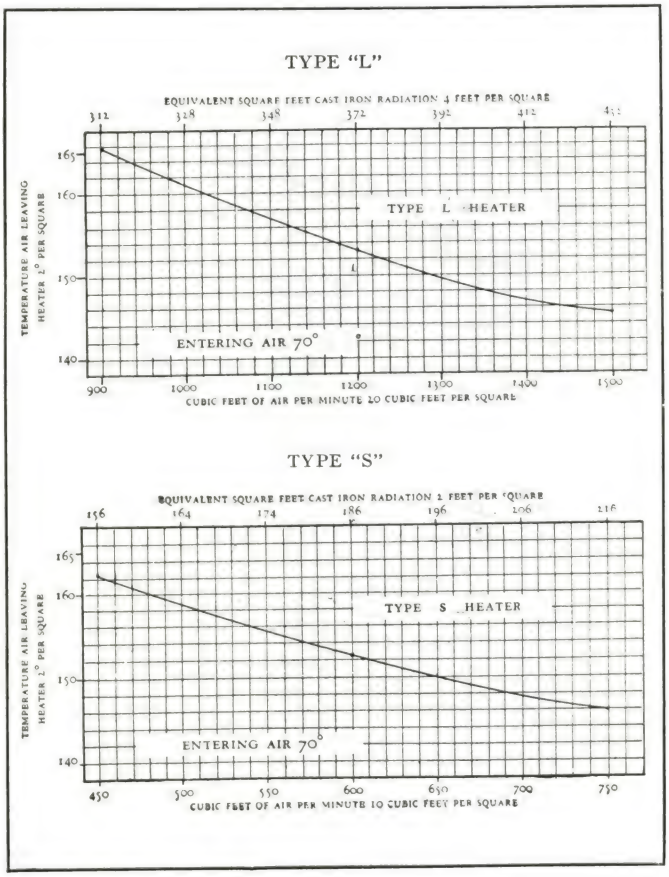
The mercoid thermostat has a standard scale 56° to 80°, with 2° markings, and with guaranteed operating differential of 2° at any point on the scale. Contact is made within the mercoid sealed glass tube containing inert gases and mercury.



DIMENSIONS OF TYPES L AND S

Type	A, in.	B, in.	C, in.	D, in.	E, in.	F, in.
L	39	43	38	44	22½	30
S	24	27	22	28	14¾	19½

Steam and return connections are interchangeable.



Capacity Charts

Capacity given in heating effect equivalent to square feet of cast iron radiator. Air at 70° F., steam 218° F.

SKINNER BROS. MFG. CO., INC.

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1484 South Vandeventer Avenue
ST. LOUIS, MO.

EASTERN OFFICE: 1014 Flatiron Building, NEW YORK, N. Y.

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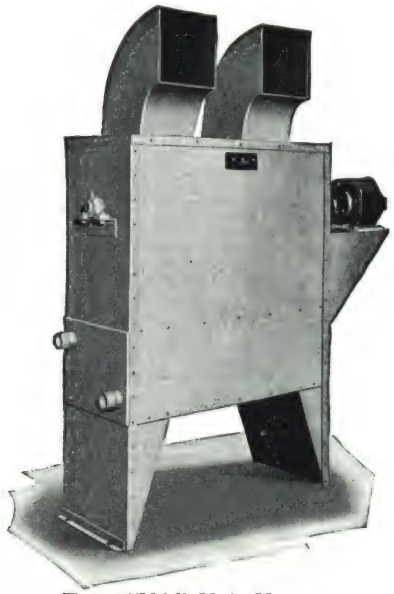
SKINNER BROS. MFG. CO., INC., "UNIT HEATERS"

Recommended for heating, ventilating, air conditioning industrial buildings, regardless of size, whether of permanent or temporary construction, sawtooth or monitor, single or multistory. In paper mills, dyehouses, packing plants, laundries, dairies and other buildings in which steam, vapor, condensation and drippings are troublesome. Installations in all parts of the world demonstrate their versatility and ability to heat buildings of any type of construction.

Making all types of unit heaters we are in a position to recommend and furnish the type or design of heater best suited for the requirements of your building.

Coils in heaters tested with 350 lbs. hydraulic pressure before shipment. The fans in the heaters are given a static and dynamic balance in order to insure the highest efficiency and smoothness of operation.

Catalogue will be furnished on request, giving detailed capacities and dimensions.



Type "UA" Unit Heater

SKINNER BROS. TYPE "UA" UNIT HEATER

This heater is of the draw-through type, in which the fans are placed between the coils and the outlet.

All units of this type have externally mounted motors, which are direct connected to the fan shaft through a flexible coupling. Bearings used are the self-aligning, ball bearing, pillow block type, and are mounted on rigid bearing supports firmly attached to the casing ends. The shafts are of high carbon steel and are ground to the exact size.

The coil sections are composed of either copper coil with extended surface or steel pipe with spring set steel fins.

The fan wheels are of the multiblade type, and have a blade setting that the air enters without shock and leaves outlet at a velocity to insure quietness.

The heater casings are constructed of 10 and 12 gauge high finish full pickled steel which give the heater a good finish and insure a long life.

CAPACITY TABLE TYPE "UA" UNIT HEATER

Recirculating air at 60° — Steam pressure 5 lb.

Size	Cu. ft. per min.	HP.	Rev. per min.	B.t.u. per hour	Final temperature	Condensation, lb.
22-1	1 750	½	1160	113 000	126	118
22-2	3 500	¾	1160	226 000	126	235
22-3	5 250	1½	1160	339 000	126	353
33-2	7 000	1½	1160	445.000	125	463
33-3	10 500	2	1160	668 000	125	696
44-2	9 000	2	860	574.000	125	597
44-3	13 500	3	860	861,000	125	896

Continued on next page

SKINNER BROS. TYPE "LW" UNIT HEATER

This heater is composed of a bank of extended surface radiation through which air is forced by a highly efficient propeller type fan. The core is welded construction throughout. The fan and motor are attached to the back plate which bolts to the header caps.

Type "LW" Unit Heater

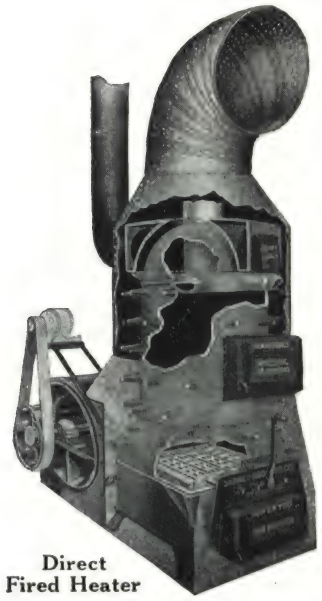
CAPACITY TABLE TYPE "LW" UNIT HEATER

Recirculating air at 60° Steam pressure 5 lb.

Size	C. F. M.	HP.	R.P.M.	B.t.u. per hr.	Condensation, lb.
52A	1055	1/20	1500	54,900	57
53A	1030	1/20	1500	67,500	70
72A	2685	1/6	1100	125,100	130
73A	2660	1/6	1100	162,400	169
92A	4140	1/4	820	196,600	205
93A	4040	1/4	820	254,000	264

SKINNER BROS. DIRECT FIRED HEATER

(Patented)



Direct Fired Heater

This heater is designed for buildings where steam is not available. It is a self-contained heating unit consisting of a cast iron firing chamber with a galvanized casing. The fan section is attached to the rear of the heater. The heater is designed for burning coal but makes a very efficient unit when equipped with an oil or gas burner. The simplicity of operation, low cost of installation and maintenance, securing maximum amount of heat with minimum amount of fuel, requiring very limited floor space, are the features of this heater. In the erection of the American Furniture Mart Building at Chicago this heater was used for temporary heat, and enabled the contractor to pour concrete and plaster with the outside temperature 17° below zero.

CAPACITY TABLE DIRECT FIRED HEATERS

Size	Cu. ft. per min.	HP.	Heating surface, sq. ft.	B.t.u. per hour
A	2900	1	48	160,000 to 300,000
B	5400	1½	65	300,000 to 600,000
C	8400	3	88	600,000 to 1,000,000

SKINNER BROS. STEAM COIL UNIT HEATER

This heater is constructed with a coil of ¾-in. steel pipe all prime surface and is designed for use in buildings in which the use of extended surface is not suitable. This is the original unit heater and a large number of installations have been in use for over twenty-five years and are still giving satisfactory service.

Steam Coil Unit Heater

CAPACITY TABLE STEAM COIL UNIT HEATER

Recirculating air at 60° Steam pressure 5 lb.

Size	Cu. ft. per minute	HP.	B.t.u. per hour	Condensation, lb.
448	6000	2	471,000	490
560	10000	3	851,000	887
672	15000	5	1,256.000	1299
784	25000	10	2,025,000	2109

PEERLESS UNIT VENTILATION COMPANY, INC.

PeerVent Heating and Ventilating Units—PeerHeat Units
General Air Conditioning Equipment

BRIDGEPORT, CONN.

SALES OFFICES IN ALL THE PRINCIPAL CITIES

Products

"PEERVENT" HEATING and VENTILATING UNITS, for schools, hospitals, libraries, churches, dormitories, clubrooms, theaters, banks, offices, auditoriums, and other buildings where many people congregate.

PEERHEAT UNITS, floor, wall and suspended types for industrial buildings, factories, garages and other spaces where large volumes of heated air are required.

Ratings and Engineering Data

Ratings and engineering data in accordance with American Society of Heating and Ventilating Engineers code adopted January 1930.

PeerHeat Units have all been tested and rated according to the new code of the American Society of Heating and Ventilating Engineers, adopted January 1930 and published April 1930.

This edition of SWEET'S CATALOGUES went to press too early to include herein the ratings and engineering data in accordance with the above mentioned code, but complete information with full details, drawings, dimensions and engineering data may be obtained from the nearest sales office or from the Home Office at Bridgeport, Connecticut.

Features of the Improved PeerVent Unit

The PeerVent Unit of today has many important improvements, including the new PeerFin radiator. This radiator consists of two large copper alloy tubes, each surrounded by a series of closely spaced fins, also of copper alloy. The fins are embedded tightly in the tubes so that under any conditions of expansion and contraction the fins and tubes are in perfect contact and there can be no loss of efficiency in the transfer of heat from tube to fin. The tubes are expanded into malleable iron headers, in the same manner that boiler tubes are expanded into the tube sheets, and the radiator assembly does not contain a single soldered, welded, braised or gasketed joint. Test pressure, 150 lb.; operating pressure, 100 lb.

Another improvement in the new PeerVent Unit is the noiseless alternating-current motor. This motor is of a design which has been developed after years of research and experimentation. It is mounted by means of a specially designed spring suspension, which precludes the possibility of noise caused by the transmission of phase vibrations.

This motor is equipped with an auto-transformer, an integral part of the motor, for providing speed regulation within limits obtainable with direct-current motors. This feature saves power, as less current is consumed at low speeds.

The new PeerVent motor improvements are the final step in placing the unit system on a strictly unit basis. The motor-generator outfit is eliminated. The unit motors operate independently and there is absolutely no expense for current except for the unit or units that are actually in service. A single room can be ventilated without the operation of any apparatus other than the PeerVent Unit. There is also a considerable saving in the elimination of the first cost and operating cost of the motor-generator equipment.

Other improvements in the new PeerVent Unit include a single-leaf inlet damper which takes the place of the former interconnected fresh air and recirculation dampers, eliminating mechanical linkage. There are no midway positions of this damper: either the full volume of fresh air enters the unit or there is a complete recirculation of the air in the room. This damper, as well as the mixing damper, has improved bearings. The mixing damper can be equipped with any type of automatic temperature control.

New fan housings have been designed, providing large discharge capacity at considerably lower tip speeds.

The mixing damper, radiator, motor and fan assembly, base assembly and air filter are all easily removable

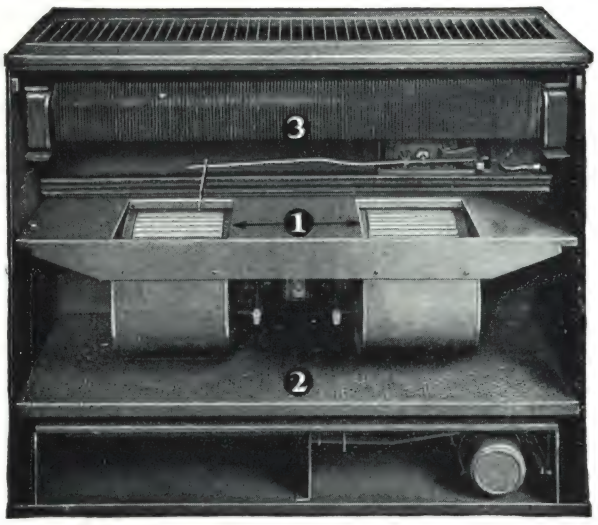
PeerVent Heating and Ventilating Unit

Continued on next page

without the use of tools. The air filter, which is not included as part of the standard unit-equipment, can be of any make preferred and can be installed after the unit has been erected, without any changes in the unit. The filter rests upon supports below the motor and fan assembly, sliding in and out of the unit like the drawer of a desk. With the filter in this position the air is cleaned before it reaches the fans, radiator, etc., and the dirt therefore does not reach these parts.

The new PeerVent Unit can be equipped with a positive-action PeerTherm Control, which automatically prevents the intake of cold air at any time when the room temperature falls below 65° (or any other predetermined temperature within a range of 15°).

Several types of PeerVent Units have now been standardized, and one or another of them will meet practically any architectural requirement, including installations in existing buildings. Six different types of control have also been standardized, including automatic control throughout, hand control throughout, and various combinations of hand and automatic regulation.



PeerVent Heating and Ventilating Unit with Front Removed

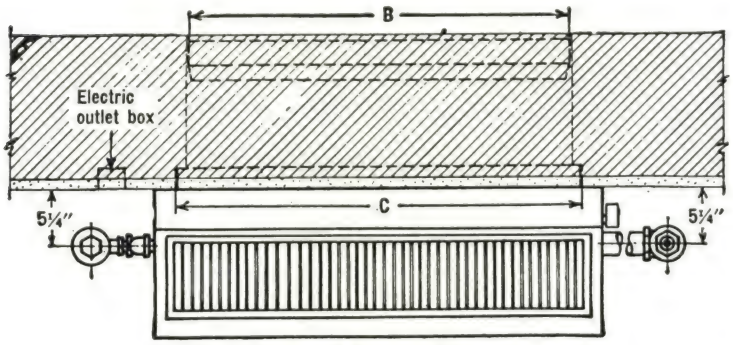
Two noiseless, motor-driven fans (1) draw in fresh air from outdoors through an opening in the back of the unit and force it upward through the unit. An air filter (2) of any type (purchased separately) cleans the incoming air before it is drawn upward to the fans. A special compact radiator (3) heats the air to the required temperature. Air then passes out of the unit vertically through a grille at the top with sufficient velocity to insure perfect diffusion, but without drafts.

Perfect control of room temperature is secured by a mixing damper (not shown) which swings back and forth in the space between the radiator and the fans, guiding the incoming air either through the radiator, or around the radiator, or partly through and partly around it. This mixing damper can be operated automatically under thermostatic control, or by hand. The volume of ventilation is constant, regardless of the position of the mixing damper

PeerVent Drawings

The accompanying drawings show the standard PeerVent heating and ventilating unit The unit illustrated on this page is equipped for thermostatic control of the mixing damper for controlling the room temperature automatically, and with pneumatic control of the recirculation damper. Hand controls can be provided if preferred.

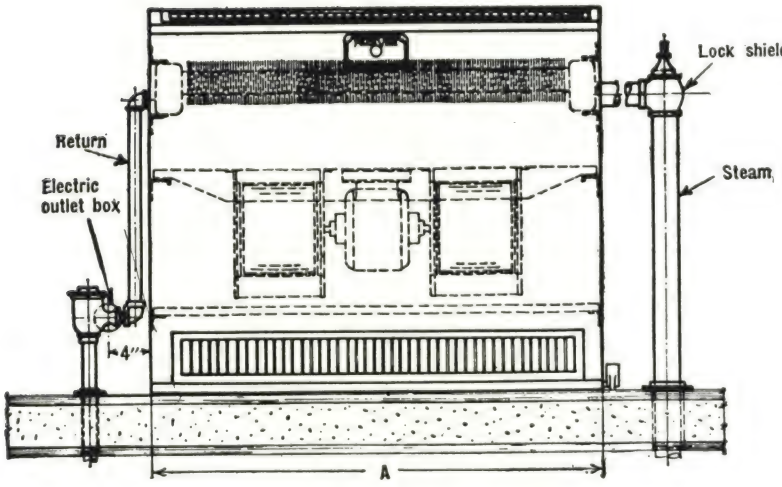
Adaptations of this unit can be furnished. Units can be provided for installation at the ceiling, also concealed and semiconcealed types, and other arrangements for special architectural requirements.



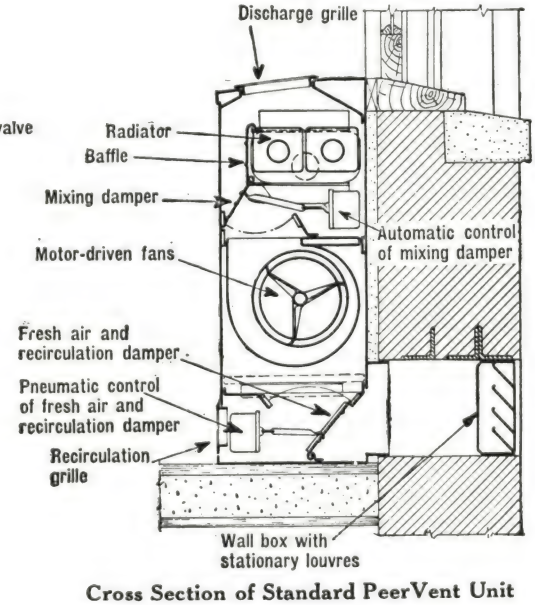
Plan View of Standard PeerVent Unit

PeerVent Catalog

The PeerVent Catalog describes the mechanical features of PeerVent Units, advantages of the PeerVent System, facts concerning installation, and directions for laying out a unit system of heating and ventilating. There are several pages of drawings which illustrate adaptations of PeerVent Units to special architectural conditions; also engineering data and useful tables. Send for this catalog and keep it in your files. If you wish to see our nearest sales representative, please so state.



Front Elevation of Standard PeerVent Unit



Cross Section of Standard PeerVent Unit

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ENGINEERING DATA—PEERVENT HEATING AND VENTILATING UNITS

Unit No.	Maximum number of pupils	Volume c.f.m.	Power consumption, watts	Entering air −20°			Entering air −10°			Entering air 0°			Entering air + 10°			Entering air + 20°		
				Final temp.	Capacity e.d.r.		Final temp.	Capacity e.d.r.		Final temp.	Capacity e.d.r.		Final temp.	Capacity e.d.r.		Final temp.	Capacity e.d.r.	
					Total	Excess		Total	Excess		Total	Excess		Total	Excess		Total	Excess
3624	15	450	70	85	258	37	90	240	48	95	222	58	102	211	73	108	197	85
	20	600	84	82	333	39	86	307	51	90	281	63	97	266	156	103	248	98
	25	750	98	79	404	36	81	363	44	85	331	58	92	314	85	98	292	110
3633	25	750	112	87	437	69	90	400	81	97	378	105	102	351	122	109	333	151
	30	900	126	83	506	64	87	464	81	91	428	100	96	394	119	104	378	153
	35	1050	146	79	567	52	83	520	73	85	464	82	90	428	108	99	414	151
3642	35	1050	141	84	595	80	86	537	90	94	513	131	100	481	161	108	461	198
	40	1200	168	80	653	86	83	594	82	90	562	125	96	526	160	104	504	204
	45	1350	195	76	705	44	81	654	79	87	612	120	93	572	160	99	533	195
3651	45	1350	186	86	780	123	90	718	143	94	660	168	100	619	207	108	593	255
	50	1500	208	80	805	80	83	742	104	90	702	157	95	650	186	104	628	253
	55	1650	226	74	845	37	77	764	61	86	738	125	90	672	168	97	634	222

Note: Heating capacities are expressed in square feet of equivalent direct radiation (e.d.r.). To express these capacities in B.t.u. per hour, multiply e.d.r. by 240. To obtain condensation pounds per hour, divide e.d.r. by 4.

Volume of air is expressed in cubic feet per minute (c.f.m.).

DIMENSION DATA—PEERVENT HEATING AND VENTILATING UNITS

Unit No.	Dimensions Height.....36 in. Depth.....14 in.		Approximate shipping weight, lbs.	Piping data Steam and return—5¼ in. from back of unit				
	Length over all, outside L	Fresh air intake, 8½ x 8 in. B		Height of steam and return from floor, in.	Steam size, in. (see note)		Return size, in. (see note)	
					Gravity system	Vacuum system	Gravity system	Vacuum system
3624	24⅜	18½	250	27¾	1½	1¼	1	¾
3633	33⅜	27½	300	27¾	2	1½	1	¾
3642	42⅜	36½	350	27¾	2	2	1	¾
3651	51⅜	45½	400	27¾	2	2	1	¾

Note: PeerVent radiators are tapped 2 in. for both steam and return connections but can be reduced, at first fitting outside casing, to sizes given in table. Bushings must not be used. PeerVent radiators can be connected with either right or left steam supply.

PeerHeat Units

PEERHEAT

PeerHeat Units are made in four types as shown in six sizes, three different motor speeds for direct current and 60-cycle alternating current and one motor speed for 25-cycle alternating current. These heaters range from 2,000 to 20,000 c.f.m. and from 150,000 to 1,300,000 B.t.u.

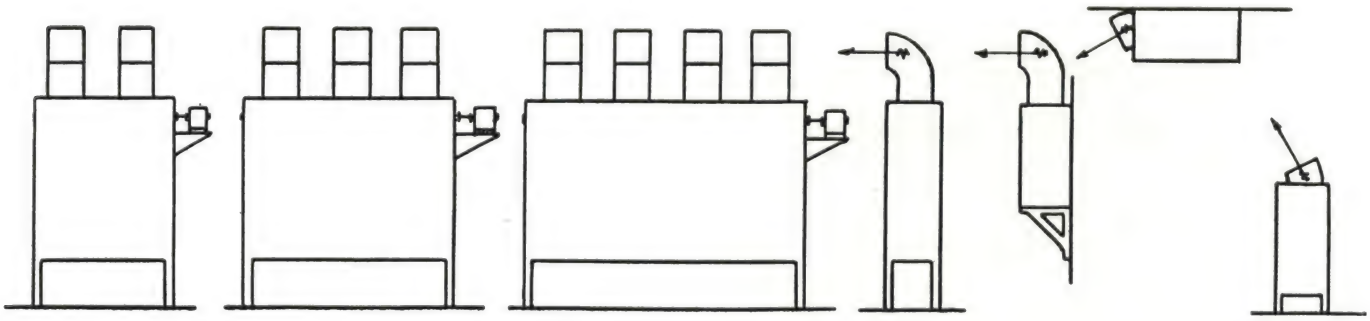
PeerHeat Units are equipped with standard motors operating at standard speed, direct connected to the fan assembly which is mounted in ball bearings.

The radiators in PeerHeat Units are of copper U-tube construction with copper fins.

Heater casings are arranged to give ready accessibility to all parts.

Any standard make of thermostatic control may be applied to PeerHeat Units.

Complete information with full details, drawings, dimensions and engineering data may be obtained from the nearest sales office or from the Home Office at Bridgeport, Connecticut.



PeerHeat Units

Data Sheets
for
THERMOLIER

A Grinnell
Development in
UNIT HEATERS

GRINNELL COMPANY
INC.

PROVIDENCE, R. I.

GRINNELL THERMOLIER

A UNIT HEATER with Fourteen Points of Superiority

The Thermolier

A unit heater of especially rugged construction, unusual heating efficiency and with indestructible copper housing—a development in unit heaters based upon 50 years' experience in heating. Thermolier has Fourteen outstanding features, dictated by practical engineering knowledge.

Other Grinnell Products

The Grinnell Company products include also Sprinkler Systems, Thermoflex Heating Specialties, Equiflo Valves, Fittings, Fabricated Pipe and adjustable Pipe Hangers. For these products see Manufacturers' Index.

Grinnell Service

A half century of experience stands in back of all Grinnell products, the benefits of which we offer freely as consultants in any matter pertaining to the use of our products. At each of our sales offices will be found an engineering staff ready to aid in the solution of problems in the various fields of industry covered by the Grinnell Company.

GRINNELL COMPANY INC. FOUNDED 1850

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PROVIDENCE, R. I.

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Continued on next page

GRINNELL THERMOLIER UNIT HEATERS

ISSUED NOVEMBER, 1930

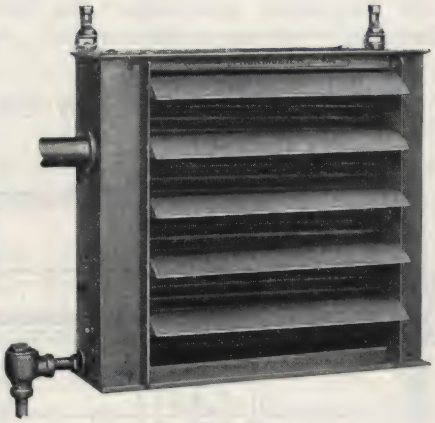
Comfortable Heating a Requisite

Industrial Type

Types and Models

Thermolier is made in two types (Industrial and Factory) and 16 models (or capacities). The Industrial and Factory types are essentially the same, the only difference being in the housing. The Industrial Type is encased in a polished copper housing which adds greatly to the appearance and makes it particularly appropriate where finished appearance is a consideration. The Factory Type is encased in a housing of steel and is finished in gray duco and is used where appearance is not of great importance.

The Industrial and Factory type Thermoliers are made in regular and "A" models (the latter being a unit of less heating surface). Various sizes, capacities, etc., of Thermoliers are hereinafter fully shown and described.



Factory Type

The fundamental consideration in all heating is comfort, because comfort means efficiency of employees, which in turn means production and profits.

Comfort in heating, in the last analysis, means unawareness of the fact that there *is* any heating. To obtain such comfort means that you must have just the heat you want when and where you want it. It means that you must have more heat on cold days and less heat on mild days. It means comfort, regardless of outside temperature or interior conditions.

Inefficiency of Old Methods

The old method of heating industrial and commercial buildings, by pipe coils and cast-iron radiation was unable to secure this kind of comfort without very expensive automatic controls on steam systems or very careful central control to vary the temperature of the heating medium in hot water systems. The new method of unit heating meets these desired ends in a revolutionary manner.

Underlying Principles

The underlying principle in unit heating is to produce a large amount of heat in a small amount of space and then to widely distribute this heat through air movement. This is accomplished by rapid air circulation over very efficient radiating surfaces. The units which do this are so small that when the rapid air movement is stopped, they radiate only a nominal amount of heat. For this reason, steam or hot water is always in the radiating elements. The amount of heat taken from the radiating elements and diffused, depends entirely on whether the fan (which is an integral part of each unit) is running or not. Except for structural features, the principle is exactly the same as that employed in automobile radiators.

This principle of heating is revolutionary in that it provides the acme of comfort at a cost substantially less than that of an ordinary direct steam system and at a mere fraction of the cost of systems that would provide anything approaching the same result in comfort by means of central or automatic control. It further provides almost instantaneous heat, which it is quite impossible to obtain with cast-iron radiation or coils.

Economy

The principle of unit heating is extremely broad in its revolutionary character, in that it successfully meets five basic elements which go to make up heating cost and which are the determining factors in the choice of all heating equipments. These five basic elements are:

(1) Minimum Initial Investment
(2) Minimum Expense of Operation
(3) Minimum Maintenance
(4) Minimum Depreciation
(5) Maximum Adaptability

Grinnell Thermolier

The Grinnell Thermolier is a modern and exceptional "unit heater"; a type of heater which is rapidly becoming standard for use in industrial buildings, garages, and some classes of commercial structures. The reason for this is apparent when it is realized that a Thermolier weighing approximately 200 lb. does the work of more than 5000 lb. of cast-iron radiation and occupies a space of less than 8 cu. ft. Unit heaters, too, can be installed in convenient out-of-the-way places. They can be hung from ceilings, supported on columns or suspended from beams. This without interfering with the comfort of the operators or

Continued on next page

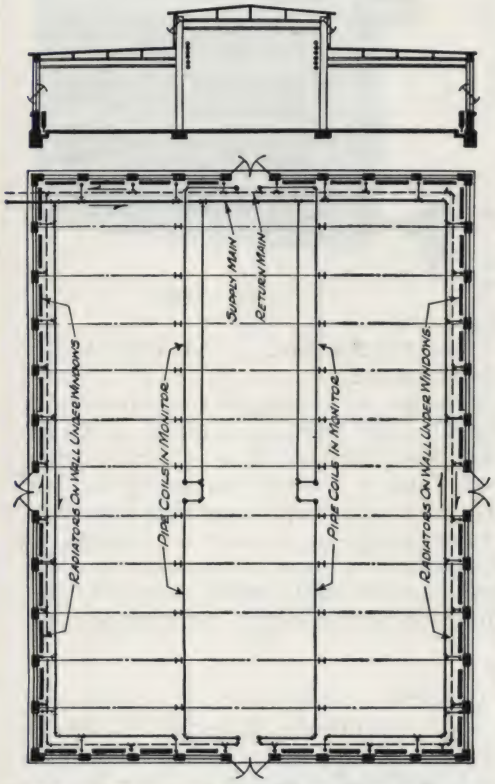
GRINNELL THERMOLIER UNIT HEATERS

ISSUED NOVEMBER, 1930

the most economical arrangement of operating machinery and equipment.

A More Efficient and Rugged Unit—In the Thermolier, GRINNELL COMPANY, INC., believes it is offering a development of unit heater so ruggedly built and so conservatively engineered that it is exceptionally well suited to make this revolutionary heater principle more effective, more successful and of wider practical application.

Layouts Showing How Unit Heating Principle Lowers Initial Investment



Materials Required with Direct Steam System

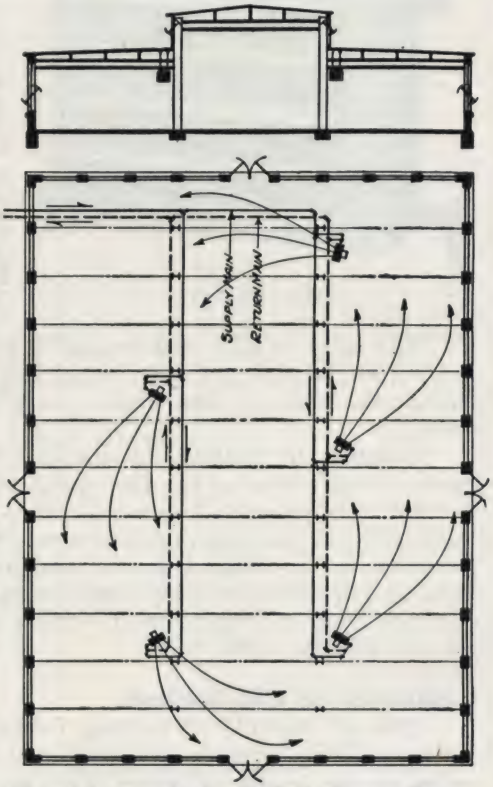
As Compared With Direct Steam

A unit heater system would require only one-eighth the number of valves, traps and accessories.

A unit heater system would require only one-eighth the number of elbows, tees, unions and other fittings.

A unit heater system would require only one-fifth the amount of pipe for supply and return lines.

A unit heater system would require only one-fifteenth of the weight in radiating elements.

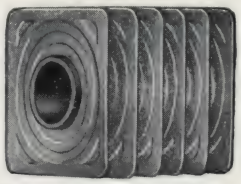


Materials Required with Unit Heater System

The 14 Features Which 50 Years' Heating Experience Built Into Thermolier

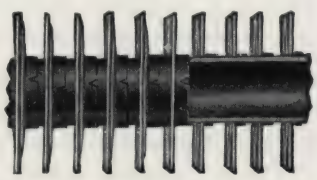
There are fourteen engineering and structural features built into Grinnell Thermolier which should give architects great confidence and freedom in adopting the principle of unit heating to their own particular problems. These features follow:

1 The steam container in the heating element of Thermolier is made of ⅜-in. seamless copper tubing, which under actual bursting tests has withstood an internal pressure of 9500 lb. Stamped fins ⅞ in. sq., slightly corrugated for stiffness, are attached uniformly to this tubing by automatic machinery. Square fins provide 24% more area than round fins occupying the same space. This accounts in no small degree for the large amount of heat obtained from the small frontal area of Thermolier.



⅜-in. Seamless Copper Tubing
Square brass fins

2 No solder whatever is used for strength in Thermolier assembly. The deep, tight fitting collars on the fins provide ample support and large



No Flat Horizontal Surfaces to Catch Dirt

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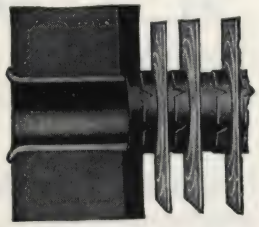
GRINNELL THERMOLIER UNIT HEATERS

ISSUED NOVEMBER, 1930

metal contacts for rapid heat transfer from tubes to fins. The final immersion of the tube and fin assembly in a solder bath is only for the purpose of establishing a permanent metal bond between fins and tubes and is not a strength factor.

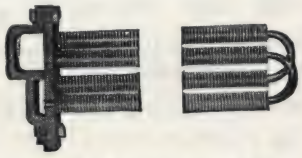
3 Reference to the illustrations in 1 and 2 will show that the heating element of Thermolier has been carefully planned to reduce the possibility of dirt-collection to an absolute minimum. Of the total heating surface, 89% is provided in *vertical* fins, which will not catch or hold dirt. The remaining 11% of the heating surface consists of the round, horizontal tubes. Only a small area at the top of the tubes could conceivably catch dirt. There is absolutely no flat horizontal surface in the unit. This minimizing of the possibility of dirt-collection is important because the deposit of dirt particles on a flat surface tends in time to seriously decrease the efficiency of such a heating element even if it does not eventually seriously interfere with the air flow through the unit.

4 As a result of many years of experience and experiment with solder in the manufacture of automatic sprinkler heads, Grinnell engineers decided against solder as a strength element in Thermolier. Again following the teachings of experience, these engineers adopted a "time-tried" process of attaching tubes to the header. Each tube in the Grinnell Thermolier is therefore expanded into a cast-iron tube sheet ½ in. thick, the finished job being practically a rolled joint. This method of header construction has been almost exclusively used for many years in the construction of condensers, heat exchangers, and other important apparatus for power plant and process work. Obviously with this construction the steam pressures which heating element of Thermolier will withstand is limited only by the weight of the cast iron header. The standard unit is built for 125 lb. working steam pressure, and may be used with ample safety up to that pressure. The proportionate gain in heating value at the higher pressures over that obtained at lower pressures does not recommend this usage, however, in view of the added possibilities for piping and trap troubles at increased pressures. Except when used in connection with drying and other special cases the higher air temperatures which obtain with increased steam pressures are also objectionable.



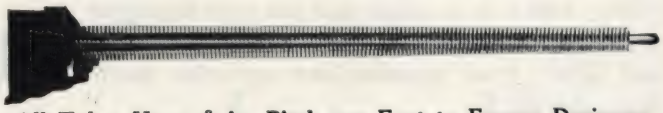
Tubes Expanded into Cast Iron Tube Sheet

5 The accompanying illustration showing a section cut through a complete Thermolier heating element, emphasizes two other practical engineering features of Thermolier. At the left is shown the large gasket bearing surface into which is heavily bolted a gasket of the very materials used in steam piping work for the highest pressures and temperatures. At the right are shown the perfect expansion bends, which are a part of every tube in Grinnell Thermolier. These bends compensate for contraction and expansion strains and consequently add greatly to the absolute dependability of the unit over long periods of time.



Perfect Expansion Bends Take Up All Strains

6 The accompanying illustration is a section cut out of a complete Thermolier heating element to show the pitch of each tube. The pitch is not less than $\frac{3}{16}$ in. per ft., which provides perfect and rapid drainage of condensation, thus increasing heating efficiency and doing away with the possibility of noisy and destructive water hammer on account of accumulated condensation.



All Tubes Have $\frac{3}{16}$-in. Pitch per Foot to Ensure Drainage

7 The motor on a unit heater is exceedingly important. In choosing this particular piece of equipment, Grinnell Company drew on the experience of its subsidiary, the American Moistening Company, which has been building humidifiers since 1888. As a result of this experi-

Continued on next page

GRINNELL THERMOLIER UNIT HEATERS

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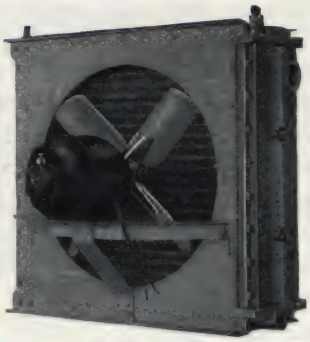
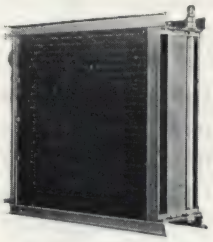
ence, Thermolier has a motor fully inclosed to keep out dirt and moisture. It has a motor equipped with ball bearings to reduce maintenance and upkeep. It has an oversize motor, especially wound to provide high efficiency and a high power factor. The direct-connected fan is also an outgrowth of our humidifying experience and is the most efficient that could be found for such service. It has a heavy hub and aluminum blades. The mounting for motor and fan is a heavy angle iron frame, reinforced by a sturdy, supporting leg.



Specially Built Motor on Rugged Bracket

8 This view of Thermolier, taken in connection with the illustration under 7, illustrates clearly the great ruggedness of this unit. Realizing that the frame is the backbone of the completed assembly, we adopted a design in which strength was the fundamental consideration. It is to be particularly noted how the heavy hanger rods extend through and become an integral part of the completed frame. Special attention is directed to the form of the frame, which is so made that the outside copper or steel housing covers and protects it closely and tightly from moisture and any other corrosive agencies.

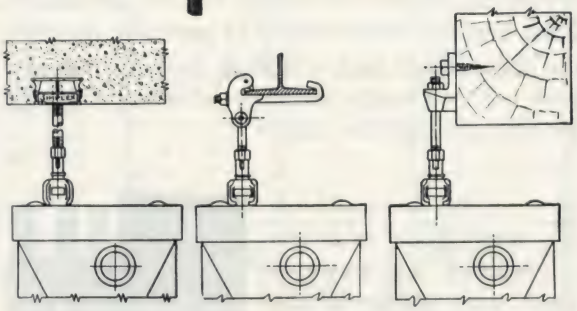


Heavy Frame with Through-bolt Hangers

Easily Adjustable Swivel Socket Hangers

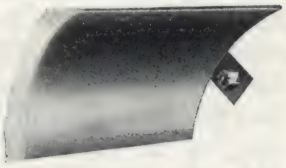
9 These illustrations show a recent addition to the well known Grinnell Hanger Line. This particular hanger is called the "Adjustable Swivel Coupling" and was especially developed to provide a standard method of hanging Grinnell Thermoliers. This hanger is an integral part of each unit. By reference to the illustration, it will be noted that the swivel is loose in the socket, which allows vibration from building or machinery to be taken up in the hanger and not transmitted to the unit.

10 The illustrations below show three of a dozen or more methods by which Thermolier, with its Adjustable Swivel Coupling, may readily be attached to various types of building construction. Grinnell shows in its



Hanger Catalogue the full line of adjustable hangers which may be utilized in connection with this special swivel coupling. This catalogue will be sent on request to anyone interested.

11 Like everything else in connection with Thermolier, the louvers are designed to last indefinitely, in that they are made of heavy, pure copper for Industrial Type or heavy steel finished in gray duco for Factory Type. These louvers are provided simply to direct the air flow in the direction required and each louver may be adjusted independently of the other. When proper direction has been established, the louvers may be set permanently into place, simply by tightening the brass nuts shown in the smaller view.



Independently Adjustable Louvers

Continued on next page

GRINNELL THERMOLIER UNIT HEATERS

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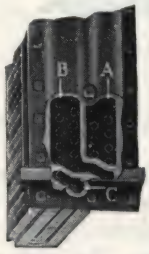
12 This illustration is designed to show one of the most unique features of Thermolier, a feature so simple, practical, and valuable that engineers and contractors alike will be quick to realize its importance.

Due to the construction of the header in Thermolier, steam circulation and removal of condensation in this unit are distinctly different than is usual in such heaters.



Unique Header Construction
Forces all condensation through integral cooling leg

Steam is delivered into chamber "A" of the header and circulates from there through the pitched U tubes, carrying its condensation with it into chamber "B." By partitioning off the lower tubes at the bottom of the steam supply chamber "A," these tubes carry all condensation from chamber "B" into drain chamber "C." In passage of this condensation through these tubes, the air from the fan is rapidly carrying off heat just as it does in the rest of the unit. The result is that these lower tubes form an efficient internal cooling leg, integral with the unit. The actual cooling effect of this construction is equal to a run of more than 100 ft. of the ordinary, exterior cooling leg piping.

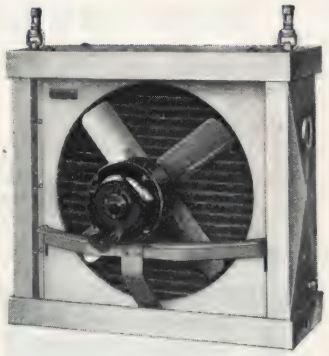
13 Due to the efficient functioning of the internal cooling leg, it is practical with the Grinnell Thermolier to make an exceedingly close connection of the return trap, as indicated on the accompanying illustration.

Simple Piping Connections
Both on same side, with close return trap

The condensation coming from the unit is cool enough so that the trap will operate continuously even when the unit is working at maximum capacity for long periods.

This feature, combined with the fact that the steam supply connection is at the same end of the unit, makes for compactness and neatness in the piping connections.

14 These pictures are rear views of the completed units, which, taken in connection with the illustrations on page 1, shows how the copper housings cover the whole unit, protecting the heavy steel framework from moisture and adding to the inherent ruggedness and quality of the unit and making it in appearance unequalled in the field.

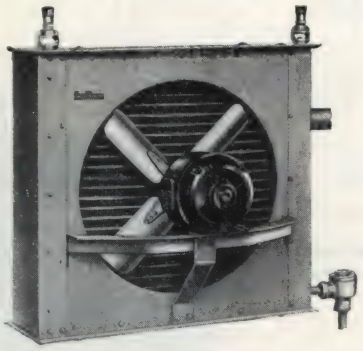


Copper Housing Makes for Durability and Fine Appearance
Thermolier—Industrial Type

All models are provided with a special paper covering during shipment, which may be easily removed after installation, thus protecting the unit's appearance until ready for use.

The fourteen features illustrated and briefly described are vital and important only when built into a working unit by a company of unquestioned integrity and responsibility.

Of greater significance even than these features is the fact that "Thermolier" is sponsored by Grinnell Company, with its half century of heating experience and its reputation as one of the country's leading manufacturers and distributors of cast-iron fittings, adjustable pipe hangers, fabricated piping, and general piping supplies.



Steel Housing with Gray Duco Makes for Durability and Neat Appearance
Thermolier—Factory Type

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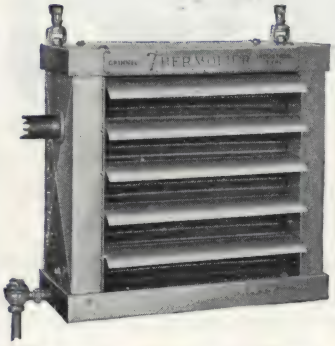
GRINNELL THERMOLIER UNIT HEATERS

ISSUED NOVEMBER, 1930

TYPES AND MODELS OF THERMOLIER



Thermolier—Industrial Type

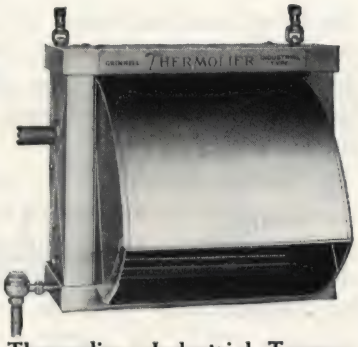
Industrial Type

Models 100-200, 300-400, 600-800, 1200-1600.

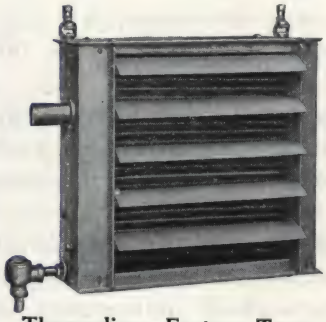
Models 100A-200A, 300A-400A, 600A-800A, 1200A-1600A.

Available with polished copper or chrome plated housing. Suitable for use in mercantile buildings, manufacturing buildings, factory offices, stores, etc., where the best in appearance is desired.

Velocity nozzles have same finish as units to which they are attached.



Thermolier—Industrial Type—with Velocity Nozzle



Thermolier—Factory Type

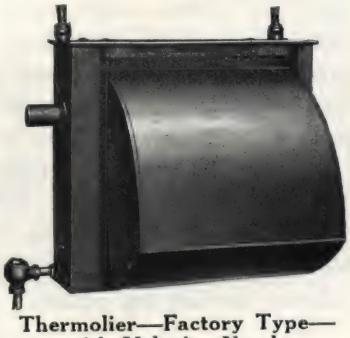
Factory Type

Models 100-200, 300-400, 600-800, 1200-1600.

Models 100A-200A, 300A-400A, 600A-800A, 1200A-1600A.

Available with steel housing gray Duco finish. Slightly less expensive than copper housing unit and for use where appearance is not of paramount importance. Appearance very substantial but not elaborate.

Velocity nozzles have same finish as units to which they are attached.



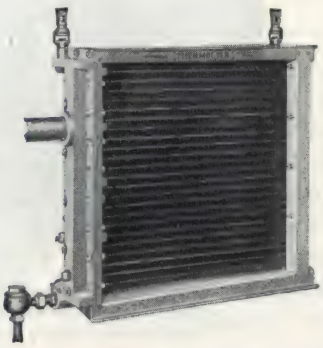
Thermolier—Factory Type—with Velocity Nozzle

Thermolier without Housing

This unit available in all model numbers as above.

It has no housing but has very substantial steel frame.

Usually used to build into special housing, duct or wall.



Thermolier without Housing

Portable Type

This type available in Model 800 only. It is portable and is used for temporary heat application.

List price $260.00
Approximate net weight .....360 lb.
Approximate shipping weight...485 lb.

Thermolier—Portable Type

Continued on next page

GRINNELL THERMOLIER DATA SHEET

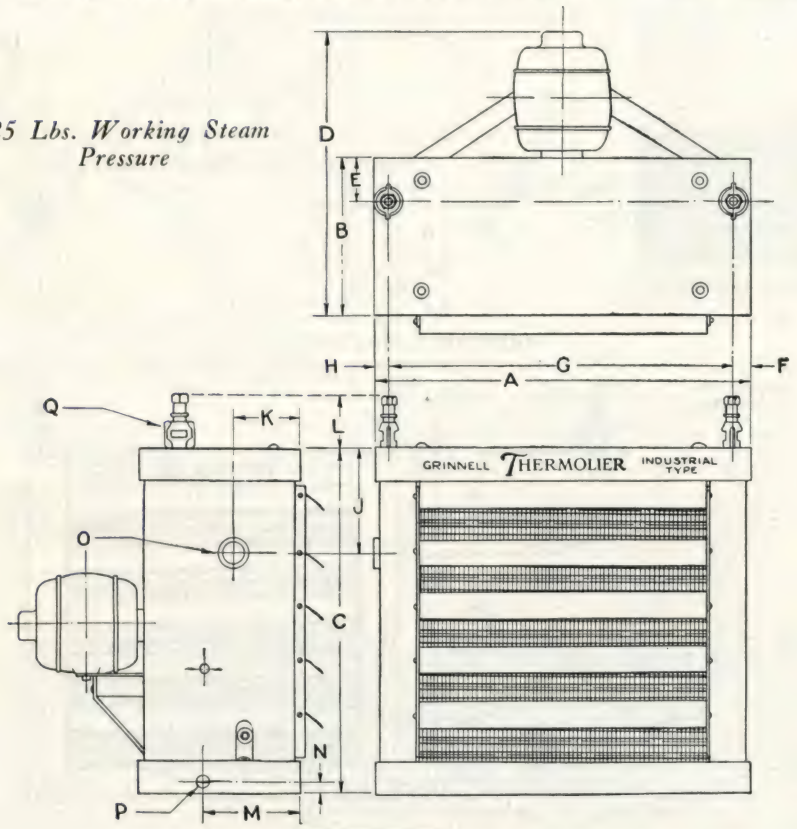
ISSUED NOVEMBER, 1930

DIMENSIONS, LIST PRICES AND WEIGHTS FOR THERMOLIER

Industrial Type

Models 100, 200, 300, 400, 600, 800, 1200 and 1600
Models 100A, 200A, 300A, 400A, 600A, 800A, 1200A and 1600A

125 Lbs. Working Steam Pressure



DIMENSIONS

Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	O Supply	P Return	Q	Number of louvers
100, 100A, 200, 200A	14¼	8½	11¾	*15	2 3/16	15/16	12 5/8	11/16	2¾	3¼	2⅝	5 11/16	13/16	1¼	½	†⅜	3
300, 300A, 400, 400A	21⅛	10 7/16	18 7/16	*17	2 15/16	1	19⅛	1	3¾	4 1/16	3⅛	6⅝	15/16	1½	¾	†½	4
600, 600A, 800, 800A	27¾	11⅞	25½	*21	3⅞	1 11/16	24⅞	1 3/16	7⅝	4⅞	4	6⅞	1 1/16	2	‡1	†⅝	5
1200, 1200A 1600, 1600A	36½	12¾	32⅝	*25	4¼	1½	33 11/16	1¼	9 7/16	5 5/16	5 7/16	6⅞	1¼	2½	‡1¼	†⅞	6

All dimensions given in inches. *This dimension varies slightly with different motors. †Adjustable swivel coupling (furnished with Thermolier) tapped standard bolt thread. ‡Outlets bushed to pipe size next smaller than indicated in table.

LIST PRICES AND WEIGHTS

Model No.	100 200	100A 200A	300 400	300A 400A	600 800	600A 800A	1200 1600	1200A 1600A
Price of unit, industrial type, complete with copper housing	$100.00	$ 90.00	$150.00	$135.00	$200.00	$180.00	$385.00	$345.00
Price of unit, industrial type, complete with chrome plated housing	110.00	100.00	160.00	145.00	215.00	195.00	405.00	365.00
Deduct for omission of motor, bracket and fan	$20.00		$35.00		$50.00		$90.00	
Deduct for omission of copper housing	10.00		13.00		15.00		40.00	
Deduct for omission of louvers per set (either finish)	2.00		4.00		5.00		20.00	
Price, additional for multi-speed single or three phase A-C. motor (See Page 35)	20.00		20.00		20.00		30.00	
Price, additional for rheostat for use with D-C. motor, for variable speed operation (See Page 35)	20.00		20.00		20.00		30.00	
Prices of electrical control equipment	See Page 34							
Approximate shipping weight, complete unit	70 lb.		130 lb.		250 lb.		550 lb.	
Approximate net weight, complete unit	55 lb.		105 lb.		190 lb.		400 lb.	

Continued on next page

GRINNELL THERMOLIER DATA SHEET

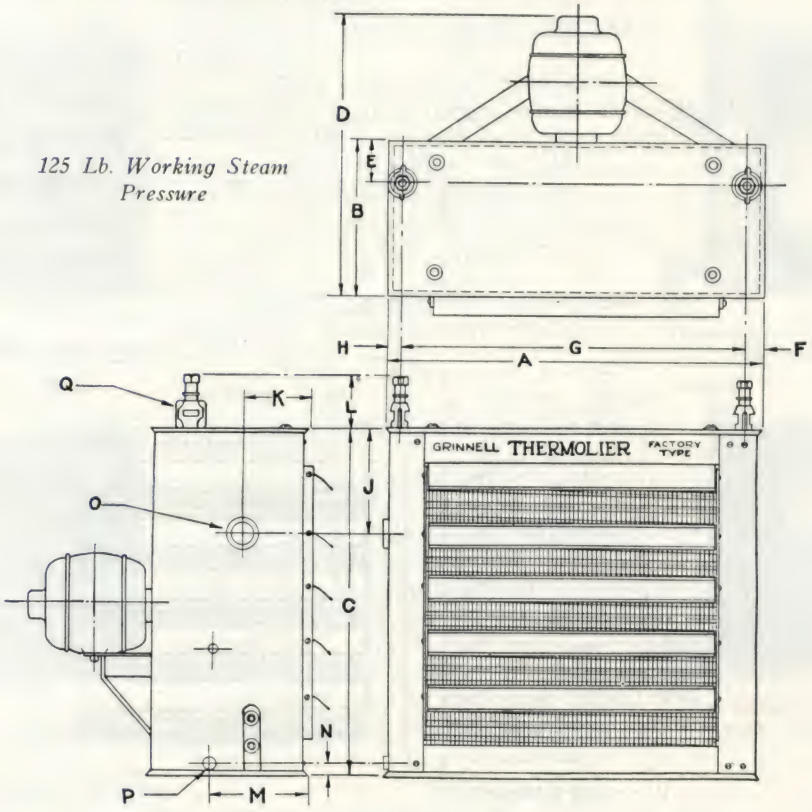
ISSUED NOVEMBER, 1930

DIMENSIONS, LIST PRICES AND WEIGHTS FOR THERMOLIER

Factory Type

Models 100, 200, 300, 400, 600, 800, 1200 and 1600
Models 100A, 200A, 300A, 400A, 600A, 800A, 1200A, and 1600A

125 Lb. Working Steam Pressure



DIMENSIONS

Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	Number of louvers
100, 100A, 200, 200A...	14 3/8	8 1/8	11 13/16	*14 13/16	2 1/8	1	12 5/8	3/4	2 3/4	3 1/16	2 5/8	5 1/2	13/16	1 1/4	1/2	† 3/4	3
300, 300A, 400, 400A...	21 1/4	9 3/8	18 1/2	*16 1/2	2 11/16	1	19 1/8	1 1/16	3 3/4	3 9/16	3 1/8	6 1/8	13/16	1 1/2	3/4	† 1/2	4
600, 600A, 800, 800A...	27 3/4	9 3/4	25 9/16	*19 15/16	2 13/16	1 11/16	24 7/8	1 3/16	7 11/16	3 13/16	4	5 15/16	1 1/8	2	‡1	†5/8	5
1200, 1200A. 1600. 1600A	36 7/16	11 1/16	32 3/4	*24 1/4	3 7/16	1 1/2	33 11/16	1 1/4	9 1/8	4 5/16	5 7/16	6	1 5/16	2 1/2	‡1 1/4	†7/8	6

All dimensions given in inches.
*This dimension varies slightly with different motors.
†Adjustable swivel coupling (furnished with Thermolier) tapped standard bolt thread.
‡Outlets bushed to pipe size next smaller than indicated in table.

LIST PRICES AND WEIGHTS

Model No.	100 200	100A 200A	300 400	300A 400A	600 800	600A 800A	1200 1600	1200A 1600A
Price of unit, factory type complete with steel housing...	$94.00	$84.00	$142.00	$127.00	$190.00	$170.00	$365.00	$325.00
Deduct for omission of motor, bracket and fan.....	$20.00		$35.00		$50.00		$90.00	
Deduct for omission of steel housing.....	4.00		5.00		5.00		20.00	
Deduct for omission of louvers per set.....	2.00		4.00		5.00		20.00	
Price additional for multi-speed single or three phase A-C. motor (See Page 35).....	20.00		20.00		20.00		30.00	
Price additional for rheostat for use with D-C. motor for variable speed operation (See Page 35).....	20.00		20.00		20.00		30.00	
Prices for electrical control equipment.....	See Page 34							
Approximate shipping weight, complete unit.....	70 lb.		130 lb.		250 lb.		550 lb.	
Approximate net weight, complete unit.....	55 lb.		105 lb.		190 lb.		400 lb.	

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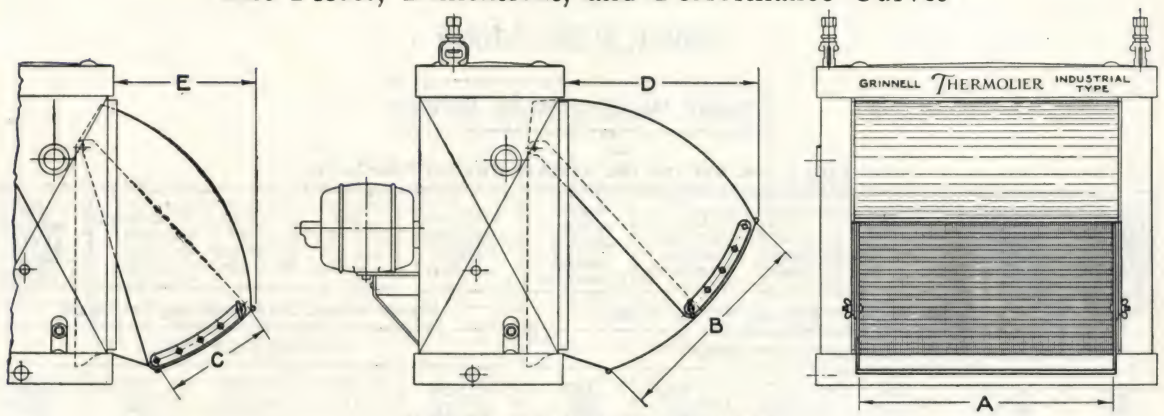
GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

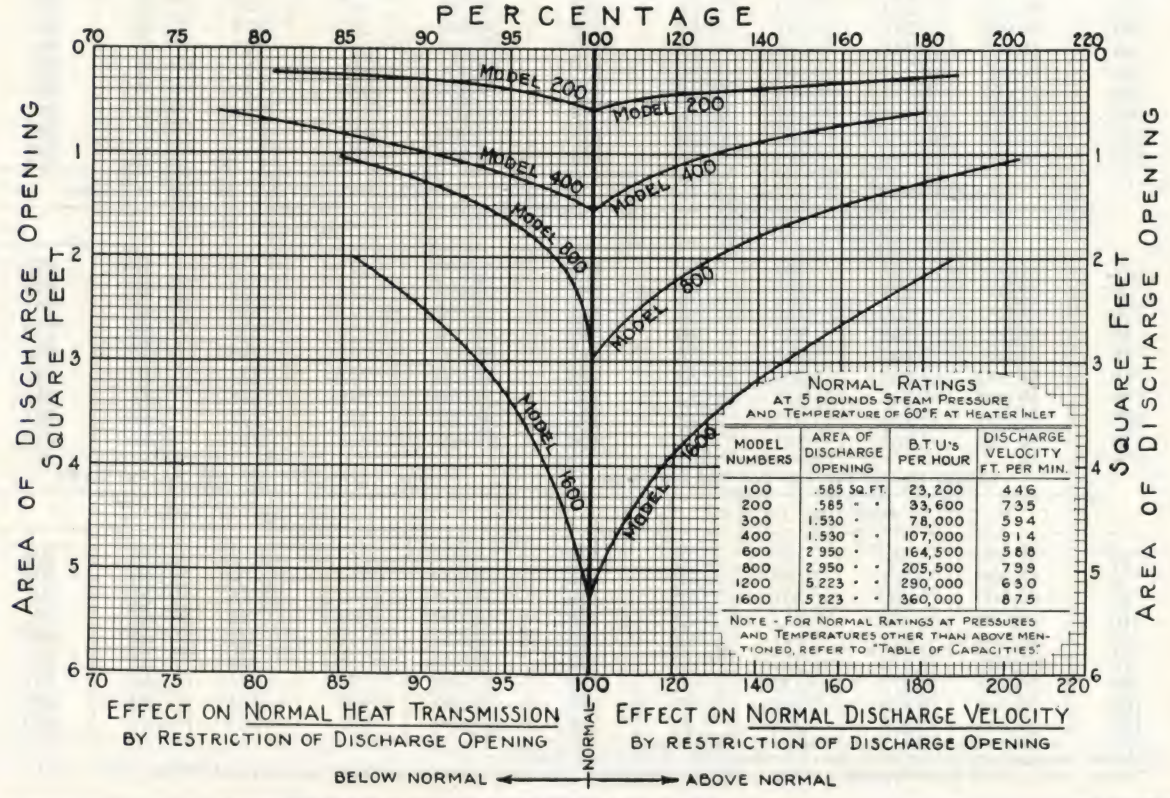
APPLICATION OF VELOCITY NOZZLE TO THERMOLIER

List Prices, Dimensions, and Performance Curves



LIST PRICES AND DIMENSIONS

Thermolier model No.	100—100A 200—200A	300—300A 400—400A	600—600A 800—800A	1200—1200A 1600—1600A
*List price—velocity nozzle only—copper	$12.00	$12.00	$15.00	$25.00
—Chrome plated	15.00	15.00	20.00	32.00
—Steel duco finish	8.00	8.00	10.00	15.00
*Note.—List prices shown include adjustment for omission of louvers.				
A Length of discharge opening	9¼ in.	14¾ in.	20¾ in.	28 in.
B Maximum width of discharge opening	8⅜ in.	12¾ in.	16 15/16 in.	23 in.
C Minimum width of discharge opening	3⅞ in.	6¾ in.	8 7/16 in.	10½ in.
D Maximum overhang	5½ in.	8 in.	10¾ in.	14½ in.
E Minimum overhang	7 in.	11 in.	15¼ in.	22½ in.



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GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 100

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	31,700	251	115	35	449	35,400	254	121	38	454
0	30,700	250	125	32	447	32,200	253	131	34	452
20	27,600	249	135	29	445	29,100	252	142	30	450
40	24,600	248	145	25	443	26,100	251	152	27	447
60	21,600	247	154	22	441	23,200	250	161	24	446
70	20,100	246	158	21	439	21,700	249	165	23	445
80	18,600	246	163	19	439	20,300	249	170	21	444
100	15,800	244	171	16	436	17,300	247	178	18	442
120	12,900	243	180	13	435	14,600	246	187	14	439
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	37,400	257	129	39	460	41,600	264	145	44	472
0	34,200	256	139	36	458	38,100	263	155	41	470
20	30,900	255	149	33	455	34,800	262	165	38	468
40	27,900	254	159	29	453	31,700	261	175	35	466
60	24,900	253	168	26	451	28,800	259	185	31	463
70	23,400	252	173	25	450	27,300	259	189	30	462
80	22,000	251	177	23	449	25,700	258	194	28	461
100	19,100	250	186	20	447	22,800	257	203	25	459
120	16,200	249	195	17	445	20,000	256	212	22	457
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	45,600	272	163	51	485	48,600	277	178	54	495
0	42,400	271	173	47	483	45,400	276	187	51	493
20	39,200	269	183	43	481	42,200	275	198	48	491
40	36,000	268	193	40	479	39,000	274	208	44	489
60	33,000	267	203	36	477	36,000	272	218	41	486
70	31,500	266	208	35	476	34,500	272	223	39	485
80	30,000	265	213	34	475	33,000	271	228	37	484
100	27,100	264	222	30	473	30,000	270	237	34	482
120	24,200	263	231	27	470	27,200	268	247	31	480
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	51,200	282	187	59	503	53,200	286	193	62	508
0	48,000	281	196	55	501	50,000	284	203	58	506
20	44,900	279	207	51	499	46,800	282	213	54	504
40	41,700	278	217	47	496	43,700	281	224	51	501
60	38,600	277	227	44	493	40,500	279	234	47	499
70	37,000	276	232	42	492	39,000	278	239	45	498
80	35,600	275	237	40	491	37,500	278	244	44	497
100	32,500	274	247	37	489	34,500	277	254	40	494
120	29,600	273	256	34	487	31,600	276	263	37	492

Above ratings compiled by Division of Engineering, Brown University.
*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 18%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 100-A

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage				
	Steam temp. 216° Fahr.				
—20	30,000	350	70	31	458
0	26,000	349	84	27	456
20	24,500	348	97	25	454
40	21,000	347	109	22	452
60	17,500	346	122	18	450
70	15,000	346	127	15	448
80	13,500	345	135	13	448
100	10,000	344	148	10	446
120	7,000	343	160	7	444
	Steam Press. 10 Lb. per Sq. In. Gage				
	Steam temp. 240° Fahr.				
—20	35,000	357	80	36	471
0	31,000	356	95	32	470
20	27,500	355	108	29	468
40	24,000	354	120	26	467
60	20,300	353	133	21	465
70	18,500	353	139	18	464
80	16,500	352	146	17	463
100	13,000	351	158	14	461
120	10,000	350	171	10	460
	Steam Press. 50 Lb. per Sq. In. Gage				
	Steam temp. 298° Fahr.				
—20	41,000	372	110	45	495
0	37,000	371	124	41	493
20	33,500	369	137	37	491
40	30,000	368	149	33	489
60	26,000	367	161	28	487
70	24,500	366	167	27	487
80	22,500	365	174	25	486
100	18,500	364	187	20	484
120	15,500	363	199	17	482
	Steam Press. 100 Lb. per Sq. In. Gage				
	Steam temp. 338° Fahr.				
—20	45,000	382	130	51	512
0	40,500	381	144	46	510
20	37,200	379	157	42	508
40	33,500	378	169	38	506
60	30,000	378	182	34	503
70	28,000	377	188	32	501
80	26,500	376	194	30	499
100	23,000	375	207	26	497
120	19,300	374	220	22	496

Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velociry at exit linear ft. per min.
Steam Press. 5 Lb. per Sq. In. Gage				
Steam temp. 228° Fahr.				
33,000	354	75	34	462
29,300	353	90	30	461
25,800	352	102	27	460
22,500	351	115	23	458
18,700	350	128	19	457
16,800	349	134	18	456
15,000	349	140	16	455
12,000	347	153	13	453
8,500	346	166	9	451
Steam Press. 25 Lb. per Sq. In. Gage				
Steam temp. 267° Fahr.				
37,500	365	95	40	485
33,500	363	110	36	483
30,000	362	122	32	481
26,500	361	135	28	479
23,000	360	147	25	476
21,000	360	154	23	476
19,000	359	160	20	474
15,500	358	172	17	472
12,500	357	185	13	471
Steam Press. 75 Lb. per Sq. In. Gage				
Steam temp. 320° Fahr.				
43,500	380	120	49	506
39,500	379	135	44	504
35,600	377	148	40	502
32,300	376	160	36	499
28,000	374	173	31	497
27,000	373	179	30	495
25,000	372	186	28	493
21,500	370	197	24	491
18,000	369	212	20	490
Steam Press. 125 Lb. per Sq. In. Gage				
Steam temp. 353° Fahr.				
46,500	391	137	54	519
42,000	391	151	48	517
38,800	390	163	45	515
35,000	388	175	40	512
31,500	387	188	36	510
29,500	387	194	34	508
27,500	386	200	32	506
24,500	385	213	28	504
20,800	384	227	24	503

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 18%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 200

1750 R.P.M. Motor

125 Lb. Working Steam Pressure

FROM 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 lb. Per Sq. In. Gage					**Steam Press. 5 lb. Per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	48,400	410	95	51	732	51,100	414	100	52	739
0	44,000	409	106	46	731	46,500	414	112	48	738
20	39,700	409	118	41	730	42,100	413	124	44	737
40	35,400	409	129	37	729	37,800	413	135	39	736
60	31,200	408	140	32	728	33,600	412	146	35	735
70	29,100	408	145	30	727	31,500	412	152	33	734
80	27,000	408	150	28	727	29,300	412	157	31	734
100	22,800	408	161	24	726	25,200	411	167	26	733
120	18,800	407	171	19	725	21,200	411	178	22	732
	Steam Press. 10 lb. Per Sq. In. Gage					**Steam Press. 25 lb. Per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	53,400	418	106	55	747	59,200	428	120	64	765
0	49,000	418	118	51	746	54,600	428	132	59	764
20	44,600	417	130	47	745	50,200	427	144	54	763
40	40,300	417	142	42	744	45,900	427	153	50	762
60	36,000	416	153	38	743	41,600	426	167	45	761
70	33,900	416	158	36	742	39,500	426	172	43	760
80	31,800	416	164	33	742	37,300	426	178	40	759
100	27,700	415	174	29	741	33,100	425	188	36	758
120	23,700	415	184	25	740	29,000	425	199	31	757
	Steam Press. 50 lb. Per Sq. In. Gage					**Steam Press. 75 lb. Per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	65,500	439	134	72	785	69,900	449	145	79	801
0	60,900	439	147	67	783	65,300	448	158	73	799
20	56,400	438	160	62	783	60,900	447	171	68	797
40	52,000	438	171	57	781	56,300	446	183	63	795
60	47,700	437	183	52	780	52,100	445	195	58	793
70	45,600	437	189	50	779	50,000	445	201	56	792
80	43,500	437	194	48	779	48,000	445	206	53	792
100	39,300	436	205	43	778	43,900	444	218	49	791
120	35,200	435	215	39	776	39,800	443	228	44	790
	Steam Press. 100 lb. Per Sq. In. Gage					**Steam Press. 125 lb. Per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	73,900	455	155	85	812	76,900	458	160	88	818
0	69,300	454	167	79	810	72,500	457	173	83	816
20	64,700	453	179	73	808	67,800	456	185	78	814
40	60,300	452	192	68	807	63,400	455	197	73	812
60	55,900	451	204	63	806	59,000	454	209	68	810
70	53,600	451	209	61	805	56,700	454	215	65	809
80	51,500	450	215	59	804	54,600	453	221	63	809
100	47,300	449	226	54	802	50,400	452	232	58	808
120	43,200	449	237	49	800	46,200	451	243	53	807

Above ratings compiled by Division of Engineering, Brown University.
*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 18%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 200-A

1750 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. Fahr	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	37 500	499	64	38	744	39,500	504	69	41	750
0	33,500	498	77	35	743	35,500	503	81	37	749
20	30,000	498	90	31	742	32,000	502	94	33	748
40	27,000	497	102	28	741	28,200	501	106	29	748
60	23,500	496	115	24	740	24,800	500	119	26	747
70	21,500	495	121	22	740	23,100	500	126	24	746
80	20,000	494	127	21	739	21,300	500	132	22	746
100	16,500	493	140	17	738	18,000	499	145	19	745
120	13,500	492	153	14	737	15,000	498	158	16	744
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	42,000	508	62	44	759	36,500	519	82	39	772
0	37,500	507	85	39	758	42,000	518	95	45	771
20	33,500	506	97	35	757	38,000	517	108	40	770
40	30,000	505	110	32	756	34,500	516	120	37	769
60	26,500	504	123	28	755	30,500	515	133	33	768
70	25,000	504	126	26	755	28,500	515	140	31	767
80	23,000	503	135	24	754	27,000	514	146	29	767
100	20,000	502	148	21	753	23,500	513	159	25	766
120	16,500	501	162	17	752	20,000	512	172	22	765
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	51,500	531	92	57	783	55,000	540	100	62	798
0	47,500	530	106	52	782	50,500	539	114	57	796
20	43,500	529	120	48	781	47,000	539	128	53	794
40	40,000	528	132	44	780	42,500	538	140	48	792
60	36,000	527	145	40	779	38,500	537	153	44	790
70	34,000	527	151	37	778	37,000	536	160	42	790
80	32,500	526	158	36	778	35,000	535	167	39	789
100	28,500	525	171	31	777	31,500	534	179	35	788
120	25,000	524	184	28	776	27,500	533	192	31	787
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	57,000	546	108	65	803	59,000	548	112	68	808
0	52,500	545	122	60	801	54,500	547	125	63	807
20	48,500	544	135	55	799	50,500	546	140	58	806
40	45,000	543	147	51	797	47,000	546	152	54	804
60	41,500	542	160	47	796	43,000	545	165	50	802
70	39,500	541	166	45	795	41,000	545	172	47	801
80	37,500	540	173	43	793	38,000	544	178	44	799
100	34,000	539	186	39	791	35,500	543	192	41	797
120	30,000	538	199	34	790	32,000	542	205	37	796

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 18%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 300

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	113,600	883	108	118	596	119,100	891	114	123	601
0	102,800	879	118	107	594	108,500	888	124	113	601
20	92,300	875	129	96	592	98,000	885	135	102	599
40	82,200	873	139	85	590	88,000	881	145	92	596
60	72,500	870	149	75	588	78,000	879	155	81	594
70	67,500	868	153	70	587	73,200	877	160	76	593
80	62,500	866	158	65	586	68,200	875	164	71	592
100	52,900	861	167	55	583	58,500	871	174	61	590
120	43,500	858	176	45	581	48,800	868	183	51	588
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	124,400	899	121	131	608	137,800	921	136	150	622
0	114,000	897	131	120	606	127,200	919	146	138	621
20	103,700	894	142	109	604	117,000	917	157	127	620
40	93,700	892	152	99	603	106,600	914	167	115	618
60	83,700	889	162	88	601	96,500	911	178	104	616
70	78,800	888	167	83	600	91,500	910	183	99	615
80	74,000	886	172	78	599	86,500	908	188	94	614
100	64,300	882	181	68	597	77,000	905	198	84	611
120	54,500	879	191	58	594	67,700	901	207	73	609
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	153,400	951	154	168	643	167,000	973	168	184	658
0	142,000	947	163	156	641	157,000	970	178	172	655
20	131,500	943	174	145	638	145,000	966	188	161	652
40	121,200	940	185	133	636	135,000	962	199	149	649
60	111,000	937	196	122	633	124,000	958	211	138	647
70	106,000	935	201	117	632	119,000	957	216	132	645
80	101,000	933	206	111	631	114,000	955	221	127	644
100	91,400	929	216	101	628	104,000	949	232	116	642
120	82,200	925	226	90	626	94,000	945	242	104	639
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	172,700	982	174	197	666	178,000	994	180	206	671
0	161,300	979	185	184	663	166,000	990	191	193	668
20	150,400	976	196	171	661	155,000	986	202	181	666
40	140,000	972	207	160	658	145,000	982	213	168	663
60	129,500	970	218	148	656	134,000	978	224	156	661
70	124,500	968	224	142	655	129,000	976	229	151	659
80	119,500	966	229	136	653	124,000	974	234	145	657
100	109,300	962	239	124	650	114,000	970	245	133	655
120	100,000	957	249	113	647	105,000	966	255	121	653

Above ratings compiled by Division of Engineering, Brown University.
*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 300-A

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	98,300	1098	50	112	783	105,000	1110	55	109	791
0	87,000	1096	65	90	781	92,000	1108	68	96	789
20	77,000	1094	80	80	779	82,000	1106	83	86	786
40	65,000	1092	93	67	777	70,000	1104	98	73	784
60	54,000	1090	108	56	775	58,800	1100	112	61	781
70	48,000	1087	115	50	775	53,200	1097	119	55	780
80	42,000	1085	123	43	774	47,600	1094	127	50	778
100	31,000	1083	138	32	772	36,000	1092	142	38	776
120	20,000	1080	153	21	770	25,000	1090	156	26	774
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	110,000	1120	59	116	796	119,000	1142	70	128	807
0	97,000	1118	73	102	794	107,000	1140	85	115	805
20	86,000	1116	87	90	792	95,000	1138	100	102	803
40	75,000	1113	102	79	790	84,000	1135	114	90	801
60	63,000	1111	116	66	788	73,000	1133	128	78	800
70	58,000	1108	124	61	788	67,000	1130	136	72	800
80	52,000	1105	130	55	787	62,000	1128	143	67	798
100	40,000	1102	145	42	785	50,000	1126	157	54	796
120	28,000	1098	160	30	783	38,000	1123	172	41	795
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	130,000	1171	80	143	823	135,000	1196	90	151	835
0	118,000	1169	96	130	821	125,000	1193	106	140	833
20	107,000	1166	111	118	819	113,000	1189	120	127	832
40	95,000	1163	125	104	817	102,000	1185	135	114	829
60	84,000	1160	140	92	814	90,000	1182	150	101	826
70	78,000	1157	147	86	814	85,000	1179	157	95	826
80	72,000	1154	155	79	812	80,000	1169	165	90	824
100	61,000	1152	169	67	810	68,000	1166	179	76	821
120	50,000	1150	184	55	808	57,000	1163	194	64	819
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	141,000	1207	98	160	842	147,000	1215	105	169	847
0	130,000	1203	114	148	839	135,000	1212	120	156	845
20	119,000	1200	128	135	837	124,000	1208	135	143	842
40	107,000	1196	142	122	835	113,000	1204	149	130	841
60	96,000	1193	157	109	832	101,000	1200	164	116	838
70	90,000	1190	165	102	832	96,000	1196	171	111	838
80	85,000	1186	172	97	829	90,000	1192	177	104	835
100	73,000	1182	187	83	827	80,000	1188	193	92	832
120	62,000	1179	202	70	824	68,000	1185	208	78	830

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 400

1750 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	154,500	1342	92	159	909	162,500	1356	97	170	918
0	140,500	1341	103	145	908	148,500	1355	109	155	917
20	126,500	1339	115	131	907	134,200	1353	120	140	916
40	113,000	1338	126	117	906	120,400	1352	132	125	915
60	99,700	1336	138	103	905	107,000	1351	143	111	914
70	93,000	1336	143	96	905	100,400	1350	149	104	914
80	86,200	1335	148	89	904	93,700	1350	154	98	913
100	73,300	1334	159	76	903	80,600	1348	165	84	912
120	60,300	1333	170	63	903	67, 00	1347	177	71	911
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	171,100	1371	103	180	927	188,800	1401	116	204	949
0	156,500	1369	115	164	926	174,200	1400	128	189	948
20	142,400	1368	126	149	926	160,200	1398	140	174	946
40	128,500	1366	138	134	925	146,300	1397	152	159	945
60	115,000	1365	150	121	924	132,800	1396	163	144	944
70	108,500	1364	156	114	923	126,200	1395	169	137	944
80	102,000	1364	161	107	923	119,500	1394	175	129	943
100	88,500	1362	172	93	922	106,000	1392	185	115	942
120	75,800	1361	182	79	921	92,700	1390	197	101	941
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	208,000	1435	127	229	971	225,000	1465	142	251	989
0	194,000	1434	142	213	970	211,000	1462	154	235	988
20	179,700	1432	154	197	969	197,000	1460	167	220	987
40	165,800	1431	167	182	968	183,000	1457	179	204	986
60	152,200	1429	179	167	967	168,000	1455	191	188	985
70	145,600	1428	184	159	966	162,000	1455	197	180	985
80	139,000	1427	190	152	966	155,000	1454	203	173	984
100	125,500	1425	201	138	965	142,000	1453	214	158	983
120	112,200	1424	212	123	964	128,000	1452	226	143	982
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	234,600	1482	149	266	1003	242,000	1496	156	280	1012
0	220,400	1480	161	250	1002	228,000	1493	168	263	1011
20	206,000	1478	174	234	1000	214,000	1491	180	246	1009
40	192,000	1476	186	218	999	200,000	1487	192	230	1008
60	178,200	1474	199	203	998	186,000	1485	205	214	1007
70	171,500	1473	205	195	997	179,000	1484	210	207	1007
80	164,000	1472	211	187	997	172,000	1484	216	199	1006
100	151,000	1470	222	172	996	159,000	1483	228	184	1005
120	137,700	1469	233	156	995	145,000	1482	239	167	1004

Above ratings compiled by Division of Engineering, Brown University.
*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 400-A

1750 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	118,000	1685	42	122	1104	125,000	1704	45	130	1113
0	106,000	1684	58	110	1103	112,000	1703	62	117	1112
20	95,000	1683	72	98	1102	100,000	1702	75	104	1111
40	83,000	1681	87	86	1101	89,000	1701	90	93	1110
60	72,000	1680	101	74	1100	78,000	1700	105	82	1108
70	66,000	1879	108	68	1100	72,600	1698	112	76	1108
80	61,000	1877	115	63	1099	67,200	1698	120	70	1107
100	50,000	1875	130	52	1098	56,000	1697	135	58	1106
120	40,000	1874	145	41	1097	46,000	1695	148	48	1105
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	130,000	1719	50	137	1121	144,000	1749	60	154	1133
0	118,000	1718	65	124	1120	131,000	1748	75	141	1132
20	107,000	1717	80	112	1119	120,000	1747	90	129	1131
40	96,000	1715	94	101	1117	108,000	1745	105	116	1130
60	84,000	1714	109	88	1116	97,000	1744	119	104	1129
70	78,000	1712	116	82	1116	92,000	1744	126	99	1128
80	73,000	1710	123	77	1115	87,000	1742	134	94	1128
100	61,000	1709	138	64	1114	75,000	1741	148	80	1127
120	50,000	1707	152	53	1113	65,000	1740	162	80	1126
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	160,000	1785	70	176	1145	169,000	1813	80	189	1159
0	146,000	1783	87	160	1144	155,000	1811	95	174	1158
20	134,000	1781	100	147	1143	143,000	1809	110	160	1157
40	123,000	1779	115	135	1142	132,000	1806	124	148	1156
60	112,000	1777	130	123	1141	121,000	1804	138	135	1155
70	107,000	1777	137	118	1140	115,000	1803	140	129	1155
80	101,000	1775	144	111	1140	110,000	1802	152	123	1154
100	90,000	1773	159	99	1139	100,000	1800	167	112	1153
120	80,000	1771	174	88	1138	89,000	1798	182	100	1152
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	176,000	1829	87	200	1166	183,000	1841	93	210	1173
0	162,000	1828	101	184	1165	169,000	1839	107	195	1172
20	150,000	1826	116	171	1164	158,000	1837	121	182	1170
40	140,000	1824	130	159	1163	147,000	1835	136	169	1169
60	128,000	1822	145	145	1162	135,000	1833	150	155	1168
70	123,000	1820	152	140	1162	130,000	1832	158	149	1167
80	118,000	1819	159	134	1161	125,000	1831	165	144	1167
100	107,000	1817	174	122	1160	113,000	1829	180	130	1166
120	96,000	1815	188	109	1160	104,000	1827	195	120	1165

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

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GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 600

850 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp entering air Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu ft per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	239,000	1740	119	250	594	251,500	1760	127	258	601
0	217,000	1730	128	225	591	228,500	1750	136	238	598
20	195,000	1720	138	202	588	207,000	1740	145	216	594
40	174,000	1710	147	179	585	185,500	1730	154	193	591
60	153 000	1700	156	158	581	164,500	1720	163	171	588
70	143,000	1695	160	147	580	154,000	1715	168	160	587
80	132,000	1690	164	137	578	144,000	1710	172	149	585
100	112,000	1683	173	116	575	123,500	1700	180	128	582
120	92,000	1675	181	95	573	103,000	1695	188	107	579
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	263,000	1780	132	275	607	291,000	18 5	150	315	626
0	241,000	1770	143	253	606	269,000	1820	159	291	622
20	219,000	1760	153	230	602	247,000	1810	169	267	619
40	197,000	1750	162	208	599	225,000	1800	179	243	615
60	177,000	1740	171	185	596	204,000	1790	188	220	612
70	165 000	1735	175	174	594	193,000	1785	192	209	610
80	156,000	1730	179	163	593	182,000	1780	197	198	609
100	135,000	1722	188	142	590	161,000	1770	205	175	605
120	114,000	1715	196	120	587	141,000	1760	214	152	602
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp 320° Fahr.				
—20	320,000	1885	168	353	644	344,000	1913	181	382	657
0	300,000	1875	178	329	640	322,000	1908	191	358	653
20	277,000	1860	188	304	637	299,000	1900	201	332	651
40	255,000	1850	198	280	633	277,000	1889	211	308	647
60	233,000	1840	207	256	630	255,000	1877	221	284	642
70	223,000	1835	212	245	628	244,500	1869	226	272	640
80	213,000	1830	216	233	626	234,000	1868	230	260	639
100	191,000	1820	225	210	623	213,000	1857	239	237	636
120	171,000	1812	234	188	620	192,000	1847	248	214	632
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	363,000	1955	192	411	668	375,500	1969	202	436	674
0	341,000	1940	202	387	665	356,500	1963	212	411	672
20	318,000	1930	212	361	661	332,000	1952	221	382	668
40	295,000	1920	222	335	658	310,000	1947	231	357	666
60	273,000	1910	232	310	654	287,500	1935	241	331	662
70	262,000	1905	237	298	652	277,000	1930	246	319	660
80	251,000	1900	242	285	650	266,000	1920	251	306	657
100	229,000	1890	250	260	647	244,500	1913	260	282	655
120	209,000	1880	259	237	645	223,500	1905	269	257	652

Above ratings compiled by Division of Engineering, Brown University.
*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

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GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR

THERMOLIER

Model 600-A

850 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	180,000	2220	50	186	760	189,000	2241	55	196	764
0	161,000	2210	63	166	756	168,000	2234	68	175	760
20	141,000	2200	73	146	752	148,000	2223	83	154	757
40	121,000	2190	92	125	748	127,700	2213	97	133	754
60	100,000	2180	108	103	745	107,300	2200	112	112	750
70	90,000	2175	115	92	743	97,100	2193	120	102	748
80	80,000	2168	122	83	741	87,000	2187	127	91	746
100	60,000	2162	138	62	737	67,000	2180	142	70	744
120	41,000	2158	151	42	734	47,000	2173	156	49	741
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	197,000	2260	60	207	770	216,000	2320	70	232	780
0	176,000	2250	73	185	767	196,000	2310	85	210	777
20	156,000	2240	88	164	764	175,000	2300	100	188	774
40	136,000	2230	130	143	761	155,000	2290	115	166	771
60	115,000	2220	118	121	758	135,000	2280	130	145	768
70	105,000	2212	125	110	756	125,000	2273	127	134	766
80	95,000	2206	133	100	753	105,000	2263	145	113	764
100	75,000	2201	148	79	749	95,000	2253	160	102	761
120	57,000	2195	161	60	746	77,000	2242	174	83	758
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	235,000	2369	85	258	793	250,000	2410	95	280	804
0	215,000	2357	98	236	790	229,000	2397	108	256	801
20	195,000	2347	113	214	787	209,000	2387	123	234	798
40	175,000	2335	127	192	784	188,000	2376	137	211	795
60	154,000	2325	142	169	782	167,000	2365	153	187	791
70	142,000	2320	150	156	780	156,000	2360	160	175	789
80	133,000	2315	157	146	778	147,000	2355	167	165	787
100	113,000	2310	172	124	775	127,000	2345	183	142	784
120	95,000	2305	187	104	773	108,000	2337	197	121	781
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	260,000	2425	102	296	813	267,000	2457	110	308	820
0	240,000	2415	116	273	809	248,000	2446	130	285	817
20	220,000	2405	131	250	807	228,000	2434	139	262	813
40	200,000	2395	146	227	803	208,000	2422	155	240	809
60	178,000	2385	161	202	800	187,000	2410	170	215	805
70	167,000	2380	170	190	798	177,000	2405	177	204	803
80	157,000	2375	176	178	796	167,000	2400	185	192	801
100	138,000	2365	191	157	793	147,000	2390	199	169	797
120	120,000	2357	205	136	790	139,000	2383	204	160	794

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

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GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 800

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	298,000	2345	106	305	801	312,500	2367	113	336	800
0	270,000	2335	116	280	798	285,500	2360	123	297	807
20	243,000	2325	127	253	796	258,000	2355	134	269	805
40	217,000	2320	137	225	793	232,000	2345	144	242	802
60	191,000	2315	147	197	791	205,500	2335	154	214	799
70	178,000	2310	152	184	790	193,000	2335	159	201	798
80	165,000	2305	157	171	788	180,000	2330	164	188	797
100	140,000	2295	166	145	786	154,000	2320	173	161	794
120	115,000	2290	175	120	784	129,000	2315	182	135	792
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	329,000	2390	119	346	818	364,000	2460	133	394	840
0	301,000	2385	130	317	816	336,000	2450	144	364	837
20	274,000	2380	141	288	814	308,000	2440	155	334	834
40	247,000	2370	151	260	811	281,000	2430	166	304	831
60	221,000	2365	161	232	808	255,000	2425	176	276	828
70	208,000	2360	166	218	807	242,000	2420	181	262	827
80	195,000	2360	171	205	806	229,000	2415	186	248	826
100	169,000	2350	180	179	803	203,000	2410	196	220	823
120	144,000	2340	189	152	801	178,000	2400	206	193	821
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	402,000	2525	150	442	864	432,000	2560	162	481	877
0	374,000	2515	161	411	860	402,000	2555	173	448	875
20	347,000	2505	172	380	856	374,000	2550	184	415	873
40	319,500	2495	183	350	853	346,000	2539	195	384	869
60	293,000	2490	194	320	851	321,500	2533	206	357	867
70	280,000	2485	199	306	849	306,000	2527	211	340	865
80	266,000	2480	204	291	848	293,500	2522	217	326	863
100	239,500	2475	214	262	845	267,000	2514	227	297	861
120	214,000	2465	223	233	843	241,000	2504	236	266	857
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	452,000	2615	172	513	893	470,000	2626	180	543	901
0	424,000	2605	183	482	890	443,000	2624	191	511	900
20	396,000	2590	194	450	887	415,500	2621	203	479	897
40	369,000	2585	205	419	884	387,000	2611	214	446	894
60	342,000	2575	216	388	880	360,000	2602	225	415	891
70	328,000	2570	222	373	879	346,500	2596	230	399	889
80	315,000	2565	227	358	877	333,500	2592	236	384	888
100	288,000	2560	237	328	874	307,500	2581	246	354	884
120	262,000	2550	247	298	871	280,500	2574	256	323	881

Above ratings compiled by Division of Engineering, Brown University.
*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR

THERMOLIER

Model 800-A

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	203,000	2853	43	209	967	211,000	2895	47	219	973
0	182,000	2845	60	188	964	192,000	2887	65	200	969
20	162,000	2837	74	167	961	170,000	2876	79	177	966
40	141,000	2830	88	145	958	151,000	2866	93	158	963
60	120,000	2825	103	124	955	131,000	2850	107	137	950
70	110,000	2820	110	114	953	121,000	2850	114	127	959
80	101,000	2815	116	105	951	111,000	2843	120	117	957
100	81,000	2810	130	84	948	90,000	2838	135	93	956
120	64,000	2805	144	66	945	71,000	2834	148	73	953
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	220,000	2910	53	231	979	247,000	2958	66	265	989
0	200,000	2900	70	210	976	224,000	2948	82	240	986
20	180,000	2890	84	189	973	203,000	2940	95	217	983
40	160,000	2880	98	168	970	183,000	2930	110	196	981
60	140,000	2875	112	147	967	162,000	2925	125	173	978
70	130,000	2870	120	137	965	151,000	2920	132	161	976
80	120,000	2865	126	126	963	143,000	2915	138	153	974
100	100,000	2855	140	105	959	123,000	2908	152	131	971
120	81,000	2845	153	85	956	105,000	2900	165	112	968
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	268,000	3020	78	294	1007	285,000	3068	89	319	1017
0	246,000	3010	94	270	1003	262,000	3059	104	293	1014
20	226,000	3000	108	248	999	242,000	3051	117	270	1010
40	205,000	2990	122	225	995	222,000	3040	132	249	1007
60	185,000	2985	136	203	992	201,000	3035	146	225	1003
70	174,000	2980	144	190	990	190,000	3030	153	212	1001
80	165,000	2975	150	181	988	181,000	3025	160	202	999
100	145,000	2966	164	159	985	161,000	3015	173	180	996
120	128,000	2958	177	141	983	143,000	3011	187	160	993
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	300,000	3119	93	340	1028	310,000	3146	100	357	1031
0	277,000	3110	110	315	1025	288,000	3138	117	332	1028
20	256,000	3100	125	291	1021	268,000	3130	132	308	1025
40	236,000	3090	139	268	1017	247,000	3120	146	284	1022
60	215,000	3085	153	244	1013	227,000	3115	160	261	1018
70	205,000	3080	160	233	1011	215,000	3110	167	248	1016
80	195,000	3075	167	221	1009	207,000	3105	173	238	1014
100	175,000	3070	181	198	1006	188,000	3097	188	216	1011
120	157,000	3065	195	178	1003	170,000	3092	201	195	1008

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 35%.

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GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 1200

850 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	446,000	3830	92	463	726	470,000	3850	98	490	735
0	400,000	3812	103	417	725	424,000	3842	109	442	733
20	357,000	3794	114	371	724	380,000	3834	120	394	731
40	314,000	3780	124	325	722	335,000	3826	130	348	730
60	271,000	3774	134	281	721	291,000	3818	140	305	728
70	250,000	3771	140	260	720	272,000	3815	145	283	727
80	232,000	3768	145	240	720	252,000	3812	150	264	727
100	194,000	3764	155	202	718	215,000	3806	160	223	726
120	158,000	3760	165	162	716	177,000	3800	171	184	724
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	492,000	3880	105	515	744	549,000	4006	120	590	763
0	448,000	3892	115	467	742	505,000	3993	130	540	761
20	405,000	3880	125	419	740	459,000	3980	140	490	759
40	360,000	3868	136	373	738	414,000	3966	150	441	756
60	317,000	3857	146	329	736	368,000	3952	160	398	754
70	294,000	3851	152	307	735	345,000	3945	166	370	753
80	273,000	3846	157	285	734	324,000	3939	171	347	752
100	234,000	3837	167	245	732	284,000	3926	182	304	749
120	197,000	3828	177	206	730	246,000	3914	192	263	746
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	620,000	4128	137	679	784	666,000	4192	149	742	800
0	570,000	4112	147	626	781	614,000	4181	159	686	796
20	520,000	4096	157	573	778	564,000	4163	169	630	792
40	474,000	4079	167	521	775	516,000	4144	179	576	788
60	429,000	4063	177	470	772	469,000	4125	189	524	785
70	408,000	4054	182	448	771	446,000	4117	194	498	784
80	385,000	4045	187	425	770	425,000	4106	199	474	783
100	342,000	4030	197	377	767	381,000	4086	209	427	781
120	301,000	4015	207	332	765	342,000	4067	219	382	779
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	701,000	4287	161	803	816	730,000	4339	168	853	826
0	647,000	4265	170	744	812	678,000	4312	178	792	822
20	594,000	4241	179	685	808	626,000	4285	188	731	818
40	547,000	4219	189	627	805	579,000	4262	197	673	814
60	503,000	4194	199	574	801	532,000	4237	207	617	810
70	481,000	4181	203	548	799	508,000	4224	212	591	808
80	458,000	4169	208	524	798	484,000	4211	217	566	806
100	414,000	4146	218	476	794	440,000	4186	227	517	802
120	373,000	4123	228	434	790	399,000	4162	236	473	798

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 45%.

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GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 1200-A

850 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	340,000	4070	35	351	800	360,000	4130	40	375	806
0	304,000	4067	52	307	797	320,000	4123	55	333	803
20	268,000	4063	67	276	795	285,000	4116	72	296	800
40	230,000	4059	83	238	792	249,000	4110	88	260	798
60	193,000	4055	99	199	790	213,000	4100	104	222	796
70	178,000	4051	107	183	788	195,000	4095	112	203	795
80	160,000	4047	115	164	785	177,000	4095	120	184	794
100	120,000	4042	131	125	782	140,000	4090	137	146	792
120	90,000	4038	148	97	799	103,000	4086	153	107	790
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	372,000	4183	45	390	814	410,000	4325	55	439	827
0	337,000	4173	60	353	812	374,000	4312	70	401	823
20	300,000	4162	76	315	809	338,000	4298	87	362	821
40	264,000	4152	92	277	806	300,000	4289	103	322	819
60	227,000	4145	108	238	804	263,000	4285	118	282	816
70	210,000	4138	117	220	801	245,000	4280	127	263	813
80	191,000	4130	125	200	798	229,000	4273	135	245	809
100	146,000	4122	140	153	795	192,000	4267	152	205	806
120	120,000	4116	157	126	793	158,000	4263	168	169	803
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	453,000	4460	67	497	843	480,000	4542	77	537	852
0	418,000	4446	84	458	840	446,000	4524	93	499	849
20	380,000	4432	100	417	837	410,000	4499	110	459	847
40	345,000	4415	107	378	833	373,000	4480	125	418	843
60	309,000	4390	133	339	830	338,000	4460	142	378	840
70	290,000	4365	140	320	827	318,000	4440	150	356	836
80	272,000	4350	148	298	824	300,000	4421	158	336	833
100	236,000	4334	165	259	821	263,000	4401	174	294	830
120	200,000	4318	182	220	818	228,000	4382	190	255	827
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	505,000	4581	85	573	864	525,000	4645	92	604	872
0	470,000	4563	102	534	860	490,000	4622	108	565	868
20	432,000	4544	118	490	857	453,000	4597	124	522	864
40	394,000	4528	134	447	853	416,000	4573	140	479	860
60	360,000	4510	150	409	849	380,000	4550	155	437	856
70	340,000	4490	157	386	845	361,000	4532	164	415	851
80	320,000	4470	165	363	842	344,000	4513	172	390	848
100	287,000	4448	182	326	839	308,000	4406	188	354	844
120	250,000	4425	198	284	835	273,000	4387	205	314	840

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 45%.

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GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 1600

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage					**Steam Press. 5 Lb. per Sq. In. Gage**				
	Steam temp. 216° Fahr.					Steam temp. 228° Fahr.				
—20	539,000	5203	90	558	993	566,000	5250	98	590	1003
0	485,000	5196	100	502	991	510,000	5246	105	533	1001
20	433,000	5189	111	446	989	457,000	5239	116	476	999
40	380,000	5181	122	390	988	405,000	5231	127	423	997
60	329,000	5173	132	339	986	355,000	5223	137	370	996
70	304,000	5169	138	314	986	330,000	5220	143	346	995
80	280,000	5166	143	290	985	305,000	5216	148	320	995
100	236,000	5160	154	247	983	258,000	5208	159	270	993
120	197,000	5154	164	205	982	215,000	5200	169	223	991
	Steam Press. 10 Lb. per Sq. In. Gage					**Steam Press. 25 Lb. per Sq. In. Gage**				
	Steam temp. 240° Fahr.					Steam temp. 267° Fahr.				
—20	595,000	5303	100	627	1010	659,000	5450	115	703	1038
0	539,000	5296	111	567	1009	603,000	5429	124	647	1034
20	483,000	5289	122	507	1008	546,000	5408	135	586	1030
40	430,000	5282	132	451	1007	492,000	5390	145	527	1028
60	380,000	5275	143	398	1005	441,000	5372	156	470	1024
70	354,000	5272	148	372	1005	416,000	5363	162	442	1022
80	329,000	5268	154	346	1004	391,000	5354	167	414	1020
100	281,000	5263	165	297	1002	341,000	5336	178	362	1016
120	236,000	5255	175	252	1001	293,000	5317	188	314	1012
	Steam Press. 50 Lb. per Sq. In. Gage					**Steam Press. 75 Lb. per Sq. In. Gage**				
	Steam temp. 298° Fahr.					Steam temp. 320° Fahr.				
—20	731,000	5568	127	802	1061	784,000	5611	137	876	1076
0	673,000	5552	138	738	1058	720,000	5621	149	809	1073
20	615,000	5536	149	674	1055	659,000	5610	160	742	1070
40	558,000	5522	160	613	1053	603,000	5599	170	678	1067
60	506,000	5510	170	555	1050	551,000	5587	181	617	1064
70	480,000	5503	176	526	1049	526,000	5582	187	587	1062
80	455,000	5497	181	497	1048	500,000	5576	192	557	1061
100	405,000	5485	192	442	1045	450,000	5565	203	501	1058
120	356,000	5473	203	392	1043	401,000	5555	214	449	1056
	Steam Press. 100 Lb. per Sq. In. Gage					**Steam Press. 125 Lb. per Sq. In. Gage**				
	Steam temp. 338° Fahr.					Steam temp. 353° Fahr.				
—20	824,000	5730	146	947	1093	856,000	5785	152	1013	1107
0	756,000	5716	156	877	1091	788,000	5772	163	930	1103
20	690,000	5702	167	807	1088	725,000	5757	174	857	1099
40	633,000	5688	178	739	1085	668,000	5742	185	786	1095
60	580,000	5673	189	675	1081	613,000	5727	196	720	1092
70	556,000	5666	194	643	1080	587,000	5719	202	688	1090
80	531,000	5659	200	613	1078	562,000	5711	207	657	1088
100	482,000	5644	210	556	1074	511,000	5697	218	599	1084
120	433,000	5630	222	502	1070	460,000	5683	229	545	1080

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 45%.

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GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TABLES OF CAPACITIES FOR THERMOLIER

Model 1600-A

1150 R.P.M. Motor

125 Lb. Working Steam Pressure

FOR 1 LB. TO 125 LB. STEAM PRESSURE-GAGE

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 1 Lb. per Sq. In. Gage				
	Steam temp. 216° Fahr.				
—20	380,000	5530	40	393	1065
0	342,000	5523	57	353	1063
20	305,000	5516	70	315	1061
40	264,000	5508	85	272	1059
60	230,000	5500	100	237	1057
70	215,000	5493	108	222	1055
80	200,000	5490	114	207	1053
100	165,000	5486	128	170	1051
120	130,000	5482	143	135	1050
	Steam Press. 10 Lb. per Sq. In. Gage				
	Steam temp. 240° Fahr.				
—20	410,000	5631	50	431	1086
0	379,000	5623	65	393	1083
20	340,000	5616	78	357	1080
40	306,000	5608	93	321	1077
60	269,000	5600	109	282	1074
70	250,000	5590	116	262	1072
80	233,000	5580	123	244	1070
100	200,000	5568	137	210	1068
120	165,000	5555	152	173	1066
	Steam Press. 50 Lb. per Sq. In. Gage				
	Steam temp. 298° Fahr.				
—20	500,000	5885	70	548	1113
0	465,000	5875	86	511	1110
20	430,000	5864	100	472	1107
40	390,000	5852	115	428	1103
60	355,000	5840	130	389	1100
70	338,000	5830	138	371	1098
80	320,000	5820	145	351	1096
100	286,000	5808	160	314	1094
120	252,000	5795	174	277	1092
	Steam Press. 100 Lb. per Sq. In. Gage				
	Steam temp. 338° Fahr.				
—20	550,000	6075	85	625	1138
0	518,000	6062	101	588	1133
20	480,000	6050	115	545	1130
40	444,000	6035	131	505	1126
60	408,000	6020	146	464	1122
70	390,000	6010	153	443	1119
80	375,000	6000	160	426	1116
100	340,000	5991	175	386	1112
120	306,000	5984	189	348	1108

Temp. entering air °Fahr.	Total heat delivered B.t.u. per hour	Air delivery cu. ft. per min.	Exit air temp. °Fahr.	Condensation lb. per hour	*Air velocity at exit linear ft. per min.
	Steam Press. 5 Lb. per Sq. In. Gage				
	Steam temp. 228° Fahr.				
—20	338,000	5581	45	352	1072
0	360,000	5576	60	375	1070
20	325,000	5568	74	338	1068
40	288,000	5560	89	298	1066
60	253,000	5550	104	262	1065
70	235,000	5545	111	244	1064
80	218,000	5540	118	226	1064
100	180,000	5532	132	188	1062
120	148,000	5525	147	154	1060
	Steam Press. 25 Lb. per Sq. In. Gage				
	Steam temp. 267° Fahr.				
—20	454,000	5726	60	487	1102
0	420,000	5719	74	450	1098
20	384,000	5712	88	411	1093
40	346,000	5700	103	371	1089
60	310,000	5690	118	332	1085
70	291,000	5680	126	312	1082
80	275,000	5670	133	295	1079
100	240,000	5658	147	257	1075
120	206,000	5645	162	221	1071
	Steam Press. 75 Lb. per Sq. In. Gage				
	Steam temp. 320° Fahr.				
—20	530,000	5970	80	593	1127
0	497,000	5962	95	557	1123
20	460,000	5952	110	515	1120
40	422,000	5940	123	473	1116
60	387,000	5930	138	433	1112
70	370,000	5920	147	414	1110
80	350,000	5910	153	392	1108
100	318,000	5898	167	356	1106
120	284,000	5886	183	318	1103
	Steam Press. 125 Lb. per Sq. In. Gage				
	Steam temp. 353° Fahr.				
—20	573,000	6120	92	660	1145
0	540,000	6109	108	622	1141
20	505,000	6097	123	582	1137
40	470,000	6085	137	541	1132
60	432,000	6070	153	498	1128
70	415,000	6060	160	478	1124
80	400,000	6050	165	461	1120
100	365,000	6038	180	421	1116
120	331,000	6026	200	381	1112

*Taken with louvers in wide open position; with louvers in 45° position velocity increases approximately 45%.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TYPICAL CONNECTIONS AND SCHEDULE OF MATERIALS FOR THERMOLIER

Vacuum or Vented Return Gravity Systems

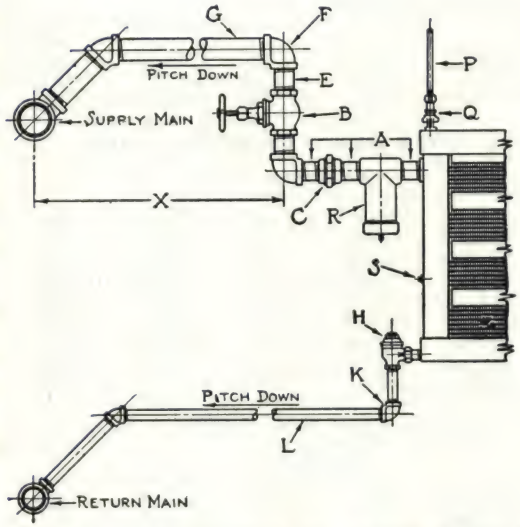


Fig. No. 1

Fig. No. 1 for equipments where distance "X" is *less* than 10 feet.

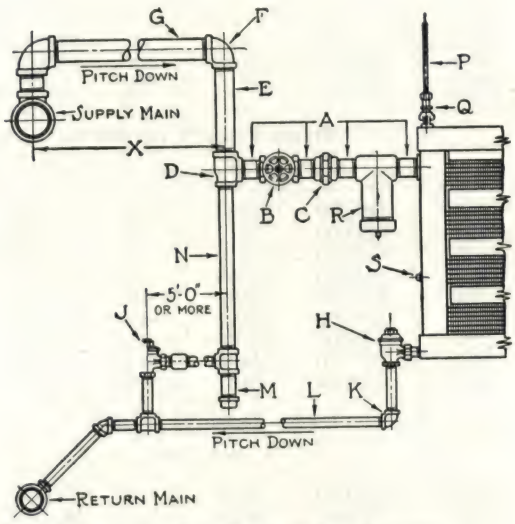


Fig. No. 2

Fig. No. 2 for equipments where distance "X" is *more* than 10 feet.

Typical Connections for Thermolier for Vacuum and Vented Return Gravity Heating Systems

TYPICAL SCHEDULE OF MATERIAL FOR ABOVE

	Thermolier model No.	100—200 100A—200A	300—400 300A—400A	600—800 600A—800A	1200—1600 1200A—1600A
	Size of drip tapping	½ in.	¾ in.	1 in.	1¼ in.
	Size of bushing furnished for above			1x¾ in.	1¼x1 in.
A	Nipples	1¼ in.	1½ in.	2 in.	2½ in.
B	Globe or gate valve	1¼ in.	1½ in.	2 in.	2½ in.
C	Union	1¼ in.	1½ in.	2 in.	2½ in.
D	Cast iron tee	1¼x1¼x1¼ in.	1½x1¼x1½ in.	2x1¼x2 in.	2½x1½x2½ .n.
E	Pipe	1¼ in.	1½ in.	2 in.	2½ in.
F*	Cast iron reducing elbow	.....x1¼ in.	.....x1½ in.	.....x2 in.	.....x2½ in.
G*	Supply run-out				
H†	Thermoflex trap—0—25 lbs	½ in. No. 2	¾ in. No. 2	¾ in. No. 3, 4	1 in. No. 4 | 1¼ in. No. 4
	—25—125 lbs.	½ in. No. 100	½ in. No. 100	¾ in. No. 100	1 in. No. 100
J†	Thermoflex trap— 0—25 lbs.	½ in. No. 2	½ in. No. 2	½ in. No. 2	½ in. No. 2
	—25—125 lbs.	½ in. No. 100	½ in. No. 100	½ in. No. 100	½ in. No. 100
K	Cast iron reducing elbow	¾x½ in.	1x¾ in.	1x¾ in.	1¼x1 in.
L	Pipe	¾ in.	1 in.	1 in.	1¼ in.
M	Scale pocket	1¼ in.	1¼ in.	1¼ in.	1½ in.
N	Pipe	1¼ in.	1¼ in.	1¼ in.	1½ in.
P	Hanger rod (See pages 36 and 37)	⅜ in.	½ in.	⅝ in.	⅞ in.
Q	Adjustable swivel nut (furnished with Thermolier)	⅜ in.	½ in.	⅝ in.	⅞ in.
R	Sediment strainer	1¼ in.	1½ in.	2 in.	2½ in.
S	Pipe plug (furnished with Thermolier)	¾ in.	⅜ in.	⅜ in.	⅜ in.

*Size governed by installation conditions.
†Union required if other than a union-end trap is specified.

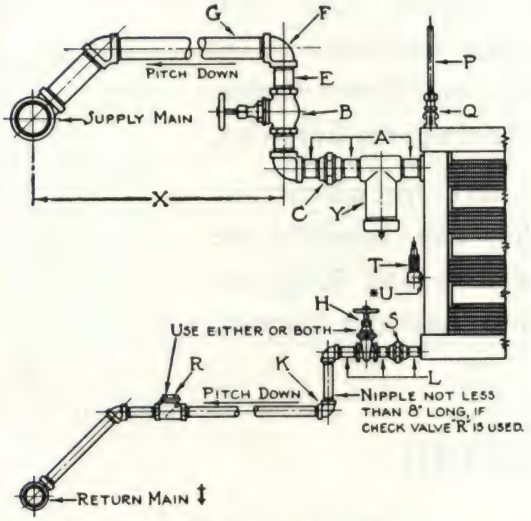
Continued on next page

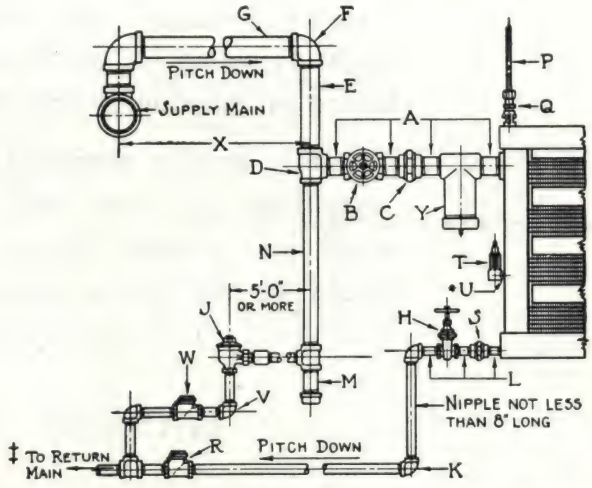
GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

TYPICAL CONNECTIONS AND SCHEDULE OF MATERIALS FOR THERMOLIER

Closed Return Gravity Systems





The Above Drawings Show Typical Connections for Thermolier for Closed Return Gravity Heating Systems

‡*Note:* Return mains or risers must be vented, preferably at point where lines drop below water line of boiler.

Fig. No. 3

Fig. No. 3 for equipments where distance "X" is *less* than 10 feet.

Fig. No. 4

Fig. No. 4 for equipments where distance "X" is *more* than 10 feet.

TYPICAL SCHEDULE OF MATERIAL FOR ABOVE

Thermolier model No.	100—200 100A—200A	300—400 300A—400A	600—800 600A—800A	1200—1600 1200A—1600A
Size of drip tapping	½ in.	¾ in.	1 in.	1¼ in.
Size of bushing furnished for above			1x¾ in.	1¼x1 in.
A Nipples	1¼ in.	1½ in.	2 in.	2½ in.
B Globe or gate valve	1¼ in.	1½ in.	2 in.	2½ in.
C Union	1¼ in.	1½ in.	2 in.	2½ in.
D Cast iron tee	1¼x1¼x1¼ in.	1½x1¼x1½ in.	2x1¼x2 in.	2½x1½x2½ in.
E Pipe	1¼ in.	1½ in.	2 in.	2½ in.
F* Cast iron reducing elbow	.....x1¼ in.	.....x1½ in.	.....x2 in.	.....x2½ in.
G* Supply run-out				
H Gate valve	½ in.	¾ in.	¾ in.	1 in.
J† Thermoflex trap— 0—25 lbs.	½ in. No. 2	½ in. No. 2	½ in. No. 3, 4	½ in. No. 4
—25—125 lbs.	½ in. No. 100	½ in. No. 100	½ in. No. 100	½ in. No. 100
K Cast iron reducing elbow	¾x½ in.	1x¾ in.	1x¾ in.	1¼x1 in.
L Nipples	½ in.	¾ in.	¾ in.	1 in.
M Scale pocket	1¼ in.	1¼ in.	1¼ in.	1½ in.
N Pipe	1¼ in.	1¼ in.	1¼ in.	1½ in.
P Hanger rod (see Pages 36 and 37)	⅜ in.	½ in.	⅝ in.	⅞ in.
Q Adjustable swivel nut (furnished with Thermolier)	⅜ in.	½ in.	⅝ in.	⅞ in.
R Check valve	¾ in.	1 in.	1 in.	1¼ in.
S Union	½ in.	¾ in.	¾ in.	1 in.
T Air valve	⅛ in.	⅛ in.	⅛ in.	⅛ in.
U Bushing	⅜x⅛ in.	⅜x⅛ in.	⅜x⅛ in.	⅜x⅛ in.
V Cast iron reducing elbow	¾x½ in.	¾x½ in.	¾x½ in.	¾x½ in.
W Check valve	¾ in.	¾ in.	¾ in.	¾ in.
Y Sediment strainer	1¼ in.	1½ in.	2 in.	2½ in.

*Size governed by installation conditions.
†Union required if other than a union-end trap is specified.

Continued on next page

GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

ELECTRIC WIRING DIAGRAMS FOR THERMOLIER

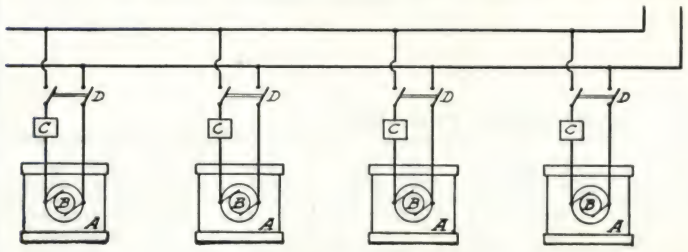
The wiring diagrams on this and the following pages are offered as suggested methods only. The National Electric Code, with such modifications as might be called for by State, City, and Town Codes, having jurisdiction, supersede the data given herewith.

It is usually preferable to have special circuits controlling the Units only. They can, however, be wired into present circuits but care and judgment should be used so as not to overload the circuits.

MANUAL CONTROL

D-C. or Single Phase—A-C.

Manual Control—D-C. up to 440 Volts or single phase A-C. up to 220 Volts—

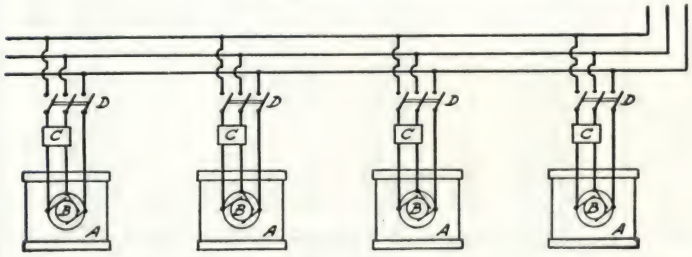


As many Thermoliers as desired may be connected into one manually controlled circuit. It is, however, recommended that at least each room or section be on a separate circuit.

A. Thermoliers.
B. Thermolier motors.
C. Thermal overload cutouts (recommended).
D. Double pole switches.

Three Phase—A-C.

Manual Control—Three phase up to 550 Volts A-C.—



As many Thermoliers as desired may be connected into one manually controlled circuit. It is, however, recommended that at least each room or section be on a separate circuit.

A. Thermoliers.
B. Thermolier motors.
C. Thermal overload cutouts (recommended).
D. Triple pole switches.

Note: See page 34 for list prices on Thermal overload cutouts.

Continued on next page

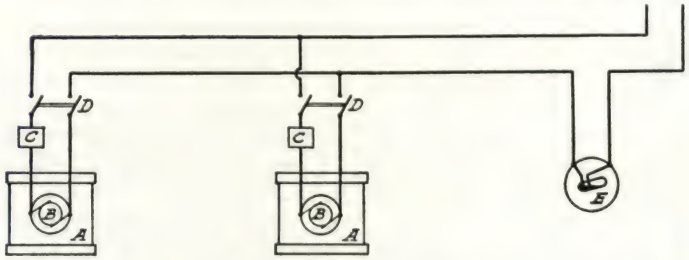
GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

ELECTRIC WIRING DIAGRAMS FOR THERMOLIER

AUTOMATIC CONTROL

Automatic Control Directly by Thermostat

*D-C. up to †230 Volts or single phase A-C. up to *220 Volts*



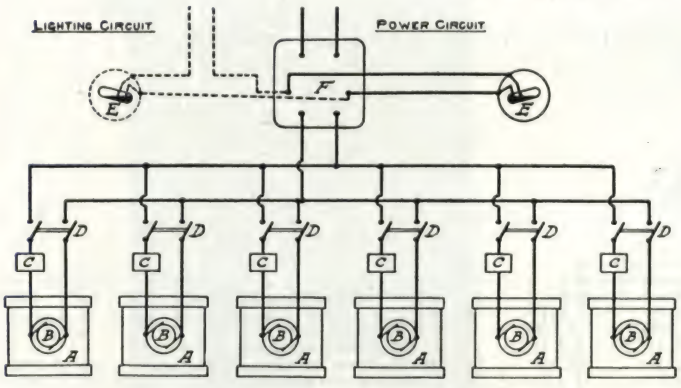
A. Thermoliers.
B. Thermolier motors.
C. Thermal overload cutouts (recommended).
D. Double pole switches.
E. Single pole (ten amps. at 110 V. or five amps. at 220 V.) mercury contact thermostat.

Limit numbers of Thermoliers controlled directly by one thermostat "E" are as follows:

Model No.	100-100A	200-200A	300-300A	400-400A	600-600A	800-800A	1200-1200A	1600-1600A
D-C. up to 230 Volts	8	6	4	2	1	1	1	1
1 Ph. A-C. up to 220 Volts	8	6	4	3	3	3	2	1

Automatic Control by Thermostat with Automatic Starter

D-C. up to 440 Volts



A. Thermoliers.
B. Thermolier motors.
C. Thermal overload cutouts (recommended).
D. Double pole switches.
E. Single pole (three amps. at 110 v. or one and one-half amps. at 220 v.) mercury contact thermostat.
F. Automatic starter, definite time type undervoltage release, no overload protection or push button unless specified.

The number of units to be controlled by a single thermostat with automatic starter should be governed by conditions included in the area to be heated.

When power circuit voltage does not exceed 230 d-c., mercury contact thermostat "E" should be connected to automatic starter "F" as indicated in solid lines. *(In ordering specify power voltage.)*

When power circuit voltage exceeds 230 d-c., automatic starter "F" must be of a type to allow energizing of control circuit through mercury contact thermostat "E" from lighting circuit (230 v. or less) as indicated by dotted lines. *(In ordering specify both power and lighting voltages.)*

Note: If there is to be only one Thermolier on circuit put overload protection in F and omit C. If there is to be more than one Thermolier on circuit we recommend installation of C in each individual circuit and omit protection in F.

**Note:* For voltage above 220 volts single phase a-c. it is necessary to use magnetic switch "F" to control *one* or more Thermoliers with mercury contact thermostat "E."

†*Note:* For voltage above 230 volts d-c. it is necessary to use automatic starter "F" to control *one* or more Thermoliers with mercury contact thermostat.

Note: See page 34 for list prices on mercury contact thermostat, magnetic switch, automatic starter and thermal overload cutouts.

Continued on next page

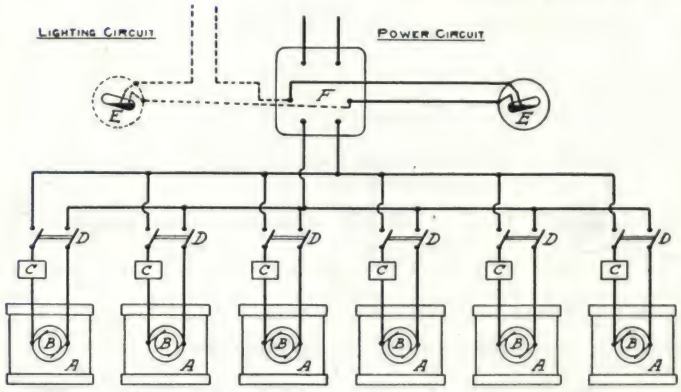
GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

ELECTRIC WIRING DIAGRAMS FOR THERMOLIER

AUTOMATIC CONTROL

Automatic Control by Thermostat with Magnetic Switch

Single phase A-C. up to 220 Volts



The number of units to be controlled by a single thermostat with relay should be governed by conditions included in the area to be heated.

A. Thermoliers.
B. Thermolier motors.
C. Thermal overload cutouts (recommended).
D. Double pole switches.
E. Single pole. (Three amps. at 110 V. or one and one-half amps. at 220 V.) Mercury contact thermostat.
F. Magnetic switch, undervoltage release, no overload protection or push button unless specified.

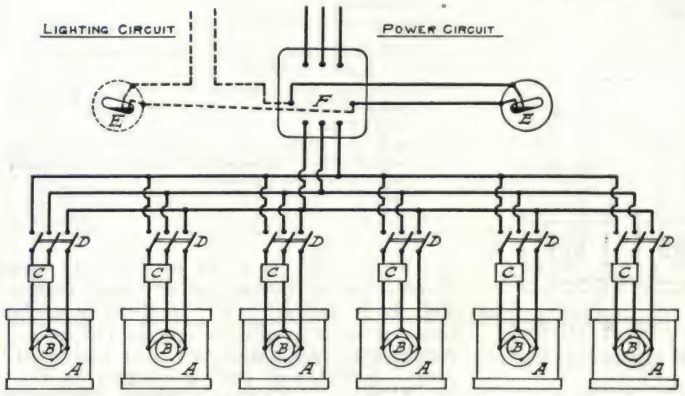
Note: If there is to be only one Thermolier on circuit put overload protection in F and omit C. If there is to be more than one Thermolier in circuit we recommend installation of C in each individual circuit and omit protection in F.

When power circuit voltage does not exceed 220-A-C., mercury contact thermostat "E" should be connected to magnetic switch "F" as indicated in solid lines. *(In ordering specify power voltage.)*

When power circuit voltage exceeds 220-A-C., magnetic switch "F" must be of a type to allow energizing of control circuit through mercury contact thermostat "E" from lighting circuit (220 V. or less) as indicated by dotted lines. *(In ordering specify both power and lighting voltages.)*

Automatic Control by Thermostat with Magnetic Switch

Three phase up to 550 Volts, A-C.



The number of units to be controlled by a single thermostat with relay should be governed by conditions included in the area to be heated.

We recommend against the use of a two pole mercury contact thermostat to control three phase Thermoliers directly.

A. Thermoliers.
B. Thermolier motors.
C. Thermal overload cutouts (recommended).
D. Triple pole switches.
E. Single pole. (Three amps. at 110 V. or one and one-half amps. at 220 V.) Mercury contact thermostat.
F. Magnetic switch, undervoltage release, no overload protection or push button unless specifid.

Note: If there is to be only one Thermolier on circuit put overload protection in F and omit C. If there is to be more than one Thermolier on circuit we recommend installation of C in each individual circuit and omit protection in F.

When power circuit voltage does not exceed 220-A-C., mercury contact thermostat "E" should be connected to magnetic switch "F" as indicated in solid lines. *(In ordering specify power voltage.)*

When power circuit voltage exceeds 220-A-C., magnetic switch "F" must be of a type to allow energizing of control circuit through mercury contact thermostat "E" from lighting circuit (220 V. or less) as indicated by dotted lines. *(In ordering specify both power and lighting voltages.)*

Note: See page 34 for list prices on mercury contact thermostat, magnetic switch and thermal overload cutouts.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

Grinnell Duotherm Control for Unit Heating Systems

(Patents Applied For)

The Grinnell Duotherm Control is a device for regulating room temperatures where unit heating systems are installed. With this device a high temperature is automatically maintained when required, and a low temperature automatically maintained during idle hours such as at night and on Sundays and holidays. This wide range of high and low temperatures cannot be secured by the ordinary single thermostat control.

The advantages to be secured from this control are at once obvious to anyone familiar with the proper and most economical handling of heating equipments in industrial plants. Bulletin No. A-3 giving a more complete description of this product, also a detailed analysis of the economies to be had by its use, will be mailed upon request.

Remote Control

The Grinnell Duotherm is applicable to single room temperature control but the most important economies to be gained by its use are in the remote control of temperatures throughout large plants. When so used, the temperatures throughout the whole plant are under the control of one responsible individual in the boiler room or any other convenient place.

Construction

The thermostats together with switches, coils and other parts are compactly mounted in a cast aluminum box with sides and bottom perforated to provide proper circulation of air around the thermostats. Adjustment of the thermostats is made through a hinged and locked bottom drop panel. Binding post strip is plainly marked to insure proper connection of wiring to the device.

High or black push-button and *low* or red push-button are enclosed in a separate compartment.

Whenever *high* temperature control thermostat is in operation, a red bull's eye is illuminated by a small electric light in a properly ventilated enclosure on top of the main unit.

Remote control, a standard two-button push-button box, can be mounted on wall or other convenient point.

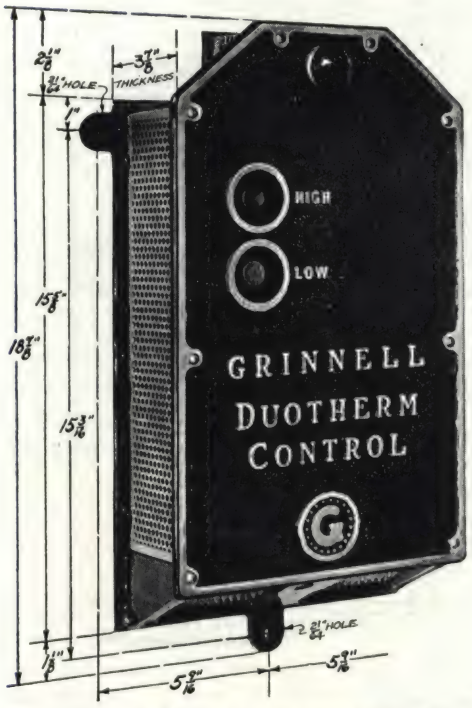


Fig. No. 1—Grinnell Duotherm with Cover in Place Showing High and Low Push Buttons

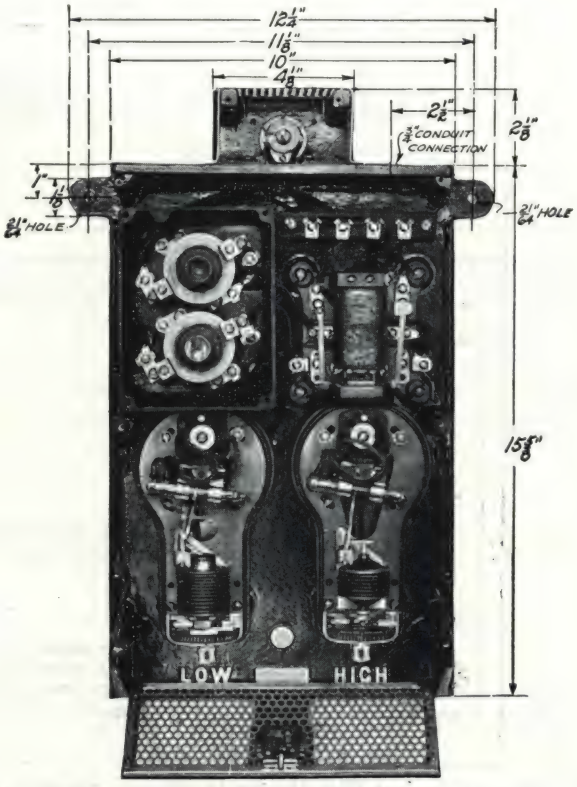


Fig. No. 2—Grinnell Duotherm with Cover Removed

Note: See page 32 for wiring diagram of typical installation.
Note: See page 34 for list prices on electrical control equipment.

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GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

Grinnell Duotherm Control for Unit Heating Systems

(Patents Applied For)

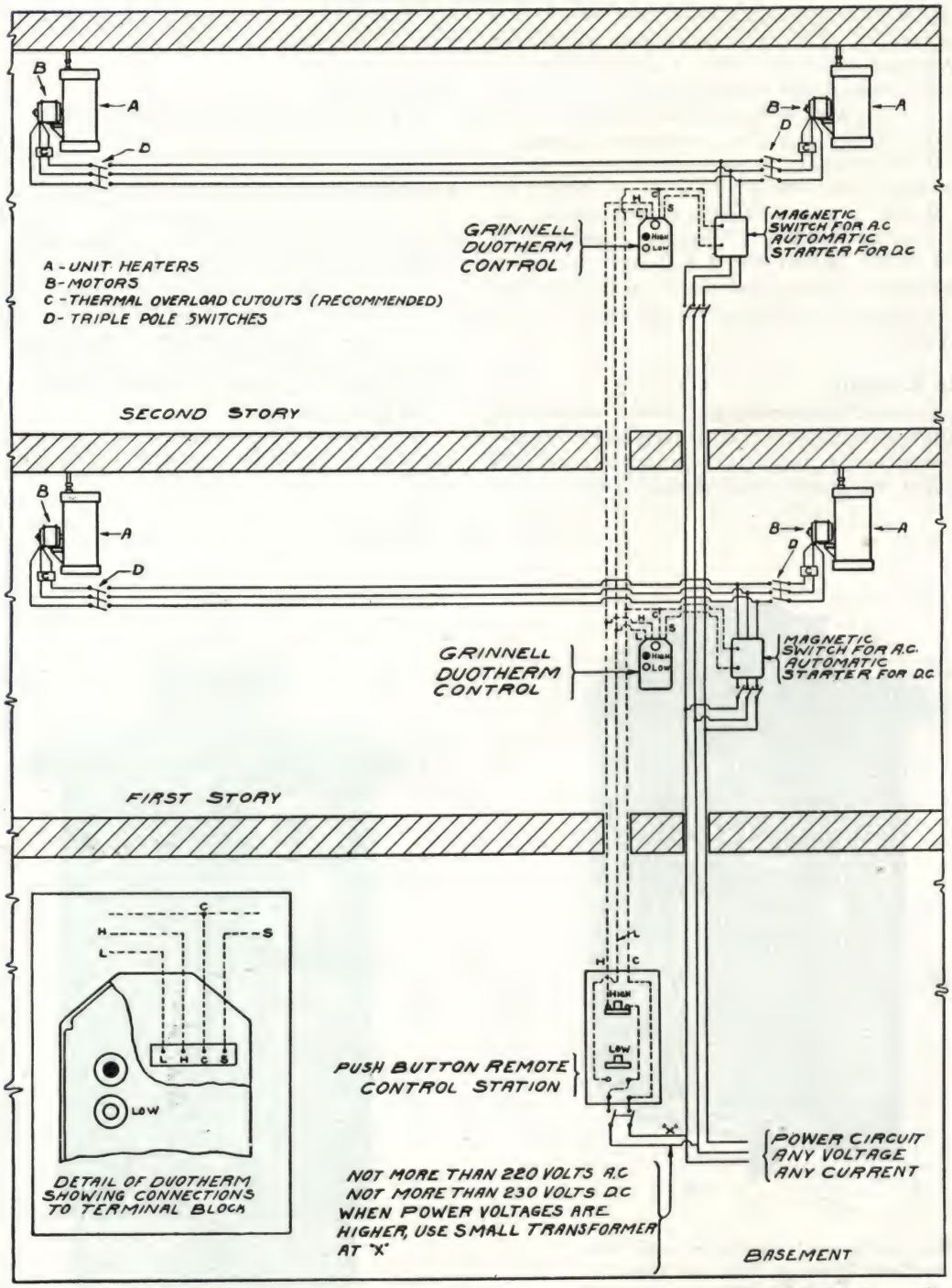


Fig. No. 3—Typical Unit Heater Installation Showing How Grinnell Duotherms May All Be Controlled from One Central Point by High-Low Remote Control

Note: Magnetic switch for A-C. or automatic starter for D-C. must always be used when Grinnell Duotherm Controls are installed, regardless of the number of units to be controlled.

Note: See page 34 for list prices on electrical control equipment.

Continued on next page

GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

AUTOMATIC CONTROL FOR THERMOLIER

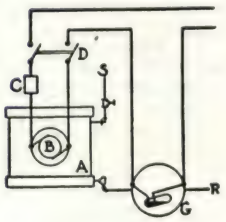
Mercury Contact Thermostats with Magnetic Switches or Automatic Starters

Data pages 28, 29 and 30 illustrate typical wiring diagrams and indicate the various methods of automatic control, that is, either directly by mercury contact thermostat or by mercury contact thermostat in conjunction with magnetic switch (for A-C.) or automatic starter (for D-C.). These pages also indicate limits as to number of Thermoliers of various sizes that may be controlled by either method.

All mercury contact thermostats for use with Thermoliers are single pole, either three or ten amperes, as called for on pages 29, 30 and this page, and are *always* single circuit, *not* double circuit.

Mercury contact thermostats can be furnished in two standard temperature ranges and in special ranges as tabulated on page 34.

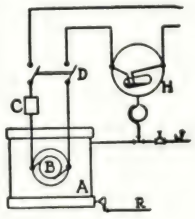
Surface Temperature Type Mercury Contact Controls



A. Thermoliers.
B. Thermolier motors.
C. Thermal overload cutouts (recommended).
D. Double pole switches.
G. Single pole, surface temperature type (ten amps. at 110 V. or five amps. at 220 V.) mercury contact control.
H. Single pole, pressure type (ten amps, at 110 V. or five amps. at 220 V.) mercury contact control.
R. Steam return.
S. Steam supply.

With the surface temperature type mercury contact control, a metallic strip is clamped against pipe line and the temperature of the line thereby actuates the instrument. If, therefore, line is cold due to no steam being available, motor on Thermolier will not operate (thereby circulating cold air). The device should be wired as illustrated for single phase and D-C.

Pressure Type Mercury Contact Controls



With the pressure type mercury contact control, the pressure in steam line governs the starting and stopping of motor on Thermolier. A tee with ¼ in. outlet should be provided in steam line and instrument connected to it through pigtail or similar siphon. The device should be wired as illustrated for single phase and D-C.

Thermoliers with single phase or d-c. motors may be controlled directly in quantities not exceeding those listed in the following table:

Model No.	100-100A	200-200A	300-300A	400-400A	600-600A	800-800A	1200-1200A	1600-1600A
D-C. up to 230 volts	8	6	4	2	1	1	1	1
1 ph. A-C. up to 220 volts	8	6	4	3	3	3	2	1

If a greater number of Thermoliers than specified in table must be controlled by a single thermostat or, if voltages exceed those specified in table, a magnetic switch (for A-C.) or automatic starter (for D-C.) should be added similar to method shown on Page 29.

If Thermolier motors are 3-phase we recommend the addition of a magnetic switch similar to method shown on Page 34.

If room temperature thermostat is used in conjunction with above, the two instruments should be wired in series.

Pressure type mercury contact controls can be furnished in ranges as tabulated on Page 34.

Continued on next page

GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

LIST PRICES FOR ELECTRICAL CONTROL EQUIPMENT

Grinnell Duotherm Control

Grinnell Duotherm control	$150.00
Remote control push button station for above	3.00

Magnetic Switch

Magnetic switch with push button and overload protection	$ 16.00
Allowance for omission of push button	2.00
Allowance for omission of overload protection	1.00

Automatic Starter

Automatic starter with push button and overload protection	$ 35.00
Allowance for omission of push button	2.00
Allowance for omission of overload protection	.50

Thermal Overload Cutout

Thermal overload cutout for single phase A-C. and for D-C.	$ 3.00
Thermal overload cutout for three phase A-C.	4.00

Mercury Contact Thermostat

	Temperature range	Single pole for single phase A-C. and D-C. (ten amps. @ 110 V. or five amps @ 220 V.)	Single pole for use with automatic starter or magnetic switch 3 amps @ 110 V. or 1½ amps. @ 220 V.
Mercury contact thermostat	38° F. to 60° F.	$22.50	$20.50
	56° F. to 80° F.	22.50	20.50
	special ranges (to order)	26.50	24.50

If locking device is required, add $1.00 List. If thermometer is required, add $1.50 List.

Surface Temperature Type Mercury Contact Control

	Temperature range	Single pole for single phase A-C. and D-C. (ten amps. @ 110 V. or five amps. @ 220 V.)	Single pole for use with automatic starter or magnetic switch 3 amps. @ 110 V. or 1½ amps. @ 220 V.
Surface temperature type mercury contact control	110° F. to 200° F.	$20.00	$18.00

Pressure Type Mercury Contact Control

	Operating range	Single pole for single phase A-C. and D-C. (ten amps. @ 110 V. or five amps. @ 220 V.)	Single pole for use with automatic starter or magnetic switch 3 amps. @ 110 V. or 1½ amps. @ 220 V.
Pressure type mercury contact control	10 in. vacuum to 15 lbs. pres. with differential of 1 to 6 lbs.	$22.00	$20.00
	Other ranges on application.		

Continued on next page

GRINNELL THERMOLIER DATA SHEET ISSUED NOVEMBER, 1930

MOTOR SPECIFICATIONS FOR THERMOLIER

General Description

The motors used on the Grinnell Thermolier are made by a nationally known motor manufacturer. All standard types are fully enclosed, and are made especially for use on the Thermolier with full regard for efficiencies and power factors along with the motor size in question.

Stock Motors, H-P. Ratings, Speed of Motors

We endeavor to maintain a stock in accordance with the following schedule. Units with motors of other characteristics can usually be furnished on special order and with slight delay and in some cases slight increase in cost. See page 6 for dimensions, weights and prices.

Model No.		1600-1600A	1200-1200A	800-800A	600-600A	400-400A	300-300A	200-200A	100-100A
H-p. rating of motor	D-C. and 60 Cycle A-C.	1/2	1/4	1/6	1/10	1/8	1/20	1/30	1/100
	25 Cycle A-C.	1/2	1/6	1/6	1/20	1/10	1/40	1/75	1/100
R.P.M. of motor	D-C. and 60 Cycle A-C.	1150	850	1150	850	1750	1150	1750	1150
	25 Cycle A-C.	1450	720	1450	720	1450	720	1450	720
Electrical characteristics of motor:									
3 phase 60 cycle	110 Volt	X	X	X	X	X	X		
	220 Volt	X	X	X	X	X	X		
	440 Volt	X	X	X	X				
	550 Volt	X	X	X	X				
2 phase 60 cycle	220 Volt			X	X	X	X		
1 phase 60 cycle	110 Volt	XM	XM	XM	XM	XM	XM	X	X
	220 Volt	XM	XM	XM	XM	XM	XM	X	X
3 phase 25 cycle	220 Volt	*X		*X					
	440 Volt	*X		*X					
	550 Volt	*X		*X					
1 phase 25 cycle	110 Volt	*X	*X	*X	*X	*X	*X	*X	
	220 Volt	*X	*X	*X	*X	*X	*X	*X	
Direct current	115 Volt	X	X	X	X	X	X	X	X
	230 Volt	X		X					

X—Indicates items we endeavor to carry in stock.

XM—Indicates units also carried with multispeed motors.

*—It will be noted that 25 cycle units are of a different speed than the 60 cycle. Adjustment is made, however, in the fan pitch or relation of fan to unit so as to compensate for this difference. The capacities therefore of 25 cycle units as well as all other odd frequencies are approximately the same as 60 cycle units.

Multi-Speed Motors

All regular motors are for constant speed operation of r.p.m. listed but on special order and at increased price (see pages 7-8) we can furnish multi-speed motors for characteristics and models as follows:

Single phase 60 cycle a-c. not exceeding 220 volt for all models.

Three phase 60 cycle a-c. not exceeding 220 volt for models 400-A to 1600 inclusive.

Direct current not exceeding 230 volt for all models listed. In this case regular motor is used with rheostat.

All above provide one speed approximately as rated and other speeds (or speed) lower.

Power Consumption

Power consumption is dependent upon electrical characteristics of the motor in question. Approximate consumption figures will be furnished on application giving current specifications.

Repair Parts

Each Thermolier has a small number plate on which is stamped the type number and serial number of the unit. In ordering any parts whatsoever, these numbers should always be mentioned.

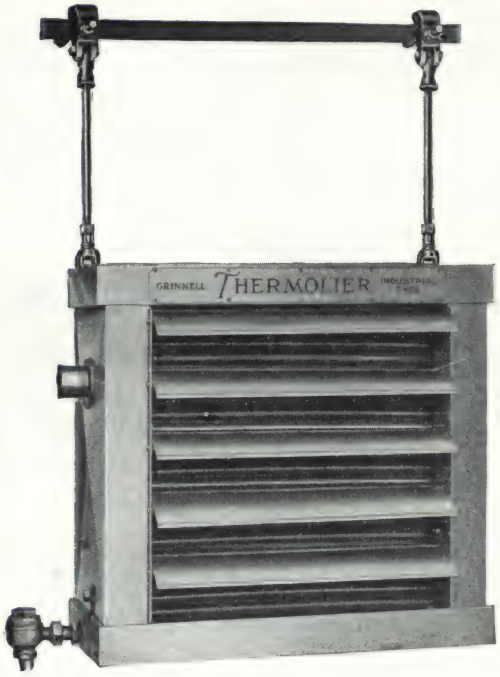
Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

APPLICATION OF GRINNELL ADJUSTABLE HANGERS TO THERMOLIER

Suspended from I Beams or Channels

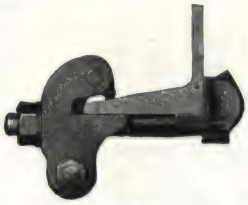


Universal Side I-Beam Clamp

Fig. No. 225 with extension eye bolt Fig. No. 220

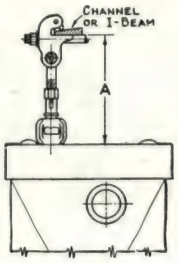
Application of Extension Piece

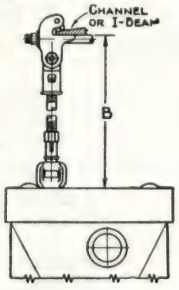
Fig. No. 157 and hanger rod to universal clamps



Universal Channel Clamp

Fig. No. 226





For ordering short hangers, specify (quantity and rod size).

Fig. No. 225 universal side I-beam clamps (state depth, weight and type of beam), or

Fig. No. 226 universal channel clamps (state depth, weight and type of channel).

Fig. No. 220 extension eye bolts (specify length from table below*).

Lengths of extension eye bolts required for varying lengths of "Dimension A" using Fig. No. 220 extension eye bolt, in conjunction with either Fig. 225 or 226 Clamps.

Thermolier Model No., hanger rod size	100—200—⅜ in. 100A—200A—⅜ in.		300—400—½ in. 300A—400A—½ in.		600—800—⅝ in. 600A—800A—⅝ in.		1200—1600—⅞ in. 1200A—1600A—⅞ in.	
	*	Dimension A	*	Dimension A	*	Dimension A	*	Dimension A
Fig. No. 220 Ext. Eye Bolt, short	2½ in.	4½–5¾ in.	2¾ in.	5½–7 in.	3 in.	6¼–8 in.	3¼ in.	8 –9½ in.
Fig. No. 220 Ext. Eye Bolt, medium	4 in.	6–7¼ in.	4¼ in.	7–8½ in.	4½ in.	7¾–9½ in.	4¾ in.	9½–11 in.
Fig. No. 220 Ext. Eye Bolt, long	5½ in.	7½–8¾ in.	5¾ in.	8½–10 in.	6 in.	9¼–11 in.	6¼ in.	11–12½ in.

For ordering longer hangers, specify (quantity and rod size).

Fig. No. 225 universal side I-beam clamps (state depth, weight and type of beam), or

Fig. No. 226 universal channel clamps (state depth, weight and type of channel).

Fig. No. 157 extension pieces.

Fig. No. 140 hanger rods (specify length from table below).

Thermolier Model No.	100—200 100A—200A	300—400 300A—400A	600—800 600A—800A	1200—1600 1200A—1600A
Hanger rod size	⅜ in.	½ in.	⅝ in.	⅞ in.
Correct length of hanger rod	"B" minus 4 in.	"B" minus 5 in.	"B" minus 6 in.	"B" minus 7 in.

Continued on next page

GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

APPLICATION OF GRINNELL ADJUSTABLE HANGERS TO THERMOLIER

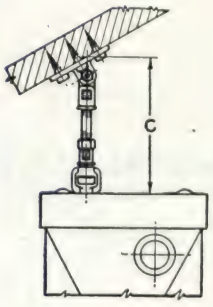
Adjustable Swinging Hanger Flange
Fig. No. 155

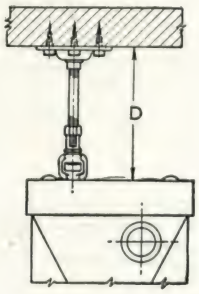
Swivel Hanger Flange
Fig. No. 154

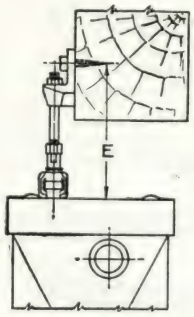
Side Beam Bracket
Fig. No. 202

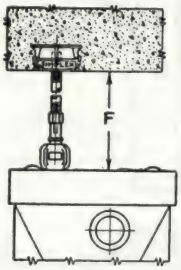
Simplex Insert
Fig. No. 281

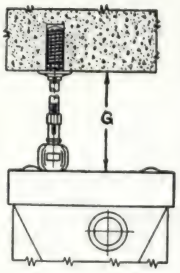
Expansion Case
Fig. No. 117











	Quantity and Size, per Hanger			
	Models 100—200 100A—200A	Models 300—400 300A—400A	Models 600—800 600A—800A	Models 1200—1600 1200A—1600A
Suspended from Pitched Wood Roofs				
For ordering hangers, specify:				
(Quan.) (Rod size) Fig. No. 155 adj. swinging hanger flanges	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
(Quan.) (Size) Coach or wood screws	2–1 1/2 in. No. 18	3–3/8x2 in.	3–1/2x2 in.	3–5/8x2 in.
(Quan.) (Rod size) Fig. No. 140 hanger rods. (State length*)	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
*For correct hanger rod length, deduct from dimension "C"	4 in.	5 in.	5 1/2 in.	8 in.
Suspended from Flat Wood Roofs or Ceilings				
For ordering hangers, specify:				
(Quan.) (Rod size) Fig. No. 154 swivel hanger flanges	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
(Quan.) (Size) Coach or wood screws	2–1 1/2 in. No. 18	3–3/8x2 in.	3–1/2x2 in.	3–5/8x2 in.
(Quan.) (Rod size) Fig. No. 140 hanger rods. (State length †)	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
†For correct hanger rod length, deduct from dimension "D"	2 in.	2 in.	3 in.	4 in.
Suspended from Side of Wood or Concrete Beams				
For ordering hangers, specify:				
(Quan.) (Rod size) fig. No. 202 side beam brackets	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
(Quan. (Size) Coach screws—for wood beams, or	1–3/8x2 1/2 in.	1–1/2x3 in.	1–5/8x3 in.	1–7/8x4 in.
(Quan. (Size) Fig. No. 117 expan. bolts and cases—for concrete	1–3/8x2 in.	1–1/2x2 1/2 in.	1–5/8x3 in.	1–7/8x4 1/2 in.
(Quan.) (Size) hexagonal nuts	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
(Quan.) (Rod size) Fig. No. 140 hanger rods. (State length‡)	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
‡For correct hanger rod length, deduct from dimension "E"	1 in.	1 1/2 in.	2 1/2 in.	4 in.
Suspended from Concrete (by Inserts)				
For ordering hangers, specify:				
(Quan.) (Rod size) Fig. No. 281 simplex inserts, or	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
(Quan.) (Rod size) Fig. No. 280 universal inserts, with nuts	1–3/8 in.	1–1/2 in.	1–5/8 in.	Not made
(Quan.) (Rod size) Fig. No. 140 hanger rods. (State length §)	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
§For correct hanger rod length, deduct from dimension "F"	1/2 in.	1 in.	1 in.	1 in.
Suspended from Concrete (by Expansion Cases)				
For ordering hangers, specify:				
(Quan.) (Rod size) Fig. No. 117 expansion cases	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
(Quan.) (Rod size) Fig. No. 215 ceiling plates	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
(Quan.) (Rod size) Fig. No. 140 hanger rods. (State length ‖)	1–3/8 in.	1–1/2 in.	1–5/8 in.	1–7/8 in.
‖For correct hanger rod length, add to dimension "G"	1/2 in.	1/2 in.	1/2 in.	0 in.

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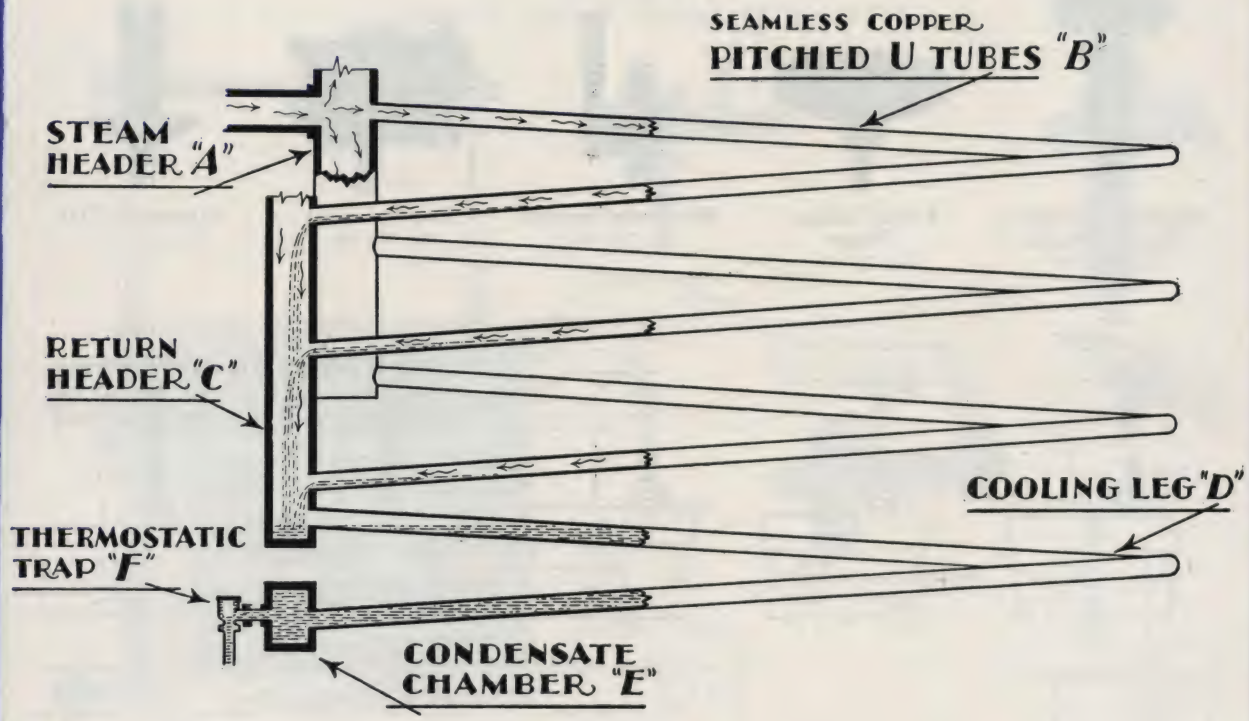
GRINNELL THERMOLIER DATA SHEET

ISSUED NOVEMBER, 1930

Diagrammatic Description of Function of Internal Cooling Leg of THERMOLIER

(Patent Pending)



Operation

Steam enters steam header "A" and is distributed to pitched U tubes "B," which consist of seamless copper tubes with extended heating surface in the form of brass fins.

Air from fan is blown across these tubes collecting heat from the steam which condenses and flows into return header "C."

Air from fan is also blown across cooling leg "D," made of the same extended heating surface as tubes "B." This cools condensate to a point where thermostatic trap "F" is kept open as long as condensate chamber "E" is filled and cooling leg "D" is at least partially filled with water.

Thermostatic trap "F" opens only when condensate at a slightly lower temperature than steam surrounds the thermostatic bellows.

No steam can get into condensate chamber "E" except when all tubes (including cooling leg) are dry.

Condensate is held back in cooling leg tube "D" a sufficient distance to permit ample cooling, because as the amount of condensate collected increases, the distance to which it is held back in "D" increases, also the cooler it becomes. This cooling of the condensate causes the thermostatic trap "F" to open wider and automatically keep the unit drained with a steady flow of condensate. The capacity of tube "D" is ample to take care of the greatest possible quantity of condensate which can collect.

The rated capacity of thermostatic traps "F" are always given for operation under normal working conditions, which is to drain a chamber containing a mixture of steam and condensate. The operation of a thermostatic trap under the conditions imposed by the Grinnell Thermolier cooling leg permits in many cases the doubling of the commercial rating of the trap with safety.

This cooling leg also acts as a condenser tube creating a vacuum effect tending to pull steam into the unit, so that steam will circulate uniformly through the tubes at pressures down to atmosphere or below and with steam supply connections considerably smaller than customary.

It should also be noted that when steam is turned off the water automatically drains out of the cooling leg tubes "D" through chamber "E" and trap "F" and the entire unit then becomes dry.

AEROFIN CORPORATION

850 Frelinghuysen Avenue, NEWARK, N. J.

CHICAGO, ILL., Burnham Building
DETROIT, MICH., United Artists Building
NEW YORK, N. Y., 11 West 42nd Street
PHILADELPHIA, PA., Land Title Building
PITTSBURGH, PA., Oliver Building
ST. LOUIS, MO., Paul Brown Building

Aerofin

AEROFIN is the modern Standardized Light-Weight Fan System Heat-Surface developed by *Fan Engineers* to meet the present-day requirements of this highly specialized field, and to afford an adaptability which permits the new and advanced applications of tomorrow.

Low Pressure, Universal and High Pressure Aerofin

AEROFIN is built in three distinct types: LOW PRESSURE AEROFIN, tube-plate construction, for pressures up to 50 lb. gauge; UNIVERSAL AEROFIN, continuous, multicoil, seamless tubes, for pressures from 2½ to 200 lb. gauge; and HIGH PRESSURE AEROFIN, continuous seamless tubes, for pressures from 25 to 350 lb. gauge (temp. 500° F.).

Design and Construction

The heat-transfer surface in AEROFIN is a plurality of seamless copper tubes about which is wound a helix of copper ribbon, crimped on its inner edge to permit winding and to afford maximum contact between tube and fin. The extended fin surface is applied, and tinned while held in position, by highly developed automatic machines, being accurately crimped and spaced. The tinning of the tube and the extended surface makes them metallicly integral, affording maximum heat transmission and permanent effectiveness. The thickness and width (height) of the extended surface, the crimping and the pitch of the helix were determined by careful experiment, to afford maximum heat transfer, uniform air flow and minimum resistance thereto. The copper tubes and fins of AEROFIN transmit heat eight times as effectively as iron. So scientifically is AEROFIN designed that air is heated more in passage through a single row of its tubes, a travel of 1⅛ in., than in passage through an entire section of cast iron surface, a travel of 9 in.

In Low Pressure AEROFIN the tubes are set into flexible tube-plates by means of a highly developed joint which is tight and permanent. (See Figure 1.) In Universal and High Pressure AEROFIN the seamless tubes, with their extended fin surface, are continuous. (See Figures 2 and 3.)

Low Pressure, Universal, and High Pressure AEROFIN are furnished as completely encased Units, ready for pipe and duct connections. The casings are built of pressed steel and are exceptionally strong and rigid, protecting the Unit from all the strains of pipe connection and expansion or contraction in service. The casings are flanged on both faces, top and bottom, and template punched for bolting together adjacent units, or for duct connection.

Standard Casings

The casings of all AEROFIN Units, whether comprising one, two or three rows of tubes, are 29 in. wide (except 6-tube Universal which is 21⅛ in.) across tubes, from outer edge one flange to outer edge opposite flange, and 10 in. deep in direction of air flow. Length of casing is nominal tube length plus 8½ in.

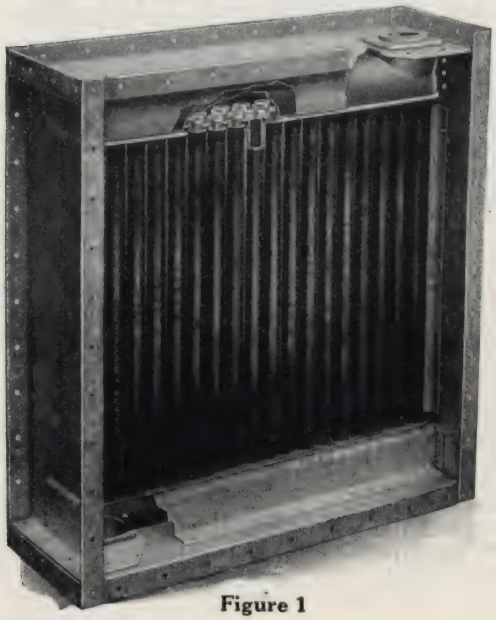


Figure 1

Sales

AEROFIN *is sold only by manufacturers of nationally advertised fan heating apparatus. List upon request.*

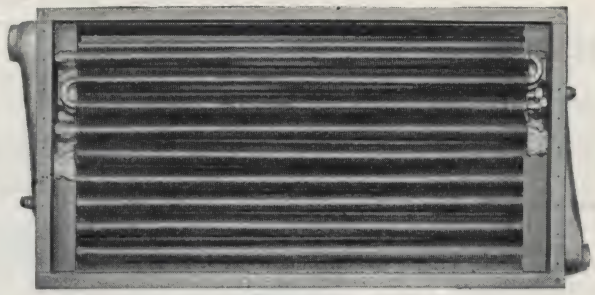


Figure 2

Aerofin Sizes

Low Pressure Aerofin—Made in fifteen standard tube lengths, either one, two or three staggered rows of tubes per unit. There are thus forty-five standard units available, a range which adequately meets all requirements.

Tubes are furnished of any length between 2 ft. and 6 ft., in increments of 6 in., and between 6 ft. and 12 ft. in increments of 1 ft.

Complete tables of sizes and capacities are shown in Bulletin SA-30, mailed gratis upon request. This bulletin also contains 23 proved piping diagrams in four colors.

Universal Aerofin—Available in one-row or two-row units, in seventeen standard tube lengths (distance between end baffle plates, or between 180° bends), between 2 and 10 ft., inclusive, in increments of 6 in. Batteries of double width are easily assembled by setting units end-to-end, leaving space for pipe connections.

Complete information is contained in our Bulletin SA-30, mailed gratis upon request.

High Pressure Aerofin—Made in five standard tube lengths (i. e., length of straight section of tube, between 180° bends), 2 ft., 2 ft. 6 in., 3 ft., 3 ft. 6 in., 4 ft., either one, two or three staggered rows of tubes per unit. There are thus fifteen standard units now available, meeting practically all requirements. Since the supply and drip connections of High Pressure AEROFIN are located on the same end, Figure 3, units may be placed end-to-end, thus affording battery widths of twice the standard tube-length. Complete tables of sizes and capacities are shown in our Bulletin SA-30, mailed gratis upon request.

Aerofin Booster Units—For horizontal or vertical air flow. Five sizes of each type, 170 to 1430 c.f.m., 350 lb. working steam pressure. Complete information upon request to Newark. Ask for bulletin SA-30.

Steel Supporting Legs

Standard steel supporting legs, 18 or 24 in. high, template punched to same bolt hole centers as standard casing, are furnished when ordered. These legs may be attached quickly and obviate necessity of any other foundation.

Advantages

AEROFIN weighs but 9 to 16% as much as equivalent cast iron and occupies but 35% of the space required by equivalent cast iron (3-row units). Two men can easily carry any AEROFIN Unit.

Expensive foundations are unnecessary, building reinforcement is not required and the units may readily be suspended from beams or roof trusses, or installed snugly in any out-of-the-way corner.

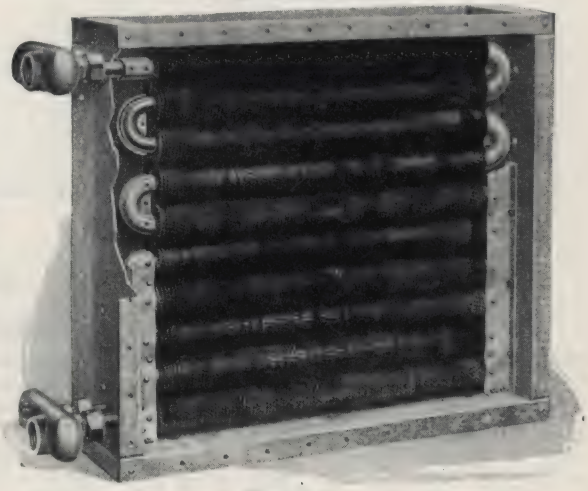


Figure 3

THE HART & HUTCHINSON COMPANY

Manufacturers of Concealed Wall and Cabinet Radiation Units

NEW BRITAIN, CONN.

For Veneer-Steel Toilet Partitions and Shower Stalls, see Manufacturers' Index

Hart & Hutchinson Cabinet Radiators

H. & H. Cabinet Radiators, shipped complete and including Hart & Hutchinson copper fin radiators, offer a solution in remodeling residences; in multi-storied structures, or where for various reasons concealed "in the wall" radiation is not practical. Light in weight—easy to handle and install—save 15% in floor space when replacing cast iron radiators—and in a majority of cases install cheaper than a good grade of radiator cover over old cast radiators.

Construction Features

These cabinet radiators have removable tops for cleaning and servicing—an important factor. Curtains, drapes and wall paper are protected against radiator dirt.

In operation they can be depended on to render outstanding heating comfort as their heat is directed to the living level of the room.

When installed and operated according to our instructions, these cabinets are guaranteed to give their rated capacities and to be free from defects in workmanship and material.

The radiator itself has vertical copper fins soldered to horizontal copper supply tubes, which are secured to cast iron headers, or steam chambers, by special screw compression fittings. The legs are integral with header castings.

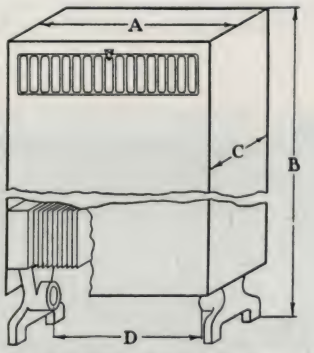
The tappings are for outside connection, 4½ in. from center of tapping to floor and from center of tapping to back wall as follows: 3⅜ in. for 600 Series, 4⅜ in. for 800 series and 6⅜ in. for 1200 Series. Tapping sizes are 1¼ in. for 600 and 800 Series and 1½ in. for 1200 Series. The outside of tapping faces is 1½ in. less than over-all width of cabinet.

The cabinets are of sheet metal, usually finished in prime coat, although can be completely finished in various shades if desired. The design is of modern type, yet not obtrusive. Note the ribbed front and new pattern front grille, also the neatly moulded top and legs.

Hart & Hutchinson radiation is backed by an experience of twenty-five years in the heating field.

Bathroom Cabinet Radiators

Plain cabinet, furnished with or without damper heat control, has inside connections—otherwise same as standard cabinet radiators.



Dimension Diagram of Bathroom Cabinet Radiators

CAPACITY AND DIMENSIONS OF BATHROOM CABINET RADIATORS

No.	A, in.	B, in.	C, in.	D, in.	E, in.	Sq. ft. rating
1401	13 11/16	13¾	4 7/16	10½	2½	8
1402	13 11/16	22	4 7/16	10½	2½	12
1403	27 3/16	13¾	4 7/16	24	2½	16
1404	27 3/16	22	4 7/16	24	2½	20

Tappings—1 in. both ends and 2¾ in. off floor.

Typical Hart & Hutchinson Cabinet Radiator

CAPACITY AND DIMENSION TABLES FOR CABINET RADIATORS

No.	Width, in.	Height, in.	Depth, in.	Sq. ft. rating
Series 600				
601	25	20	7¼	24
602	31⅛	20	7¼	30
603	37¼	20	7¼	36
604	48¾	20	7¼	48
611	25	24	7¼	28
612	31⅛	24	7¼	35
613	37¼	24	7¼	42
614	48¾	24	7¼	56
621	25	30	7¼	33
622	31⅛	30	7¼	41
623	37¼	30	7¼	49
624	48¾	30	7¼	66
631	25	36	7¼	37
632	31⅛	36	7¼	46
633	37¼	36	7¼	55
634	48¾	36	7¼	74
Series 800				
801	25	20	9¼	32
802	31⅛	20	9¼	40
803	37¼	20	9¼	48
804	48¾	20	9¼	64
811	25	24	9¼	37
812	31⅛	24	9¼	47
813	37¼	24	9¼	56
814	48¾	24	9¼	74
821	25	30	9¼	44
822	31⅛	30	9¼	55
823	37¼	30	9¼	65
824	48¾	30	9¼	88
831	25	36	9¼	49
832	31⅛	36	9¼	61
833	37¼	36	9¼	73
834	48¾	36	9¼	99
Series 1200				
1201	25	20	13¼	48
1202	31⅛	20	13¼	60
1203	37¼	20	13¼	72
1204	48¾	20	13¼	96
1211	25	24	13¼	56
1212	31⅛	24	13¼	70
1213	37¼	24	13¼	84
1214	48¾	24	13¼	112
1221	25	30	13¼	66
1222	31⅛	30	13¼	82
1223	37¼	30	13¼	98
1224	48¾	30	13¼	132
1231	25	36	13¼	74
1232	31⅛	36	13¼	92
1233	37¼	36	13¼	110
1234	48¾	36	13¼	148

Continued on next page

TYPE W CONCEALED RADIATOR UNIT

Description

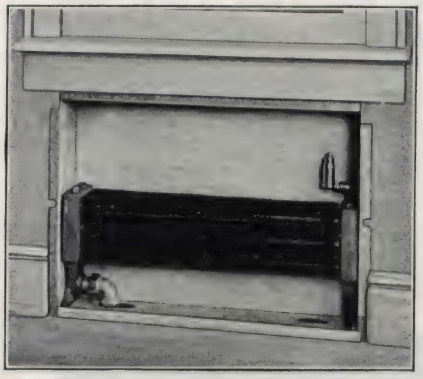
The unit for this type of recessed work consists of a Hart & Hutchinson standard copper fin radiator, a steel box entirely enclosing the recess, including the bottom which rests on finished floor, and metal front plate, or grille, making a complete installation exclusive of valves.

It is built so that it can be placed into the walls with a minimum amount of framing, and can be placed either in outside or interior walls or partitions as shallow as 4 in., or for 6 in.

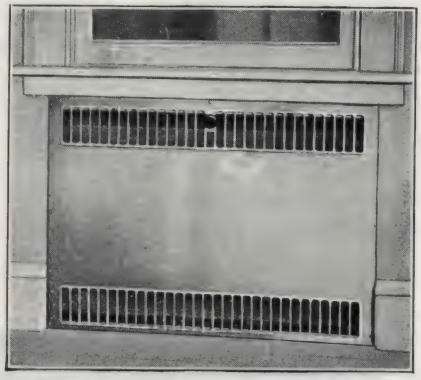
Box has outwardly turned flanges at top and sides for attaching to studding. Elongated knockout holes in bottom and sides make cutting on job for pipe connection unnecessary. Adjustment provided for grille to box. The finished floor of room should be carried into radiator recess.

The front plate includes the grille top and bottom and encloses the entire front. Cutout type in place of lower grille optional. Screens with cast special or woven wire grilles can be supplied without any fitting on the job if a change is desired. A quickly operated damper in the upper grille controls the heat. The curved shape of the damper deflects the heat into the room.

Shutoff valves can be installed where necessary.



Grille Removed Showing Method of Installation and Connections



Completed Appearance with the Grille in Place

Finish

Grilles usually furnished in priming coat. Special paint finishes or wood reproductions can be supplied, if required, at extra cost.

CAPACITY TABLES IN SQUARE FEET OF RADIATION

Important: To select a radiator for any given location, find in the table the nearest capacity to that required.

For example: If it is required to place approximately 30 sq. ft. of radiation under a window, using a 4-in. deep unit, where the available height is approximately 30¼ in., note that the required width between the studs would be 34 in.

Height of recess "D," in.	4-in. deep unit				6-in. deep unit			
	20¼ in.	24¼ in.	30¼ in.	36¼ in.	20¼ in.	24¼ in.	30¼ in.	36¼ in.
Width of recess "P," in.	Sq. ft. of radiation				Sq. ft. of radiation			
26	19	21	26	30	23	27	31½	36½
28	21	23	29	33	25	29	34½	40
30	23	26	32	36	26	31½	37	43
32	25	28½	35	39	29	34	40	46
34	27	30	37½	42	31	36	42½	49
36	28	32	40	44	33	38½	45	52
38	30	34	42	47	35	41	47	55
42	33	37	46	52	39	45	53½	62
46	36	41	50	57	43	50	59	68
50	40	45	55	62	47	55	65	75

On 4-in. units: C—1⅞ in.; G—4½ in. (or more); R—4 in.; B—2¾ in.

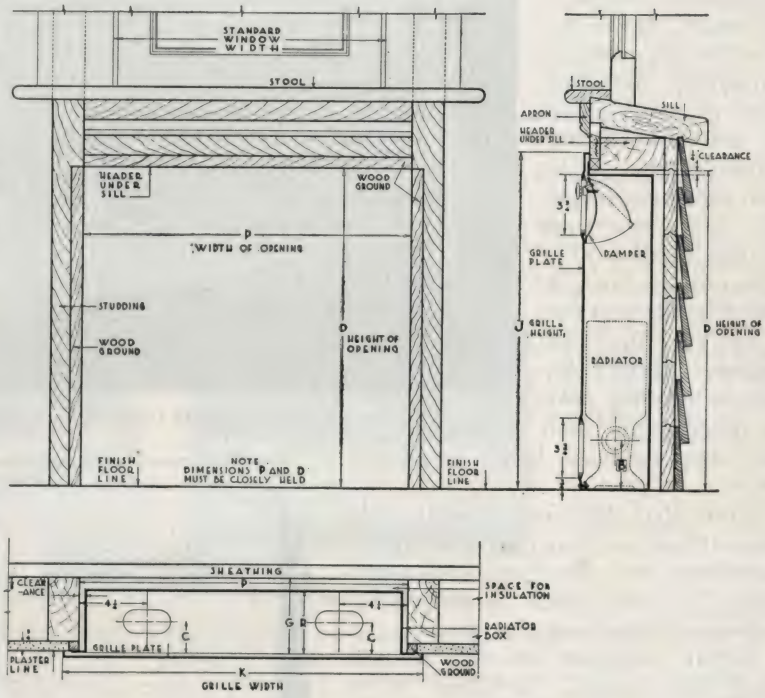
On 6-in. units: C—2⅞ in.; G—6½ in. (or more); R—6 in.; B—3¾ in.

The over-all dimensions of the grille for any radiators selected are as follows:

Grille height "J" equals 1 in. more than the height of the opening "D," and the width of the grille "K" equals 2 in. more than the width of opening "P."

Note: All Hart & Hutchinson radiators are rated on the basis of 240 B.t.u. per sq. ft. of radiation with 2 lb. of steam at the inlet to the radiator and room temperature of 70° F.

For vapor or vacuum use ¾-in. feed and ½-in. return on all sizes. For one-pipe steam or one-pipe vapor use 1-in. connection to lower radiator header. Nail ¾-in. standard grounds to the front of vertical studs or framing as indicated in above illustration. Nail stack to studs and grounds through flanges. The stack should rest on the finish floor and should clear the underside of the stud under the sill by ¼ in.



GENERAL NOTES

Stack Construction—Made of 22 gauge galvanized steel thoroughly riveted at joints. The edges where they come to the edge of the plaster are reinforced and turned back to give key for plaster and to attach the grilles. The stacks are placed in position before plastering, and the radiator can be set at any time, as they are set entirely within the opening of the stack. Stacks in exterior walls allow for ½-in. asbestos air cell covering, which should be specified to be supplied and installed under the heating contracts.

Radiators—Radiators are pitched toward one end and are reversible so that the feed may be at either right or left. For one-pipe steam or one-pipe vapor, air relief valve should be applied to higher radiator head. Radiators are made of vertical copper fins soldered to horizontal copper supply tubes. These tubes are secured to cast iron headers or steam chambers by especially constructed compression screw joints.

Front Plate—Made of one-piece steel No. 18 gauge with grille frets rounded.

HEINTZ CABINET FIN-AND-TUBE RADIATOR

HEINTZ MANUFACTURING COMPANY

MAIN OFFICE AND PLANT

Front and Olney Streets

PHILADELPHIA, PA.

CENTRAL WESTERN SALES OFFICE: 1031 Fisher Building, DETROIT, MICH.

Product

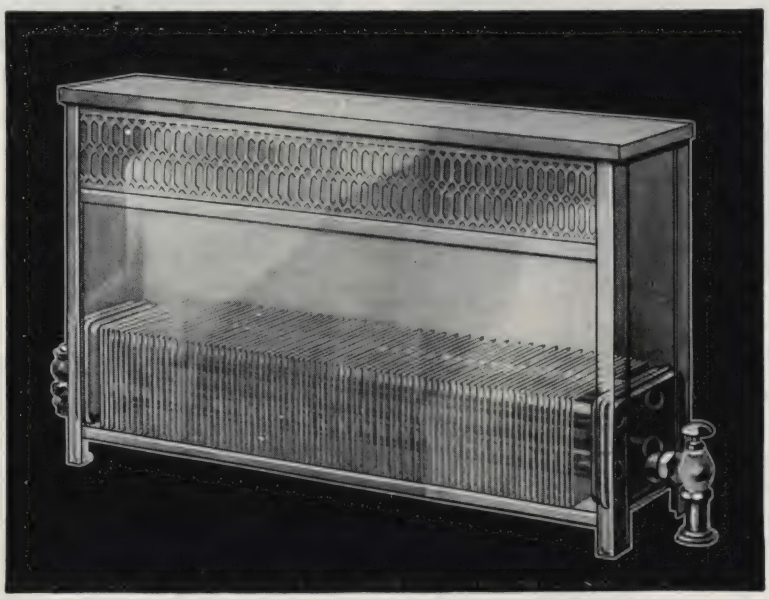
HEINTZ CABINET Fin-and-Tube RADIATOR adaptable to steam, hot water, vapor and vapor vacuum systems.

Concealed, recessed, or exposed units.

Special narrow concealed units 3⅞ in. for interior walls also available.

Description

Heating Unit—Is of the most advanced type of fin-and-tube construction. It is composed of Cop-r-loy tubes, welded at both ends to steel reservoirs. The entire space between the reservoirs is occupied by steel fins, placed at close intervals and forced into position under enormous pressure, before tubes and reservoirs are assembled. The whole unit is hot galvanized inside and out, to speed up heat emission. Heintz fin-and-tube heating units are noted for their quick response to boiler temperatures.

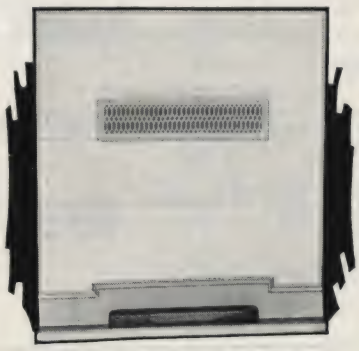


Phantom View of Heintz Cabinet Fin-and-Tube Radiator

Note that the fins present only plain, vertical surfaces. There are no obstructions to interfere with free passage of air, which insures ideal circulation throughout the room.

Metal Cabinet—Is of modern straight-line design, furnished in a priming coat, to be finished in any suitable color.

The scientific location and proportioning of the inlet and outlet passages in the cabinet assure a clean, healthful circulation of warm air. The top of the cabinet deflects the heat outward into the room, placing the heat where it is wanted—in the occupied portion of the room, instead of up the walls and ceiling. This eliminates smudged walls and soiled curtains.



Heintz Concealed Radiator

Features

Weighs less than half as much as the ordinary radiator of like capacity. Therefore, low installation cost.

Unsurpassed in quality, yet priced within the reach of all.

Sturdy construction. Guaranteed free from defects in material or workmanship.

Keeps comfort zone (two to five feet above floor) warmer than does ordinary radiator of equal rating.

Harmonizes with architecture and decorative plan of room. Suitable for all kinds of installation—homes, apartments, office buildings and others.

Suitable for replacement jobs as well as new installations, because it is adaptable to all steam, hot water, vapor and vapor-vacuum heating systems.

The Heintz Cabinet Radiator is not of pressed steel construction and it weighs less than half as much as the ordinary radiator of like capacity. It is an advanced development of the modern fin-and-tube type, which has so thoroughly demonstrated its reliability and high efficiency. Today the Heintz Cabinet Radiator is available at a price somewhat below that at which fin-and-tube type radiators have generally been sold in the past.

Specifications

Sizes: Height—20, 26, 32 and 38 in.

Length—18, 24, 30, 36, 42, 48, 54, 60, 72, 84, 96, 108 and 120 in.

High grade furniture steel used in cabinets.

Can be used with any make valves and traps—also one-way piping systems.

The catalogue ratings of Heintz Radiators are conservative steam condensation ratings.

Heating effect may range as high as 20% above that of direct radiators condensing an equal amount of steam. A fair average of this effect is about 15%, which means that Heintz Cabinet Radiators of lower rated capacities may be used, resulting in a material saving of fuel.

INTERNATIONAL RADIATOR CORP.

Manufacturers of Concealed Radiators, Cabinet Radiators and Wall Radiators of the Finned Type

PORT CHESTER, NEW YORK

Construction

International Radiators have only three parts—malleable headers, copper tubes and iron fins. The materials used are practically indestructible.

The fins are stamped channel shaped from .025-in. rust resisting sheet iron. They are forced, under high pressure, over pure seamless heavy gage copper tubes.

The copper tubes are then welded into malleable iron headers. Malleable iron is used because its high tensile strength prevents breakage.

After the tubes have been welded in, each end of the radiator is hot galvanized inside and out. Galvanizing prevents rust and keeps the inside of the radiators clean. Every radiator is neatly finished in a factory coat.

"Heat the World"

Design

International Radiators emphasize the practicability of clean cut design. Tubes have been shaped to present minimum air friction and still have a large internal volume. The internal volume of the 3-in. radiator is 20% greater than a 1½-in. pipe, and the volume of the 5 and 7-in. radiator is greater than a 2½-in. pipe. Resistance to flow of water in these radiators is minimum, as they are smooth and free from all restrictions. Fins, likewise, are smooth, straight and free from obstructions. Furthermore, fins are 8-in. high, so that air is in contact with the fins through a greater time interval and consequently can absorb more heat, making these radiators especially effective on hot water installations.

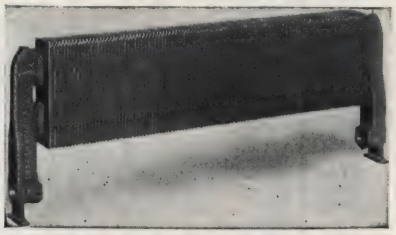
A Typical International Radiator Installation

Types

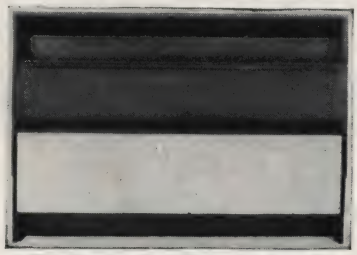
International Radiators are made in 3, 5 and 7-in. depths; and in 8 lengths, from 18 to 60 in., by 6-in. intervals. The wall-hung radiators are made only for two-pipe systems. The leg radiators are made for both two and one-pipe systems.

Two-pipe radiators can be used on vapor, vacuum, gravity steam and hot water. One-pipe radiators can be used on one-pipe pressure or vapor vacuum systems.

Legs are cast integral with the headers or fittings. Each fitting has twin pipe connections for making up valve and trap either underneath the radiator or outside of it.



Two-pipe Steam or Hot Water International Radiator



Enclosure for International Concealed Radiators

Substantial brackets for the wall-hung radiators can be furnished. The 8-in. wall radiators have a small angle frame around the top and are suitable as bathroom radiators.

Installation

All connections are equally distant from floor level and International Radiators are reversible, making roughing-in and installation easy and simple. Pipe connections are always on center of the radiator and the supply can be installed at either end. Wall radiators have top and bottom connections, which puts the valve high enough for convenience.

International Radiators have only a few standard dimensions for all sizes, making them as easy to install as cast iron radiators, and furthermore, the steamfitter has only one-fifth the weight to handle.

It is satisfactory to follow valve and trap sizes of vapor specialty companies, except that ¾-in. valves should be used on small radiators where vapor companies recommend ½-in. valves.

Standard pipe sizes generally used with cast iron radiators apply to International Radiators.

Enclosures

The INTERNATIONAL RADIATOR CORPORATION carry in stock three standard types of enclosures, the Recess Enclosure, Free Standing Cabinet and the Wall Cabinet. The Recess Enclosure is telescopic, the adjustment range being from 20 to 30 in. in height. This is a novel and very important feature, as it simplifies ordering, handling and installation. Recess Enclosures are complete with a bar type outlet grille and damper, and a removable plate at the bottom for accessibility to radiator, valve and trap when necessary.

The outlet grille overlaps the plaster frame ¼ in. on all four sides.

Specifications

The Heating Contractor shall furnish and install where shown on plans, listed in accompanying specifications or directed by the Architect, International Finned Radiators as manufactured by INTERNATIONAL RADIATOR CORPORATION, Port Chester, N. Y. Radiators are to be installed as per details given in the manufacturer's latest catalog, or as shown on tag attached to radiator. Radiators are to be guaranteed as to quality, construction, workmanship and ratings listed in the catalog. Recessed radiators are to be complete with well constructed, heavy gage steel enclosure including bar grille and damper for outlet opening.

Steel plate in outlet opening shall not be removed until after plastering is completed. Heat shall not be turned on until plaster is dry. Where concealed radiators are used without stock enclosures, recesses shall be lined with No. 22 gage galvanized sheet iron, the top curved to form an air deflector, with no pockets at the top.

Free Standing International Radiators are to be complete with stock cabinets furnished by manufacturer. International Wall Radiators are to be complete with cabinet and hangers furnished by manufacturer. Radiators and enclosures to have factory coat finish, and be packed to avoid damage in shipment.

Recesses for concealed radiators are to be provided by the general contractor and are to be of sufficient size to take radiators designated on plans or in specifications. Recess sizes may be obtained from plans, heating contractor or manufacturer's catalogue. All recesses shall be backed with ½-in. approved insulation and have nailing strips at top and both sides so enclosures can be nailed properly before plastering. General contractor shall have the baseboard notched 3 in. high by the radiator length for an air inlet for concealed radiators. The baseboard shall be cut the length of the removable panel and properly attached to it.

Guarantee

Every product bearing the "International" name is guaranteed to be free from defects in material and workmanship, and radiators found to be defective will be replaced f.o.b. factory.

Literature

Write for Catalog 30-A containing complete engineering data.

McQUAY RADIATOR CORPORATION

Manufacturers of Cabinet Radiators, Concealed Radiators, and Unit Heaters

1600 Broadway, N. E., MINNEAPOLIS, MINN.

BRANCHES IN ALL PRINCIPAL CITIES

Foreword

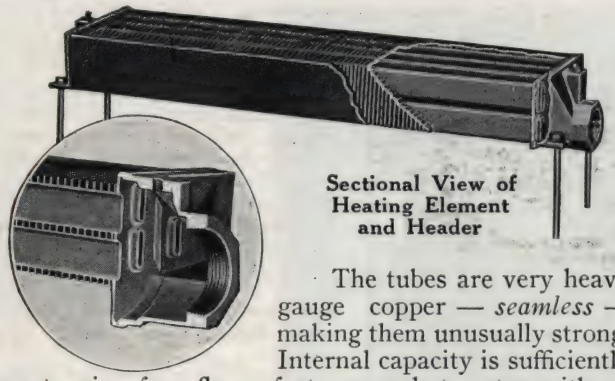
Pioneers in the building of copper radiators for industrial and home heating, as well as for automotive purposes, the McQuay Line is the result of many years' experience.

McQUAY Modern RADIATORS

The published ratings of all McQuay Products are based on actual tests made by competent industrial, heating and university engineers. Ratings are ultra-conservative—assuring ample heat.

McQuay All-copper Heating Element

Consists of a series of flat copper tubes nested into copper end tanks which act as manifolds for the entering steam, vapor or water and the returning condensate. Additional heating efficiency is provided by the vertical copper fins through which the tubes pass.



Sectional View of Heating Element and Header

The tubes are very heavy gauge copper — *seamless* — making them unusually strong. Internal capacity is sufficiently large to give free flow of steam or hot water without any tendency to clog.

Being flat they provide a greater surface for transferring heat from the heating medium to the air circulating up through the heating element. *Copper—and nothing but copper—is used in the McQuay Heating Element.*

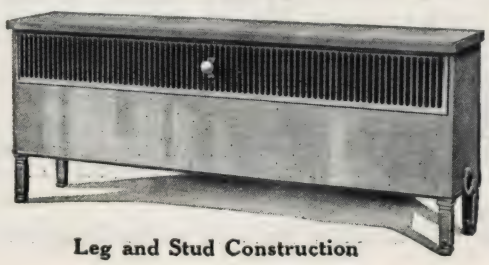
This continuous, unbroken copper conducting surface insures unusual efficiency and very quick heating. It also obviates the expansion strains caused by the use of different metals.

McQuay Cabinet Radiators

Consist of an artistically designed cabinet of heavy, rust-resisting, copper alloy steel set over a McQuay Heating Unit which is nested inside and near the bottom. Cabinet is furnished primed with one coat of duco and may be finished to harmonize with the room's decorative scheme.

Humidification is provided by a water pan inside and near the top of cabinet so that heated air circulates over the top of water pan as well as under it.

McQuay Cabinet Radiators are constructed for vacuum, vapor, air line, one-pipe steam and hot water systems. Tappings are in accordance with Master Steam Fitters Code. All radiators are bushed for eccentric return. Shipping rate approximately 2 lb. per sq. ft. of radiation.



Leg and Stud Construction

DIMENSIONS AND CAPACITIES QUAY CABINET RADIATORS

Over-all length of radiator, in.	20-in. high		23-in. high		26-in. high		32-in. high		38-in. high	
	Stock No.	Sq.ft. rad.	Stock No.	Sq.ft. rad.	Stock No.	Sq.ft. rad.	Stock No.	Sq.ft. rad.	Stock No.	Sq.ft. rad.
Series 500-E—All Cabinets in This Series Are 5¼ In. in Depth										
15	501-E	13.8	521-E	14.4	541-E	15.0	561-E	16 1	581-E	17.4
17½	502-E	16.3	522-E	17.1	542-E	17.7	562-E	19.0	582-E	20.6
20	503-E	18.8	523-E	19.7	543-E	20 4	563-E	22.0	583-E	23 8
22½	504-E	21.1	524-E	22.2	544-E	23.1	564-E	24.9	584-E	27.0
25	505-E	23.7	525-F	24.9	545-E	25.7	565-E	27.8	585-E	30.1
27½	506-E	26.2	526-E	27.4	546-E	28.5	566-E	30.8	586-E	33 2
30	507-E	28.7	527-E	29.9	547-E	31.1	567-E	33.7	587-E	36.3
32½	508-E	31.0	528-E	33.0	548-E	33.7	568-E	36.7	5. 8-E	39.5
35	509-E	33.5	529-E	35.1	549-E	36.5	569-E	39.6	589-E	42.7
37½	510-E	36.1	530-E	37.7	550-E	39.2	570-E	42.6	590-E	45.8
40	511-E	38.5	531-E	40.2	551-E	41.9	571-E	45.5	591-E	49.0
42½	512-E	41.0	532-E	42.9	552-E	44.5	572-E	48.5	592-E	52.0
45	513-E	43.6	533-E	45.5	553-E	47.3	573-E	51.5	593-E	55 2
47½	514-E	46.0	534-E	48.1	554-E	50.1	574-E	53.5	594-E	58.3
50	515-E	48.5	535-E	50.7	555-E	52.7	575-E	57.3	595-E	61.5
52½	516-E	51.0	536-E	53 4	556-E	55.4	576-E	60.4	596-E	64.7
55	517-E	53.6	537-E	55 8	557-E	58.1	577-E	63.3	597-E	67.8
57½	518-E	56 1	538-E	58.5	558-E	60 8	578-E	66.2	598-E	71.0
60	519-E	58.5	539-E	61.1	559-E	63.5	579-E	69.1	599-E	74.1
62½	520-E	61.1	540-E	63.7	560-E	66.2	580-E	72.2	600-E	77.2
Series 700-E—All Cabinets in This Series Are 7 In. in Depth										
15	701-E	14.9	721-E	16.2	741-E	16.8	761-E	18.7	781-E	20.3
17½	702-E	17.8	722-E	19.6	742-E	20.3	762-E	22.5	782-E	24.9
20	703-E	20.9	723-E	22.8	743-E	24.1	763-E	26.4	783-E	29.1
22½	704-E	24.2	724-E	26.1	744-E	27.5	764-E	30.2	784-E	33.5
25	705-E	27.4	725-E	29.5	745-E	30.9	765-E	33.9	785-E	37.7
27½	706-E	30.3	726-E	32.9	746-E	34.3	766-E	37.5	786-E	42.0
30	707-E	33.2	727-E	36.1	747-E	37.9	767-E	41.7	787-E	46.3
32½	708-E	36.4	728-E	39.4	748-E	41.6	768-E	45.3	788-E	50.7
35	709-E	39.6	729-E	42.7	749-E	45.1	769-E	49.2	789-E	55.0
37½	710-E	42.8	730-E	46.1	750-E	48.5	770-E	52.8	790-E	59.4
40	711-E	46.0	731-E	49.4	751-E	52.1	771-E	56.8	791-E	63.8
42½	712-E	48.9	732-E	52.7	752-E	55.5	772-E	60.7	792-E	68.2
45	713-E	52.2	733-E	55.9	753-E	59.3	773-E	64.5	793-E	72.6
47½	714-E	55.1	734-E	59.4	754-E	62.8	774-E	68.2	794-E	76.9
50	715-E	58.3	735-E	62.6	755-E	66.2	775-E	72.2	795-E	81.1
52½	716-E	61.9	736-E	66.0	756-E	70.1	776-E	75.9	796-E	85.4
55	717-E	64.8	737-E	69.3	757-E	73 6	777-E	79.7	797-E	89.7
57½	718-E	68 4	738-E	72.7	758-E	77 0	778-E	83 6	798-E	94.0
60	719-E	70.7	739-E	75.9	759-E	80.5	779-E	87.4	799-E	98.4
62½	720-E	74.4	740-E	79.3	760-E	84.1	780-E	91.2	800-E	102.8
Series 900-E—All Cabinets in This Series Are 8¾ In. in Depth										
15	901-E	16.4	921-E	16.9	941-E	17.5	961-E	19.8	981-E	21.4
17½	902-E	19.8	922-E	20.8	942-E	21.6	962-E	24.3	982-E	26.4
20	903-E	23.3	923-E	24.4	943-E	25.5	963-E	28.7	983-E	31.5
22½	904-E	26.7	924-E	28.4	944-E	29.7	964-E	33.3	984-E	36.4
25	905-E	30.4	925-E	32.0	945-E	33.5	965-E	37.8	985-E	41.4
27½	906-E	33.8	926-E	36.1	946-E	37.7	966-E	42.3	986-E	46.3
30	907-E	37.4	927-E	39.6	947-E	41.8	967-E	47.0	987-E	51.3
32½	908-E	40.9	928-E	43.2	948-E	45.9	968-E	51.6	988-E	56.2
35	909-E	44 3	929-E	47.3	949-E	49.7	969-E	55.9	989-E	61.4
37½	910-E	47.8	930-E	50.8	950-E	53 9	970-E	60.4	990-E	66.3
40	911-E	51 6	931-E	55.0	951-E	58.1	971-E	64.9	991-E	71.4
42½	912-E	55 0	932-E	58.6	952-E	61.9	972-E	69.3	992-E	76.3
45	913-E	58 4	933-E	62.6	953-E	66.1	973-E	73.7	993-E	81.4
47½	914-E	62 1	934-E	66 1	954-E	70.4	974-E	78.3	994-E	86.2
50	915-E	65 6	935-F	70 0	955-F	74.2	975-E	82.8	995-E	91.3
52½	916-E	69 2	936-E	73 7	956-E	78 4	976-E	87.4	996-E	96.6
55	917-E	72 6	937-E	77 3	957-E	82 5	977-E	92 1	997-E	101.3
57½	918-E	76 3	938-E	81 3	958-E	86 8	978-E	96.7	998-F	106.6
60	919-E	79 5	939-E	84.8	959-E	90.7	979-E	101.1	999-E	111.3
62½	920-E	83 3	940-E	88 8	960-E	94.8	980-E	105.6	1000-F	116.5
Series 1100-E—All Cabinets in This Series Are 10½ In. in Depth										
15	1101-E	18.6	1121-E	19.0	1141-E	20.2	1161-E	22.5	1181-E	24.8
17½	1102-E	22.4	1122-E	23.5	1142-E	24.5	1162-E	27.7	1182-E	29.8
20	1103-E	26.5	1123-E	27.7	1143-E	29.0	1163-E	32.5	1183-E	35.2
22½	1104-E	30 6	1124-E	31.9	1144-E	33.5	1164-E	37.4	1184-E	40.4
25	1105-E	34.3	1125-E	36 2	1145-E	38.2	1165-E	42.0	1185-E	45.4
27½	1106-E	38.5	1126-E	40 5	1146-E	42.8	1166-E	47.1	1186-E	50.7
30	1107-E	42 4	1127-E	44 6	1147-E	47.3	1167-E	51.7	1187-E	56.1
32½	1108-E	46 3	1128-E	48 7	1148-E	51.6	1168-E	56.7	1188-E	61.4
35	1109-E	50 4	1129-E	52 9	1149-E	56.1	1169-E	61.4	1189-E	66.3
37½	1110-E	54 2	1130-E	57 2	1150-E	60 5	1170-E	66.2	1190-E	71.6
40	1111-E	58 3	1131-E	61 5	1151-E	64.9	1171-E	71.0	1191-E	77.0
42½	1112-E	62.4	1132-E	65.8	1152-E	69.3	1172-E	75.9	1192-E	82.2
45	1113-E	66 2	1133-E	70.0	1153-E	73.7	1173-E	80.9	1193-E	87.2
47½	1114-E	70.4	1134-E	74 0	1154-E	78.1	1174-E	85.8	1194-E	92.5
50	1115-E	74 5	1135-E	78 4	1155-E	82 5	1175-E	90.6	1195-E	97.8
52½	1116-E	78 3	1136-E	82.6	1156-E	87 0	1176-E	95.6	1196-E	103.3
55	1117-E	82 5	1137-E	87 0	1157-E	91.3	1177-E	100.4	1197-E	108.4
57½	1118-E	86.6	1138-E	91.3	1158-E	95 8	1178-E	105.5	1198-E	113.8
60	1119-E	90 5	1139-E	95 7	1159-E	100 3	1179-E	110.2	1199-E	119.0
62½	1120-E	94 6	1140-E	99.7	1160-E	104 8	1180-E	115 4	1200-E	124.3

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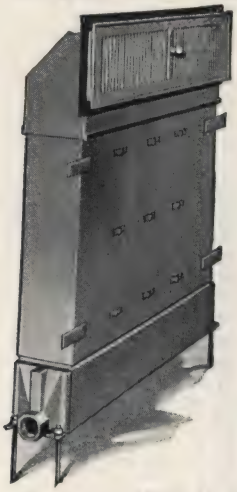
McQuay Concealed Radiators ("In the Wall" Type)



Consists of 5 major parts: The heating element with its boot; the intermediate stack; the bonnet; the outlet grille with its damper; and the air inlet grille panel arranged with access doors to the supply valve.

The entire radiator is set in the wall, the front being plastered over, leaving visible only the warm air outlet grille and the narrow opening near the floor for the admission of air.

The published ratings of McQuay Concealed Radiators are based strictly on condensate and are very conservative. *No additional capacity need* be added because of recessing.

CAPACITIES AND DIMENSIONS OF INTERMEDIATE SIZES "IN THE WALL" TYPE

Overall length of heating element, in.	20 in. high		23 in. high		26 in. high		30 in. high		40 in. high		50 in. high	
	Stock No.	Sq. ft. rad.	Stock No.	Sq. ft. rad.	Stock No.	Sq. ft. rad.	Stock No.	Sq. ft. rad.	Stock No.	Sq. ft. rad.	Stock No.	Sq. ft. rad.
Series 300-H—All Heating Elements Are 3½ In. in Depth												
15	301-H	10.7	321-H	11.1	341-H	11.5	361-H	12.0	381-H	13.0	401-H	14.3
20	303-H	13.3	323-H	14.2	343-H	15.0	363-H	15.9	383-H	18.1	403-H	20.2
25	305-H	16.0	325-H	17.3	345-H	18.6	365-H	19.9	385-H	23.1	405-H	26.2
30	307-H	18.9	327-H	20.5	347-H	22.0	367-H	23.9	387-H	28.3	407-H	32.2
35	309-H	21.7	329-H	23.5	349-H	25.4	369-H	27.9	389-H	33.3	409-H	38.2
40	311-H	24.4	331-H	26.7	351-H	28.8	371-H	31.9	391-H	38.3	411-H	44.1
45	313-H	27.0	333-H	29.9	353-H	32.4	373-H	35.7	393-H	43.3	413-H	50.0
50	315-H	30.0	335-H	33.1	355-H	36.0	375-H	39.7	395-H	48.5	415-H	56.0
55	317-H	32.7	337-H	36.2	357-H	39.5	377-H	43.8	397-H	53.5	417-H	62.1
60	319-H	35.4	339-H	39.4	359-H	43.9	379-H	47.8	399-H	58.7	419-H	68.1
Series 500-H—All Heating Elements Are 5¼ In. in Depth												
15	501-H	13.5	521-H	13.9	541-H	14.3	561-H	15.0	581-H	17.2	601-H	18.5
20	503-H	18.2	523-H	19.0	543-H	19.7	563-H	20.9	583-H	23.6	603-H	25.5
25	505-H	22.9	525-H	24.1	545-H	25.0	565-H	26.5	585-H	29.9	605-H	32.7
30	507-H	27.6	527-H	29.2	547-H	30.2	567-H	32.2	587-H	36.3	607-H	39.8
35	509-H	32.3	529-H	34.3	549-H	35.4	569-H	37.8	589-H	42.7	609-H	46.8
40	511-H	37.1	531-H	39.4	551-H	40.7	571-H	43.4	591-H	49.0	611-H	54.0
45	513-H	41.8	533-H	44.5	553-H	45.9	573-H	49.0	593-H	55.4	613-H	61.0
50	515-H	46.5	535-H	49.6	555-H	51.1	575-H	54.7	595-H	61.8	615-H	66.0
55	517-H	51.2	537-H	54.7	557-H	56.4	577-H	60.3	597-H	68.1	617-H	75.0
60	519-H	55.9	539-H	59.8	559-H	61.6	579-H	65.9	599-H	74.5	619-H	82.8

Order by stock number.

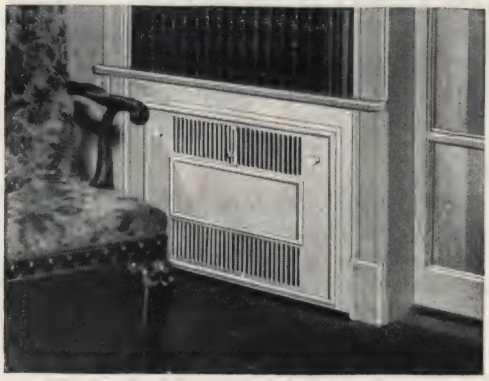
McQuay Concealed Radiators (Box Type)

McQuay Concealed Radiator (box type) is ideal for use under windows, or bookcases, etc. It consists of a heavy case of copper alloy steel (rust-resisting), the removable front panel having a grille at the top for the warm air outlet and at the bottom for the entering air.

The rear section is shaped slightly concave to act as a heat deflector—tending to force the air out into the room in a horizontal direction. The heating element (of the distinctive all-copper McQuay design) sets near the bottom of the box.

Heat can be controlled by a damper located in the warm air grille. Front panel sets flush with the wall and similarly decorated, only the two grilles being visible.

In capacities equivalent to from 9 to 83 sq. ft. of radiation. Ask for separate catalogue.



Left: **McQuay Concealed Radiator (Box Type)**

McQuay Unit Heaters

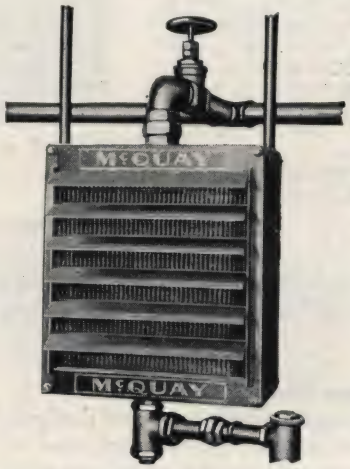
Adaptable to buildings of any type or construction.

Any amount of space can be heated, under any temperature conditions. As supplementary equipment to systems which have proven inadequate they are excellent.

The following are features embodied in McQuay Unit Heaters:

(1) An all-copper heating element which increases heat conductivity and prevents corrosion. Tested with 300 lbs. hydrostatic and 125 lbs. steam pressure.

(2) Seamless copper tubes, welded into heavy copper headers, provide equal expansion and contraction eliminating chances of leaks which often occur when tubes and headers are of different materials.



(3) Motors rest in cork insulated saddle, eliminating vibration and noise.

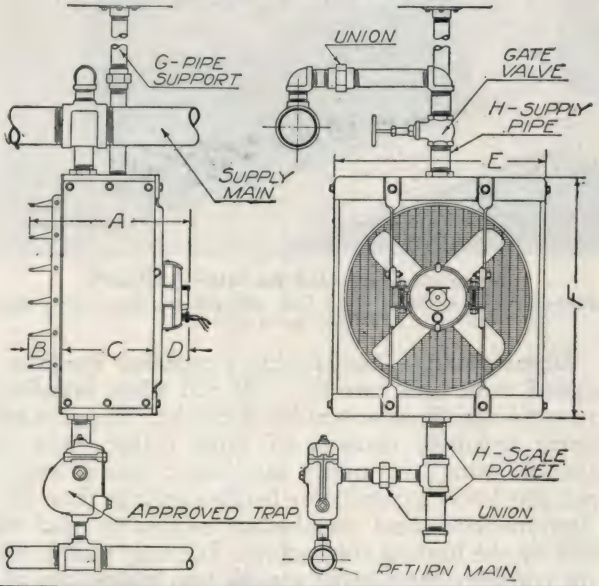
(4) Heating element suspended in a heavy metal frame so that expansion and contraction strains are not carried to the heating element.

(5) All parts of McQuay Unit Heaters are easily accessible.

Steam pressure 5 lb. gauge: Steam temp. 227° F. Entering air at 70° F.

Model	Motor		Shipping weight, lb.	B.t.u. delivery per hour	Equivalent of radiation, sq. ft.
	Hp.	R.p.m.			
2000	Two ⅓	1140	800	490,000	2040
1200	Two ¼	1140	550	298,000	1240
1000	⅓	1140	425	254,400	1060
660	¼	1140	245	156,500	652
440	⅙	1140	175	116,000	483
300	⅛	1750	95	63,800	266
200	1/15	1750	80	43,150	179
125	1/20	1750	67	29,900	124

MODELS 1300, 1000, 660, 550, 440 AND 350



Models	A	B	C	D	E	F	G	H
1300 1000	25"	4¼"	14¼"	6½"	28½"	31¾"	2½"	2½"
660 550	18"	3¼"	10"	4¾"	23¼"	26¼"	2"	2"
440 350	18¼"	3½"	10"	4¾"	19¾"	23¼"	1½"	1½"

MODINE MANUFACTURING COMPANY

OFFICE AND FACTORY
1727 Racine Street, RACINE, WIS.
NEW YORK SHOWROOM, 101 Park Avenue

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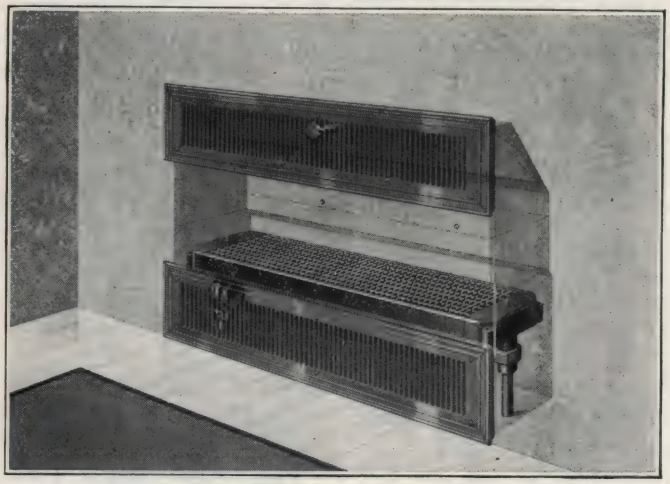
Products

MODINE CONCEALED COPPER RADIATORS; MODINE CABINET HEATERS; MODINE UNIT HEATERS for industrial heating.

Modine Concealed Copper Radiators

Modine Concealed Copper Radiators are designed for use in residences, apartments, offices, hotels and institutional buildings. They can be used wherever ordinary radiators are used on steam, vapor, vacuum, or hot water heating systems. Because of their high heat transfer capacity and consequent smaller size, Modine Concealed Radiators can often be employed where the bulkier cast iron radiators would not be practical.



Complete Concealed Radiator Assembly
Including copper radiator, upper boot with damper, lower boot, upper grille and lower grille

Description—The Modine Concealed Radiator is designed to be built into the wall and when installed is as nearly invisible as any radiator can be. The concealed radiator assembly consists of three major parts—the copper radiator, the upper and lower boots, and the upper and lower grilles. For heights greater than 20 in. an intermediate sheet metal stack section is used, furnished by the heating contractor. The only visible parts in the complete installation are the two grilles, one at or near the floor level through which cooler air is received, and the other a few feet above the floor through which heated air is delivered.

Regulation of the heated air is effectively secured by use of a damper, operated by means of a control knob on the upper grille. To secure positive heat modulation, the use of a valve with each radiator is strongly recommended.

Installation

It is necessary that a recess be left in the wall to receive the radiator assembly. After the copper radiator, enclosed in the lower boot, has been set in the recess and piping completed, the upper boot is joined to the lower boot by means of the intermediate stack section. Metal lath and plaster or other wall material is then applied across the front of the stack to conform with the rest of the wall. Following this, the upper and lower grilles are installed and decorated. Where a lower grille is not desired, the finished floor is continued to the back of the recess, with the base board returned on the sides of the recess.

Modine Copper Radiator—The Modine copper radiator consists of two rows of flattened, seamless copper tubes held on edge in horizontal position by a series of copper fins. These copper fins are so spaced and constructed as to effectively baffle the air passing through, causing all the air to come in direct contact with the heat transmitting surfaces. The flattened nature of the tubes provides ample room for expansion and contraction, so that even should water freeze within the tubes, they will suffer no damage. The radiator is an entirely brazed and arc-welded structure, having no joints which can be weakened by temperatures below 1500° F. It involves no castings with their possibility of hidden flaws. It is guaranteed for constant operation on 50 lb. steam or water pressure. The fins and tubes are so designed and metallically bonded together as to produce a unit which delivers more heat per cubic foot of space occupied than other types. The Modine copper radiator, because of metallic bonding of fins and tubes will not deteriorate in heat transfer over a period of years.

Full architectural and engineering details of Modine Concealed Radiators are contained in Data Bulletin No. 2. Write for a copy.

Modine Unit Heaters

There are more than 30,000 Modine Unit Heaters in use. Their sturdy construction and high heat capacity have made them a favorite for large space heating of all sorts. They are made in a wide range of sizes and capacities and may be applied to any type of steam, vapor, vacuum, or hot water heating system. They are fully explained in our Catalog No. 130.

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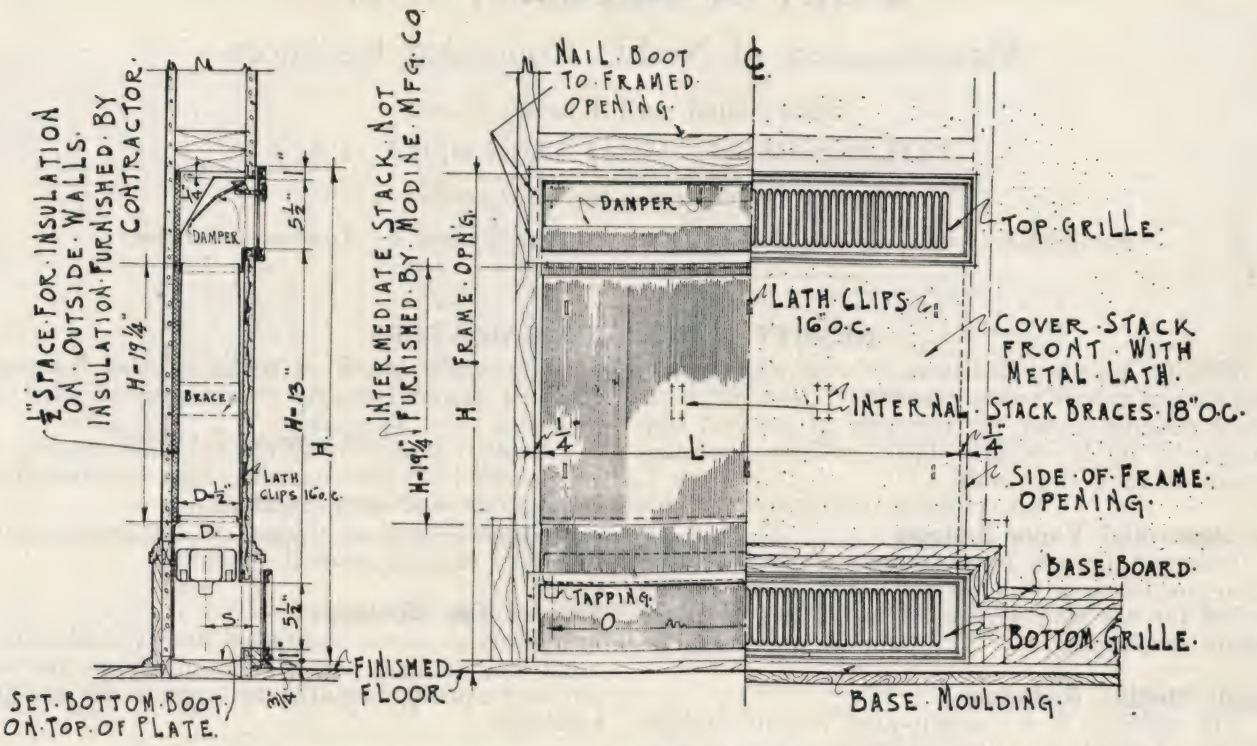
Typical Installations



Typical Modine Concealed Radiator Installation

For dimensions and capacities see table below. For details of special installations and method of ordering intermediate stacks write for Data Bulletin No. 2.

MODINE CONCEALED RADIATORS—TYPE "A"

For steam or hot water. Built for maximum pressure of 50 lb.

Model No.	Over-all dimensions of boots		Grilles	Bare heater size, in.	Capacities Sq. ft. radiation for over-all heights "H" in in.							Size tapping feed and return, in.	Dimension "O" center to center of tappings, in.	Dimension "S" center of tappings to face of plaster, in.	Stack dimensions, in. (inside at bottom, outside at top) "E" x "L" see diagram
	Depth, in. "D"	Length, in. "L"	Length, in.		20	25	30	40	50	60	70				
HD-479	3⅝	10¼	12¼	3½x10	2	2½	3½	5	6	6½	7	1	8	2⅝	3 x10⅛
HD-480	3⅝	16¼	18¼	3½x16	5	6	7	9	11	12	13	1	14	2⅝	3 x16⅛
HD-601	3⅝	19¼	21¼	3½x19	6½	7½	9	11½	13	14	15	1	17	2⅝	3 x19⅛
HD-481	3⅝	22¼	24¼	3½x22	8	9	11	14	15	17	18	1	20	2⅝	3 x22⅛
HD-602	3⅝	25¼	27¼	3½x25	9½	11	13	16	18	19½	21	1	23	2⅝	3 x25⅛
HD-482	3⅝	28¼	30¼	3½x28	11	13	15	18	20	22	24	1	26	2⅝	3 x28⅛
HD-603	3⅝	31¼	33¼	3½x31	12½	14½	16½	20½	23	25	27	1	29	2⅝	3 x31⅛
HD-483	3⅝	34¼	36¼	3½x34	14	16	18	23	26	28	30	1	32	2⅝	3 x34⅛
HD-604	3⅝	37¼	39¼	3½x37	16	18	20	25	28	31	33	1	35	2⅝	3 x37⅛
HD-484	3⅝	40¼	42¼	3½x40	18	20	22	27	30	34	37	1	38	2⅝	3 x40⅛
HD-605	3⅝	46¼	48¼	3½x46	21	23	26	31	35	39	42	1	44	2⅝	3 x46⅛
HD-485	3⅝	53¾	55¾	3½x53½	24	27	30	36	41	46	50	1	51½	2⅝	3 x53⅝
HD-486	5⅝	16¼	18¼	5½x16	9	10	12	14	16	17	18	1	14	3⅝	5 x16⅛
HD-606	5⅝	19¼	21¼	5½x19	11½	13	15	17½	20	21½	23	1	17	3⅝	5 x19⅛
HD-487	5⅝	22¼	24¼	5½x22	14	16	18	21	24	26	28	1	20	3⅝	5 x22⅛
HD-607	5⅝	25¼	27¼	5½x25	16½	18½	20½	24½	27½	30	32	1	23	3⅝	5 x25⅛
HD-488	5⅝	28¼	30¼	5½x28	19	21	23	28	31	34	37	1	26	3⅝	5 x28⅛
HD-608	5⅝	31¼	33¼	5½x31	21	23½	26	32	35	38	41	1	29	3⅝	5 x31⅛
HD-489	5⅝	34¼	36¼	5½x34	23	26	29	35	39	43	46	1	32	3⅝	5 x34⅛
HD-609	5⅝	37¼	39¼	5½x37	25½	28½	32	38	43	47	51	1	35	3⅝	5 x37⅛
HD-490	5⅝	40¼	42¼	5½x40	28	31	35	41	47	52	56	1	38	3⅝	5 x40⅛
HD-610	5⅝	46¼	48¼	5½x46	33	36	40	47	54	59	64	1	44	3⅝	5 x46⅛
HD-491	5⅝	53¾	55¾	5½x53½	38	42	46	54	61	68	74	1	51½	3⅝	5 x53⅝
HD-492	7½	22¼	24¼	7¼x22	18	20	22	27	30	34	37	1¼	19½	4½	6⅞x22⅛
HD-611	7½	25¼	27¼	7¼x25	21½	24	27	32	36	40	43	1¼	22½	4½	6⅞x25⅛
HD-493	7½	28¼	30¼	7¼x28	25	28	31	37	41	46	50	1¼	25½	4½	6⅞x28⅛
HD-612	7½	31¼	33¼	7¼x31	28	31½	35	41	46	51	56	1¼	28½	4½	6⅞x31⅛
HD-494	7½	34¼	36¼	7¼x34	31	35	39	46	52	57	62	1¼	31½	4½	6⅞x34⅛
HD-613	7½	37¼	39¼	7¼x37	34½	39	43	50	57	63	68	1¼	34½	4½	6⅞x37⅛
HD-495	7½	40¼	42¼	7¼x40	38	42	46	54	61	68	74	1¼	37½	4½	6⅞x40⅛
HD-614	7½	46¼	48¼	7¼x46	44	49	54	62	70	78	85	1¼	43½	4½	6⅞x46⅛
HD-496	7½	53¾	55¾	7¼x53½	51	57	62	72	82	91	100	1¼	51	4½	6⅞x53⅝
HD-497	9¼	28¼	30¼	9 x28	33	37	41	47	54	59	65	1¼	25½	5⅜	8⅝x28⅛
HD-615	9¼	31¼	33¼	9 x31	36	41	45	52	59	65	71	1¼	28½	5⅜	8⅝x31⅛
HD-498	9¼	34¼	36¼	9 x34	39	44	48	57	64	71	77	1¼	31½	5⅜	8⅝x34⅛
HD-616	9¼	37¼	39¼	9 x37	43½	49	54	63	71	78	85	1¼	34½	5⅜	8⅝x37⅛
HD-499	9¼	40¼	42¼	9 x40	48	54	59	69	78	86	93	1¼	37½	5⅜	8⅝x40⅛
HD-617	9¼	46¼	48¼	9 x46	55½	62	67	78	89	98	106	1¼	43½	5⅜	8⅝x46⅛
HD-500	9¼	53¾	55¾	9 x53½	65	72	78	90	102	113	122	1¼	51	5⅜	8⅝x53⅝
HD-501	13⅜	28¼	30¼	13⅜x28	53	58	63	74	83	91	100	1¼	25½	7⅝	13 x28⅛
HD-618	13⅜	31¼	33¼	13⅜x31	59½	65	72	83	93	103	112	1¼	28½	7⅝	13 x31⅛
HD-502	13⅜	34¼	36¼	13⅜x34	67	73	80	92	104	115	124	1¼	31½	7⅝	13 x34⅛
HD-619	13⅜	37¼	39¼	13⅜x37	72	79	87	101	114	125	136	1¼	34½	7⅝	13 x37⅛
HD-503	13⅜	40¼	42¼	13⅜x40	76	84	93	109	123	136	148	1¼	37½	7⅝	13 x40⅛
HD-620	13⅜	46¼	48¼	13⅜x46	89	97	107	125	141	156	171	1¼	43½	7⅝	13 x46⅛
HD-504	13⅜	53¾	55¾	13⅜x53½	105	115	124	144	163	182	200	1¼	51	7⅝	13 x53⅝

Note: Heights given are measured from bottom of lower grille to top of upper grille. Each grille is 7½ in. in height. Above capacities are based on equivalent square feet of cast iron radiation. Modine Concealed Radiators include copper radiator, upper boot with damper, lower boot, upper grille and lower grille. They do not include insulating material or the intermediate stack section. Grilles are furnished with prime coat only.

ESTABLISHED 1894

JOHN J. NESBITT, INC.

Manufacturers of Nesbitt Concealed Radiators

State Road and Rhawn Street
HOLMESBURG, PHILADELPHIA, PA.

BRANCH OFFICE, 11 Park Place, NEW YORK, N. Y.

For our pages on Heating and Ventilating Units and Unit Heaters, see Manufacturers' Index

NESBITT CONCEALED RADIATORS

Nesbitt Concealed Radiators are convection heaters comprising a copper radiator within a sheet metal enclosure designed either for recessing in the wall construction or for replacing ordinary radiators standing on floor or hung from walls.

For Steam and Vapor Systems

Designed specially for maximum efficiency as parts of two-pipe steam or vapor systems, they are not recommended for use with systems using hot water as the medium for heating.

Nesbitt Multifin Radiators

The radiator is the widely-used Nesbitt Multifin Radiator of which more than 10,000 have been in service over a long period of years. Copper fins are forced upon the surface of ¾-in. diameter seamless copper tubes at high pressure to produce an efficient thermal contact. The tubes are joined to end headers, for connections to steam piping, by ground-joint unions. There are no soldered, welded, brazed or packed joints in the Nesbitt Multifin Radiator.

Sheet Metal Enclosures

All enclosures are built to high standards of ruggedness, durability, convenience and appearance. The standard types of enclosure are:

Walled-in Radiators (Type 1)—Fully recessed in wall construction. Plaster, tile or other wall finish conceals all parts, except an air inlet opening at wall base and a discharge grille above. May be installed under windows or in inside walls and partitions for vestibules, corridors, etc. See illustration.

Panel Radiators (Type 2)—Fully recessed. Front panels are removable. Usually installed under windows.

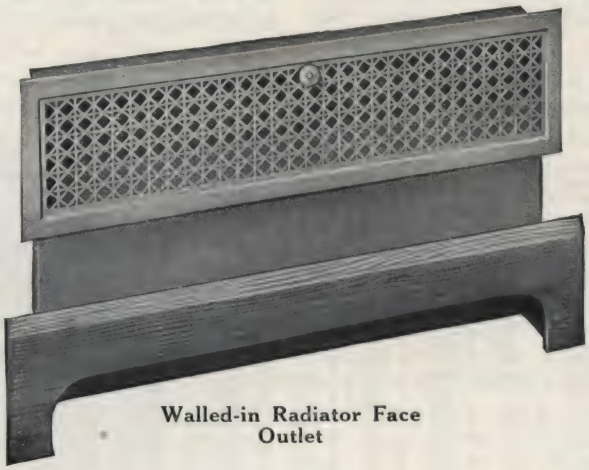
Partly Recessed Radiators (Type 3)—For use where available depth of recess in wall construction does not permit complete concealment of sheet metal enclosure. See illustration.

Cabinet Radiators (Type 4)—Not recessed. Legs are provided for floor models. May be obtained without legs for wall-hung installations.

Special—Special designs of enclosures will be furnished to meet unusual conditions.

Face or Top Discharge

All types above mentioned are available with the usual face discharge or with top discharge for heated air, as frequently required for commercial and public buildings.



Walled-in Radiator Face Outlet

Construction Details

All Nesbitt Concealed Radiators have these important features leading to easy installation and satisfactory use.

Complete accessibility to interior parts.

Airtight joints to eliminate dirt streaks.

Adjustable grille frames for variations in thickness of wall finish.

Holes for nailing and for fastening insulation.

Wide choice of grille designs.

Dampers are optional.

Steam connections at bottom or at ends.

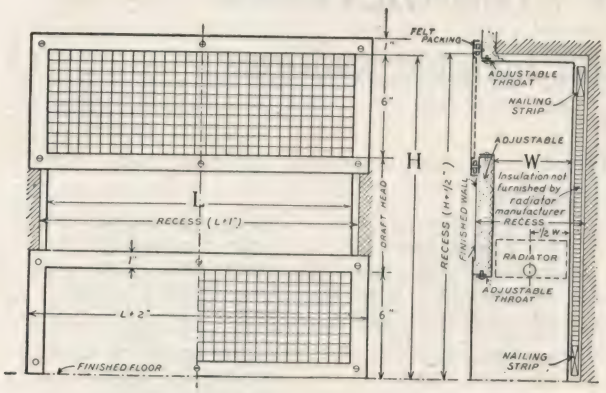
Proper pitch for radiator provided in construction without necessity for adjustments.

All radiators are suitable for use without special changes for orifice types as well as standard systems of steam circulation.

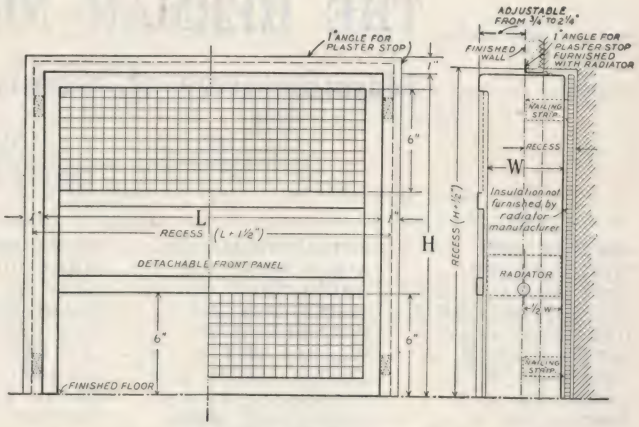
Catalogue

A 16-page publication describing Nesbitt Radiators in detail is available upon request.

Continued on next page



Walled-in Radiator—Type 1



Partly Recessed Radiator—Type 3

RATINGS FOR ALL TYPES OF NESBITT CONCEALED RADIATORS

All ratings are equivalent square feet of direct exposed cast iron radiators. From tests with 215° F. steam and 70° F. room temperature. Test ratings have been increased by 10%

Face discharge, in.		Length—"L"—inches									Top discharge, in.	
Height "H"	Draft head	16	20	24	30	36	42	48	52	70	Draft head	Height "H"
Width—"W" = 4¼ Inches (Radiator Width 4 Inches)												
20	8	6.0	11.0	14.5	18.0	22.5	27.5	31.5	35.0	45.0	8	14
22	10	6.7	11.9	15.8	19.7	24.7	29.8	34.2	38.0	48.4	10	16
24	12	7.5	12.9	17.1	21.4	26.9	32.1	36.9	41.0	51.8	12	18
26	14	8.2	13.9	18.4	23.1	29.1	34.4	39.6	44.0	55.2	14	20
28	16	8.9	14.9	19.7	24.8	31.3	36.7	42.3	47.0	58.6	16	22
30	18	9.6	15.9	21.0	26.5	33.5	39.0	45.0	50.0	62.0	18	24
36	24	10.7	17.2	22.8	28.8	36.2	43.0	49.8	55.0	70.0	24	30
42	30	11.7	18.3	24.4	30.7	38.1	46.5	54.0	59.5	76.5	30	36
48	36	12.7	19.3	25.8	32.5	40.7	49.5	57.8	63.8	82.5	36	42
60	48	13.6	21.4	28.0	34.6	42.5	51.3	60.4	66.7	88.5	48	54
72	60	14.3	23.1	29.7	36.3	44.0	52.8	62.7	69.3	93.5	60	66
Width—"W" = 6¼ Inches (Radiator Width 6 Inches)												
20	8	8.5	16.5	21.5	27.0	33.0	41.0	46.5	52.0	66.0	8	14
22	10	9.5	18.0	23.1	29.2	35.5	43.8	50.4	56.6	71.0	10	16
24	12	10.5	19.6	24.8	31.5	38.0	46.6	54.3	61.2	76.0	12	18
26	14	11.5	21.2	26.5	33.8	40.6	49.4	58.2	65.8	81.0	14	20
28	16	12.5	22.7	28.1	36.1	43.1	52.2	62.1	70.3	86.0	16	22
30	18	13.5	24.2	29.7	38.4	45.6	55.0	66.0	74.8	90.0	18	24
36	24	14.9	25.5	31.4	40.3	49.1	60.7	73.4	82.2	97.0	24	30
42	30	16.2	26.8	33.1	42.2	52.6	66.4	80.7	89.6	105.0	30	36
48	36	17.5	28.0	34.7	44.0	56.0	72.0	88.0	97.0	110.0	36	42
60	48	18.2	29.0	35.4	45.0	58.0	76.0	91.5	102.0	120.0	40	54
72	60	18.7	30.0	36.0	46.0	60.0	80.0	95.0	105.0	130.0	60	66
Width—"W" = 8¼ Inches (Radiator Width 8 Inches)												
20	8	11.6	20.4	26.4	33.6	40.7	47.3	55.0	59.0	76.6	8	14
22	10	12.8	21.5	27.5	35.5	43.2	50.7	59.0	64.0	82.6	10	16
24	12	14.1	22.6	28.6	37.3	45.8	54.0	63.0	69.0	88.3	12	18
26	14	15.4	23.8	29.8	39.2	48.4	57.4	67.0	74.0	94.1	14	20
28	16	16.7	24.9	30.9	41.1	51.0	60.7	71.0	79.0	100.0	16	22
30	18	18.0	26.0	32.0	43.0	53.5	64.0	75.0	84.0	106.0	18	24
36	24	19.4	29.0	36.7	47.7	64.2	71.3	85.0	96.0	119.0	24	30
42	30	20.7	32.0	41.5	52.5	69.0	78.6	95.0	106.0	131.0	30	36
48	36	22.0	35.0	46.0	57.2	69.3	85.8	104.0	118.8	143.0	36	42
60	48	23.0	36.2	47.8	60.5	73.2	91.3	110.9	125.4	151.5	48	54
72	60	24.0	37.4	50.6	63.8	77.0	96.8	117.7	132.0	160.0	60	66

THE HERMAN NELSON CORPORATION

Manufacturers of Herman Nelson Invisible Radiators

MAIN OFFICE

MOLINE, ILL.

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Products

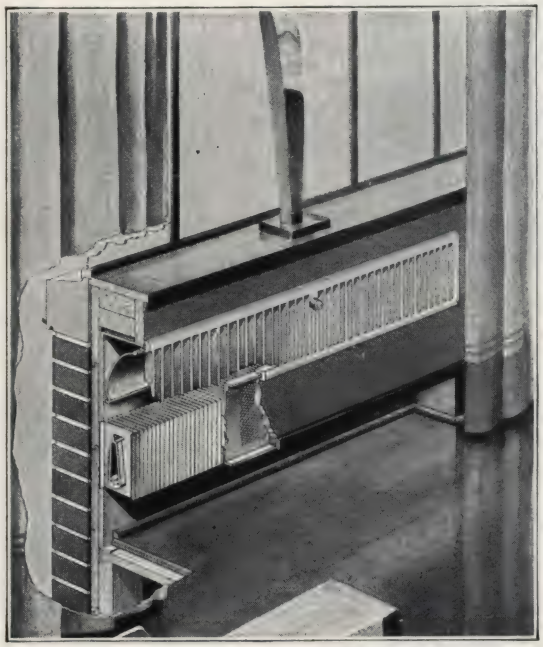
The HERMAN NELSON INVISIBLE RADIATOR for steam, vapor, vacuum or hot water heating is furnished in two types, the "Immured" and the "Paneled."

The Two Types

The "Immured" is recommended for fine homes and similar buildings where the ultimate in appearance is desired. It is furnished as a complete unit ready to be set in the wall and finished over with plaster, tile or other wall finish as desired.

The "Paneled" type radiator is essentially the same as the above, except that it is made accessible by means of an attractive removable front panel. This radiator is recommended for multistory buildings—such as offices, hotels, apartments, where good engineering practice requires the use of valves and traps at the radiator rather than on the pipe branches in the basement.

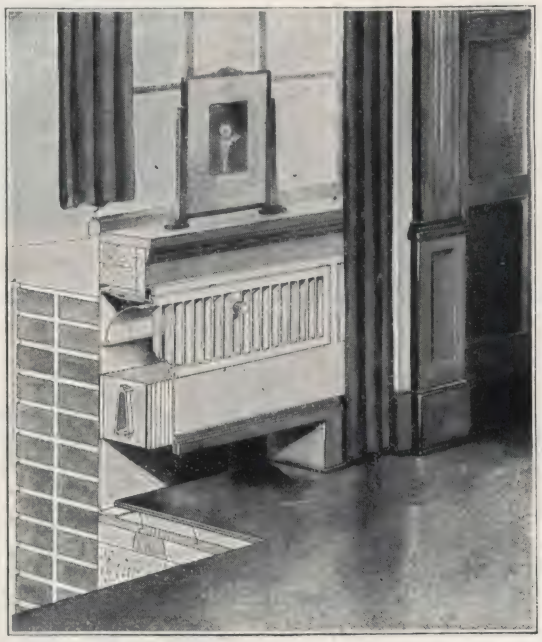
Heat control is accomplished by opening and closing the heat control Damper. Damper may be set in any position between open and closed by turning a small knob on the face of the heat outlet grille which sets the damper in any position.



Installation of "Immured" Type

Heating element comes installed in a sturdily built, scientifically designed cabinet with heat outlet grille, and is furnished complete by the manufacturer and installed by the heating contractor into a pocket or recess in wall.

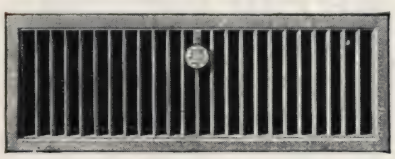
Metal lath and plaster are then applied over the entire front of the cabinet, leaving only the grille exposed to view



"Paneled" Type as Installed in Multistory Buildings

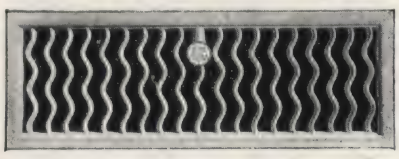
Piping and valve connections are made at opposite ends of radiator. When plastering is finished around the cabinet, the front panel is slipped into place. No furring of walls; no special construction; the complete installation is simple and durable.

Attractive self-closing doors are fitted to front panel for access to valves



The Standard

The Tracery



The Wave

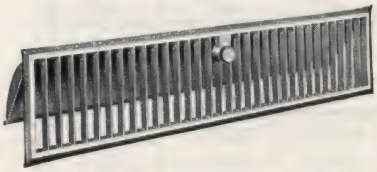
Continued on next page

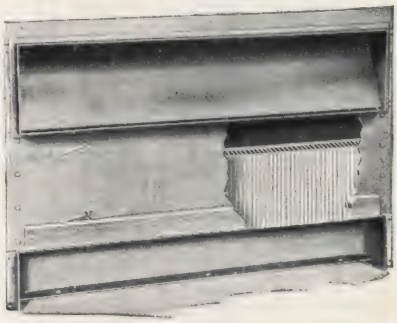
Design and Construction of Cabinet

Both types of Invisible Radiators consist of a steel cabinet in which the heating element is mounted. An air inlet opening is provided at the base of the cabinet and a warm air outlet with grille is furnished above the heating element. Cabinets for both types are built of 16 gauge steel with welded and riveted joints.

The operation of all Invisible Radiators depends entirely upon the chimney action caused by the heating element, with the cabinet acting as a flue. This action is always positive, but any slight change in the shape or dimensions of the cabinet, heating element, grille, or air inlet opening will materially affect the capacity of the complete unit. For these reasons, the manufacturers maintain a policy of only furnishing the complete Invisible Radiator, in order that their guarantee of heating capacities can be maintained.

No access is required to the wedge core heating element in Herman Nelson Invisible Radiators. Therefore, it is built into the cabinet of the "Immured" type at the factory as shown in the accompanying illustration. The front of the "Paneled" radiator may be instantly removed or replaced without the use of tools of any kind. No screws or bolts are required to hold the panel in place.



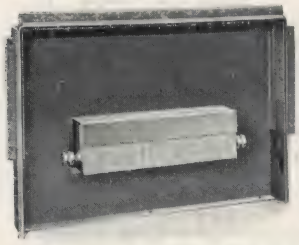


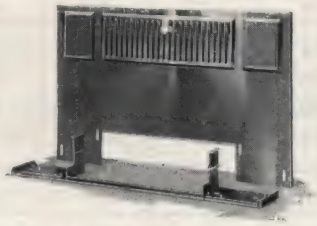
Cast Grilles

Heat outlet grilles are cast of a light aluminum alloy. The grilles illustrated on the bottom of these pages are furnished for either the "Immured" or "Paneled" type radiators. These grilles were designed by artists of note, and provide a selection that will harmonize with any style of interior decoration.

Wedge Core Heating Element

The Herman Nelson Wedge Core heating element has served unfailingly for years in various HERMAN NELSON CORPORATION products.





It consists of a wedge shape fluid container or "core" on which a series of heat conductor plates is securely mounted. It is built entirely of aluminum which makes a light, practically non-corrosive, compact and effective heating element. The core is a straight one-piece casting of an aluminum alloy which is unusually strong, dense and ductile and has a high heat absorbing capacity. The conductor plates are of pure sheet aluminum, die stamped, with interlocking flanged apertures which fit the core and afford a contacting area many times greater than the conducting area.

All cores are regularly tested at 300 lb. hydrostatic pressure before assembly.

The construction provides straight and smooth air passages, and freedom from the collection of dust or dirt.

Dimensions and Capacities

For the sake of brevity the following table is prepared to indicate the height, length and width of standard stock radiators regularly furnished in both the "Immured" and "Paneled" types.

"Immured" Type			"Paneled" Type		
Width, in.	Height, in.	Length in.	Width, in.	Height, in.	Length in.
3⅝	20⅜	15	5½	20⅜	15
4⅞	24⅜	20	7½	24⅜	20
7½	30⅜	25		30⅜	25
		30			30
		35			35
		40			40
		45			45
		50			50

Selecting the Radiator

On the following pages will be found diagrams showing the arrangement of both the "Immured" and "Paneled" type Herman Nelson Invisible Radiators when installed in outside walls. The letters on these diagrams refer to the tables on the following page.

If the number of square feet of radiation required for a given room has been determined for the system to be used in terms of equivalent direct cast iron radiation set exposed, it is only necessary to refer to the tables of dimensions and capacities to select a Herman Nelson Invisible Radiator or radiators to fit the space requirements and to have capacity equal to the required amount. This is equally true for gravity steam, vapor, vacuum, or hot water system radiators.

If the heat loss is determined in terms of B.t.u. per hour, as recommended by the A.S.H. & V.E. it is necessary to divide the B.t.u. per hour by a factor which depends upon the type of steam used, the temperature of the heating medium in the radiator, and the room temperature.

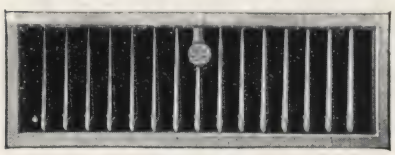
In the case of vapor, vacuum or gravity steam systems, this factor is 240 B.t.u. per hour for 215° F. temperature and 70° room temperature. This factor is higher for either greater steam temperatures or lower room temperatures and is lower for either lower steam temperatures or higher room temperatures.

In the case of hot water installations this factor varies with the mean temperature of the water in the radiator for which the system is designed and with the room temperature. As in the case of the vapor, vacuum or gravity steam systems the factor is higher for lower room temperatures and vice versa.

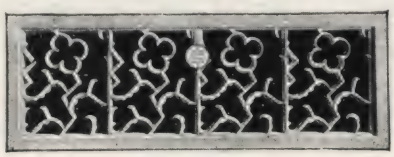
The following table will serve as a guide in determining the B.t.u. output per square foot of hot water installations for various water temperatures:

Average temperature of water in radiator, degrees	B.t.u. emitted per sq. ft. of equivalent direct cast iron radiation set exposed for 70° room temperature
160	129
170	148
180	167
190	187
200	208

For example: if the temperature of the water at the inlet is 190° and the temperature at the outlet is 170° the mean temperature of the water in the radiator is 180°. With a room temperature of 70°, 167 B.t.u. will be emitted per hour per square foot of direct cast iron radiation. Then if the total heat loss from the room is divided by this factor the result will be the number of square feet of equivalent direct cast iron radiation required. This figure then determines the size of the radiator as given in the tables of capacities.



The Bud



The Floral

The Geometric

Continued on next page

..CAPACITIES·AND·DIMENSIONS..

..THE HERMAN NELSON INVISIBLE RADIATOR..

·IMMURED TYPE· ·PANELED TYPE·

THESE RADIATORS MAY BE USED FOR EITHER STEAM OR HOT WATER. CAPACITIES ARE GIVEN IN SQUARE FEET OF EQUIVALENT STANDARD CAST IRON RADIATION SET EXPOSED IN THE ROOM.

IMMURED TYPE 3 5/8" DEEP	H 20-3/8"	Number	1511-C	2011-C	2511-C	3011-C	3511-C	4011-C	4511-C	5011-C
		Capacity	10.9	14.5	18.2	21.8	25.4	29.1	32.8	36.4
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 24-3/8"	Number	1521-C	2021-C	2521-C	3021-C	3521-C	4021-C	4521-C	5021-C
		Capacity	11.8	15.8	19.7	23.7	27.6	31.5	35.6	39.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 30-3/8"	Number	1531-C	2031-C	2531-C	3031-C	3531-C	4031-C	4531-C	5031-C
		Capacity	13.3	17.7	22.0	26.4	30.8	35.3	39.7	44.1
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
IMMURED TYPE 4 7/8" DEEP	H 20-3/8"	Number	1512-C	2012-C	2512-C	3012-C	3512-C	4012-C	4512-C	5012-C
		Capacity	14.8	19.7	24.7	29.7	34.6	39.5	44.6	49.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 24-3/8"	Number	1522-C	2022-C	2522-C	3022-C	3522-C	4022-C	4522-C	5022-C
		Capacity	16.0	21.4	26.8	32.2	37.5	42.8	48.2	53.6
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 30-3/8"	Number	1532-C	2032-C	2532-C	3032-C	3532-C	4032-C	4532-C	5032-C
		Capacity	18.0	23.9	29.8	35.8	41.8	47.7	53.8	59.7
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
IMMURED TYPE 7 1/2" DEEP	H 20-3/8"	Number	1513-C	2013-C	2513-C	3013-C	3513-C	4013-C	4513-C	5013-C
		Capacity	18.6	24.9	31.1	37.3	43.5	49.7	55.9	62.2
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 24-3/8"	Number	1523-C	2023-C	2523-C	3023-C	3523-C	4023-C	4523-C	5023-C
		Capacity	20.3	27.1	33.9	40.6	47.4	54.2	61.0	67.7
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 30-3/8"	Number	1533-C	2033-C	2533-C	3033-C	3533-C	4033-C	4533-C	5033-C
		Capacity	22.8	30.5	38.1	45.7	53.3	60.9	68.5	76.1
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
PANELED TYPE 5 1/2" DEEP	H 20-3/8"	Number	1511-D	2011-D	2511-D	3011-D	3511-D	4011-D	4511-D	5011-D
		Capacity	15.5	20.6	25.8	31.0	36.1	41.3	46.5	51.6
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 24-3/8"	Number	1521-D	2021-D	2521-D	3021-D	3521-D	4021-D	4521-D	5021-D
		Capacity	16.9	22.5	28.2	33.8	39.4	45.2	50.8	56.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 30-3/8"	Number	1531-D	2031-D	2531-D	3031-D	3531-D	4031-D	4531-D	5031-D
		Capacity	18.8	25.0	31.3	37.5	43.8	50.0	56.2	62.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
PANELED TYPE 7 1/2" DEEP	H 20-3/8"	Number	1512-D	2012-D	2512-D	3012-D	3512-D	4012-D	4512-D	5012-D
		Capacity	17.2	23.0	28.6	34.4	40.0	45.8	51.5	57.3
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 24-3/8"	Number	1522-D	2022-D	2522-D	3022-D	3522-D	4022-D	4522-D	5022-D
		Capacity	18.8	25.0	31.2	37.5	43.7	50.0	56.3	62.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"
	H 30-3/8"	Number	1532-D	2032-D	2532-D	3032-D	3532-D	4032-D	4532-D	5032-D
		Capacity	21.1	28.2	35.2	42.3	49.3	56.4	63.4	70.5
		Dimension L	15"	20"	25"	30"	35"	40"	45"	50"

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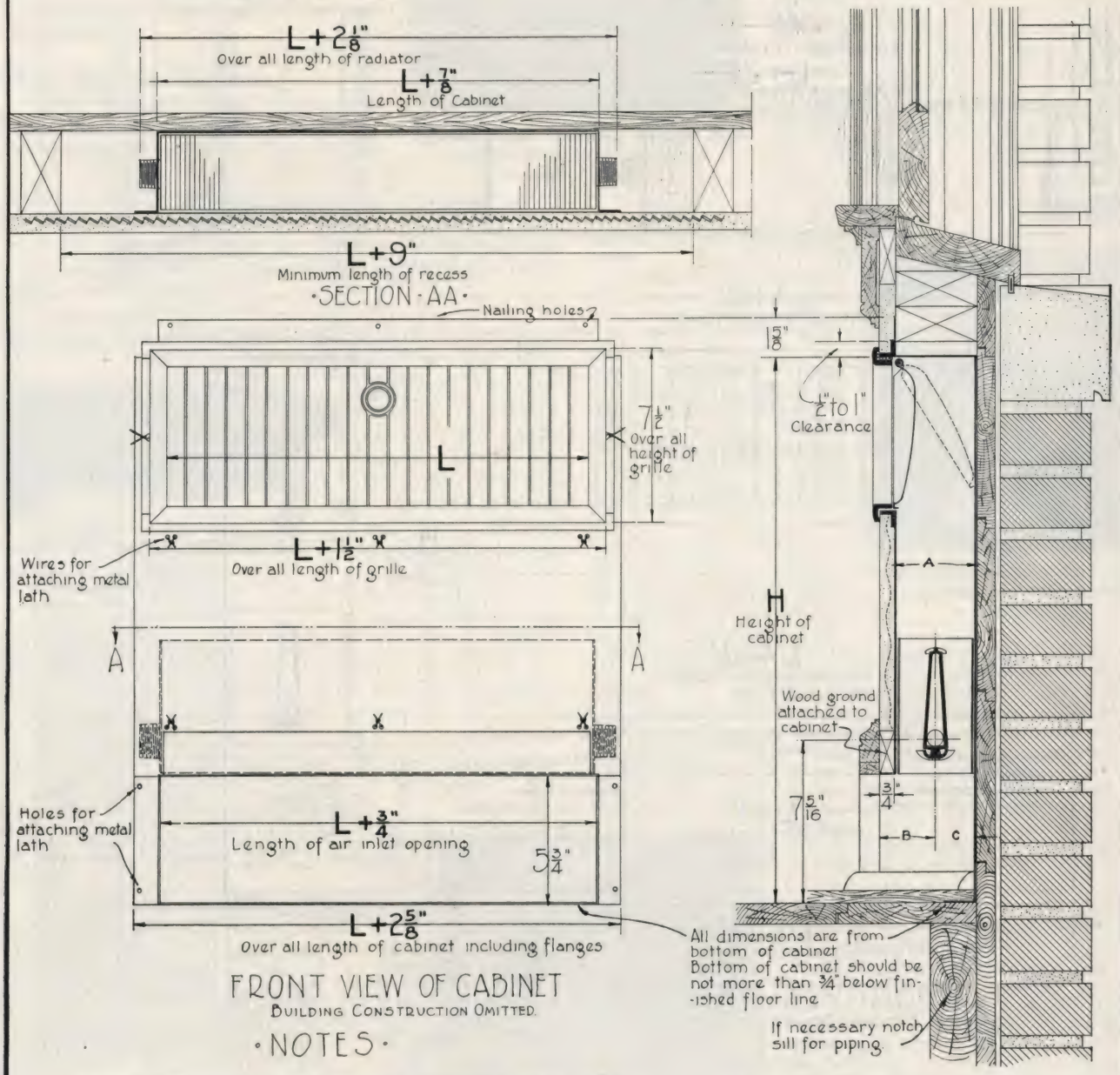
APPLICATION & DIMENSIONS

THE HERMAN NELSON INVISIBLE RADIATORS

IMMURED TYPE

3 5/8 INCHES DEEP



FRONT VIEW OF CABINET

BUILDING CONSTRUCTION OMITTED.

NOTES

All steam connections should be thoroughly tested before lathing and plastering has been completed.

Metal lath should be placed over entire cabinet and recess, attaching to cabinet by means of wire loops

If there is a plate on rough floor it should be removed in recess.

Dimension A	3 3/8" – 4 1/8" – 7 1/2"
Dimension B	2 7/16" – 3 3/16" – 4 1/2"
Dimension C	1 3/16" – 2 7/16" – 3 3/4"

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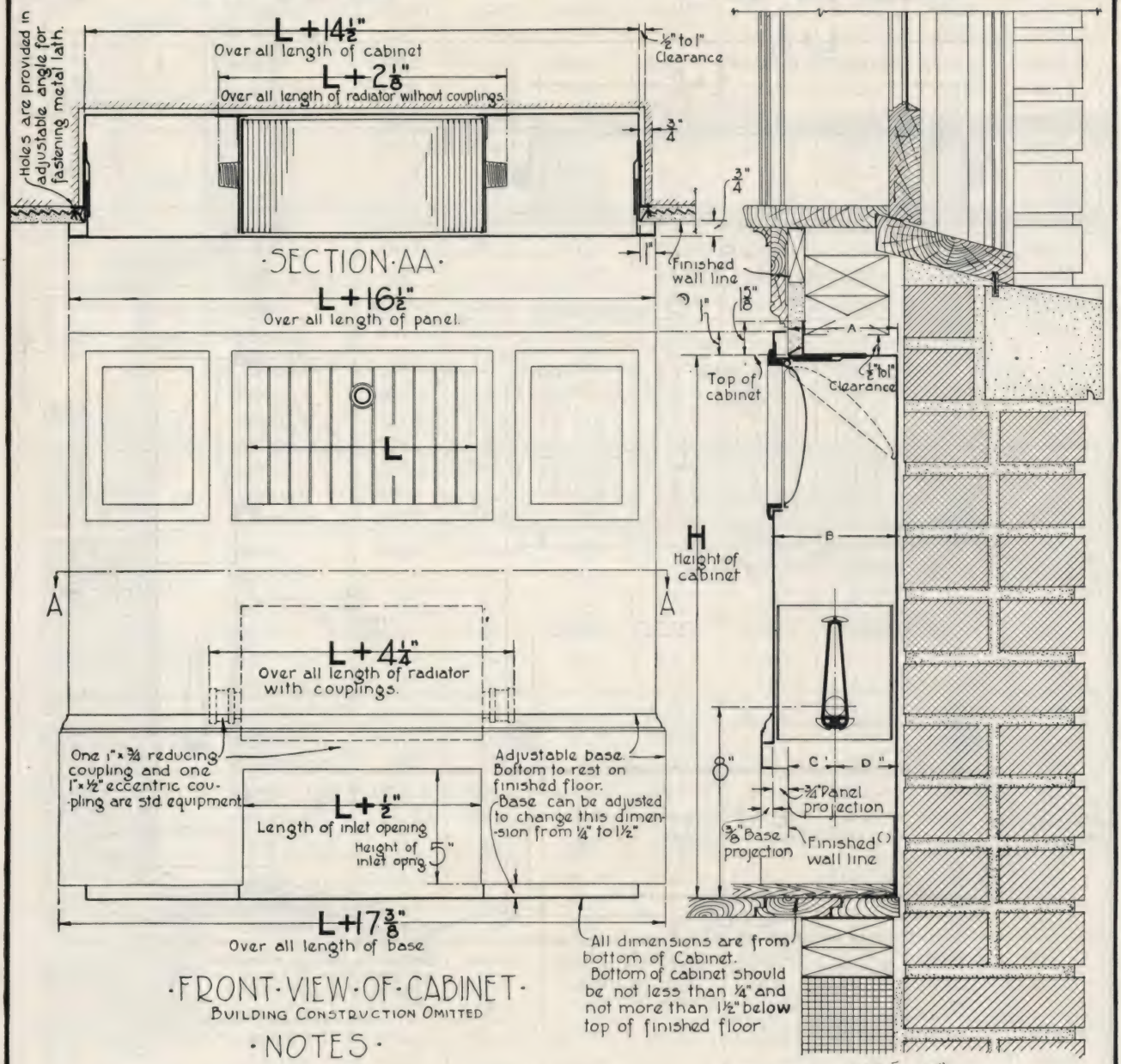
APPLICATION & DIMENSIONS

THE HERMAN NELSON INVISIBLE RADIATORS

PANELED TYPE 5½ INCHES DEEP



FRONT VIEW OF CABINET

BUILDING CONSTRUCTION OMITTED

NOTES

.. Metal lath should be placed around entire cabinet and recess attaching to cabinet by means of wire loops

·. If there is a plate on rough floor it should be removed in recess.

Dimension A	4¾"	–	6¾"
Dimension B	5½"	–	7½"
Dimension C	2"	–	3"
Dimension D	2¾"	–	3¾"

ROME BRASS RADIATOR CORPORATION

Manufacturers of Robras Welded Brass Radiators
1 East 42nd Street, NEW YORK, N. Y.

OTHER OFFICES
BOSTON CHICAGO CLEVELAND MILWAUKEE PHILADELPHIA
PITTSBURGH ST. LOUIS WASHINGTON, D. C.
REPRESENTATIVES IN PRINCIPAL CITIES

Products

ROBRAS BOX FIN, an extended surface radiator, of electrically welded brass for steam, hot water and vapor systems.

ROBRAS BATHROOM UNITS.

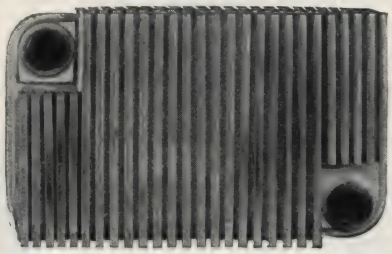
ROBRAS DIRECT RADIATORS for use in swimming pools, etc.

AULBRAS INDIRECT HEATERS and CONDENSERS.

Robras Box Fin Radiator

Two stamped brass sheets are electrically welded together so as to form chambers for the heating medium and at the same time accommodate internal nipples for assembling.

ROBRAS BOX FIN RADIATOR

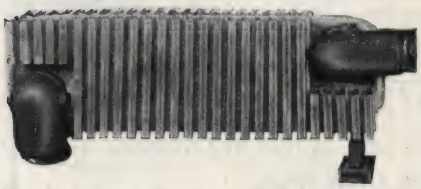


Typical High Section, Robras Box Fin Radiator Without Connection Fittings

The proportionately large amount of heating surface is obtained by copper fins forming flues, attached to the two sides of the primary heating surface of the section.

Features—

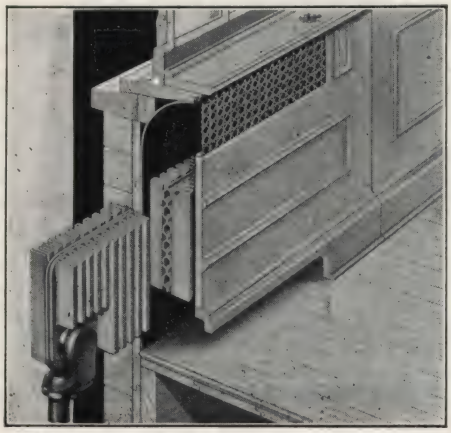
Robras Box Fin Radiators are made in two heights, 5½ in. and 10¾ in., and in nine lengths from 18 to 70 in. for each height. Single section units are 3½ in. and 5½ in. deep and these can be combined by means of T fittings to form units 7⅜ in., 9⅜ in. and 11⅜ in. deep. Where radiators of greater depth are required to meet special conditions, the units more than 11⅜ in. deep will have to be assembled by the heating contractor by means of small pipe headers.



Typical Low Section, Robras Box Fin Radiator
Note that connection fittings can be set horizontal or vertical

The supply and return connection fittings are set at our plant in positions ordered by the customer to suit space conditions and because of the wide range of possible assemblies, the radiators can be installed in almost any reasonable size wall recess 4 in. or more in depth.

The architect can easily design suitable enclosures for Robras Radiators and in this way carry out almost any architectural treatment. A clearance of about ½ in. should be allowed between the radiator and the front and back of the enclosure on the inside. The spaces at the ends of the radiator occupied by valves and traps should be baffled off with light sheet metal so as to control the passage of air through the radiator. Complete metal enclosures including recess linings, removable panel fronts, and grilles can be furnished on order in various standard designs.



High Type Robras Box Fin Radiator
Installed in a wall of standard depth

Specifications for Robras Box Fin Radiators

Robras Box Fin Radiators—Furnish and install where shown on plans and called for in the specifications, Robras Box Fin Radiators as manufactured by the ROME BRASS RADIATOR CORPORATION, 1 East 42nd Street, New York, N. Y.

All radiators shall be shipped with the connections tapped in accordance with the manufacturer's schedule.

All Robras Box Fin Radiators shall be installed in a horizontal position with the low end 4 in. above the finished floor, and shall be pitched in accordance with dimensions furnished by the manufacturer. Radiators may be set on standards made of ⅜-in. iron nipples with floor flange at either end, or on Robras adjustable supports.

Radiator Recesses—All recesses for Robras Box Fin Radiators shall be lined with No. 26 gauge sheet metal, backed with approved insulation. (Sizes of recesses shall be as shown on plans but general details may be obtained from the ROME BRASS RADIATOR CORPORATION data sheets.) Radiator recesses shall be provided with fronts having face openings above and below the radiator as shown on details. The free area of the bottom opening shall be not less than 40% of the top face area of the radiator. The free area of the top opening shall be not less than 50% of the top face area of the radiator. Free areas of grilles used in top and bottom openings shall not be less than the proportion given above, and the length of the grilles inside of borders should be the same as the length of the radiators.

Special Bathroom Robras Unit Installed Back of Pedestal Lavatory

Bathroom Units—Each Bathroom Unit shall be furnished complete with white lacquered metal cabinet 8 in. high and may be supported by the pipe connections only. (Note that on one-pipe steam jobs small angle iron brackets will be required for these units.) Robras Bathroom Units shall be so installed as to have the grille at the top.

Method of Installing Robras Box Fin Radiators

Robras Box Fin Radiators are always concealed, the pipe connections are made just as for any low pressure system. Robras Box Fin Radiators are always installed in a horizontal position with the fins standing vertically. The lining of enclosures should be as near as possible to the sides and ends of the radiators. An instruction tag giving directions to steamfitter is attached to each radiator shipped.

Engineering Data

Engineering data, including roughing-in dimensions and separate price lists will be sent upon request.

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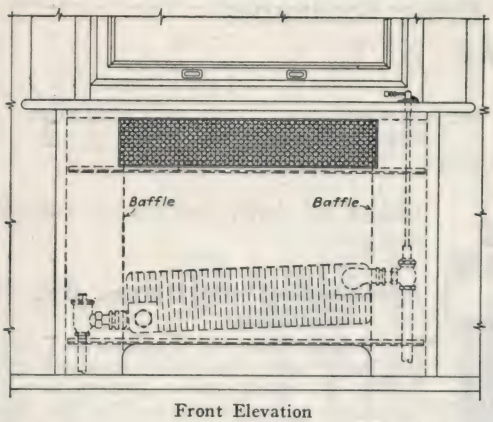
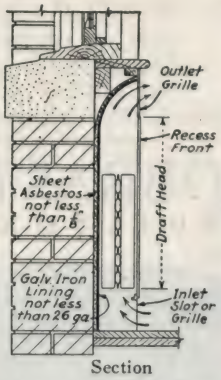
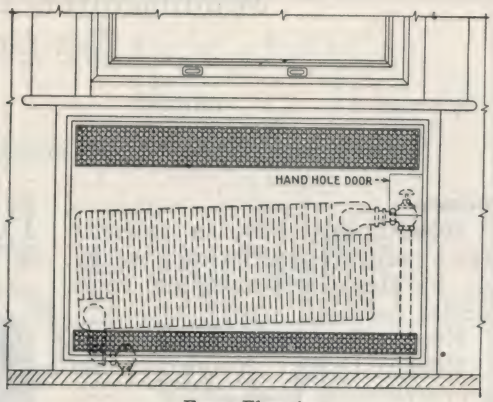


Front Elevation



Section



Front Elevation

Typical Installations Low and High Type Radiators

CAPACITY TABLES

Capacities shown are square feet of equivalent Standard Direct Cast Iron Radiation. One square foot equals 240 B.t.u. per hour in a 70° room with steam at 215° and 1 lb. pressure

Ratings for Low Radiators

L–Section length, in.		18	22	26	32	38	44	50	60	70
Radiator designation	D–Over all depth of rad., in.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.
12-in. Draft Head										
L3	3½	9	11½	13½	17¼	21	24½	28	34	40
L5	5½	13½	17¼	20¼	25¾	31½	36¾	42	51	60
L7	7⅜	18	23	27	34½	42	49	56	68	80
L9	9⅜	22½	28¾	33¾	43	52½	61¼	70	85	100
L11	11⅜	27	34½	40½	51½	63	73½	84	102	120
18-in. Draft Head										
L3	3½	9½	12½	15	19	22½	26½	30½	37	43½
L5	5½	14¼	18¾	22½	28½	33¾	39¾	45¾	55½	65¼
L7	7⅜	19	25	30	38	45	53	61	74	87
L9	9⅜	23¾	31¼	37½	47½	56¼	66¼	76¼	92½	108¾
L11	11⅜	28½	37½	45	57	67½	79½	91½	111	130½
24-in. Draft Head										
L3	3½	10½	13½	16	20	24½	29	33	40	47
L5	5½	15¾	20¼	24	30	36¾	43½	49½	60	70½
L7	7⅜	21	27	32	40	49	58	66	80	94
L9	9⅜	26¼	33¾	40	50	61¼	72½	82½	100	117½
L11	11⅜	31½	40½	48	60	73½	87	99	120	141
30-in. Draft Head										
L3	3½	11	14	17	21½	26	30½	35	42½	50
L5	5½	16½	21	25½	32¼	39	45¾	52½	63¾	75
L7	7⅜	22	28	34	43	52	61	70	85	100
L9	9⅜	27½	35	42½	53¾	65	76¼	87½	106¼	125
L11	11⅜	33	42	51	64½	78	91½	105	127½	150

Ratings for High Radiators

L–Section length, in.		18	22	26	32	38	44	50	60	70
Radiator designation	D–Over all depth of rad., in.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft,
12-in. Draft Head										
H3	3½	14½	18	22	28	34	40	45½	55	65
H5	5½	21¾	27	33	42	51	60	68¼	82½	97½
H7	7⅜	29	36	44	56	68	80	91	110	130
H9	9⅜	36¼	45	55	70	85	100	113¾	137½	162½
H11	11⅜	43½	54	66	84	102	120	136½	165	195
18-in. Draft Head										
H3	3½	16½	20½	25	31½	38½	45	51½	62½	73½
H5	5½	24¾	30¾	37½	47¼	57¾	67½	77¼	93¾	110¼
H7	7⅜	33	41	50	63	77	90	103	125	147
H9	9⅜	41¼	51¼	62½	78¾	96¼	112½	128¾	156¼	183¾
H11	11⅜	49½	61½	75	94½	115½	135	154½	187½	220½
24-in. Draft Head										
H3	3½	17½	22½	27½	34½	41½	49	56	68	80
H5	5½	26¼	33¾	41¼	51¾	61¼	73½	84	102	120
H7	7⅜	35	45	55	69	83	98	112	136	160
H9	9⅜	43¾	56¼	68¾	86¼	103¾	122½	140	170	200
H11	11⅜	52½	67¾	82½	103½	124½	147	168	204	240
30-in. Draft Head										
H3	3½	19½	24½	30	37½	45½	53½	61	74½	87½
H5	5½	29¼	36¾	45	56¼	68¼	80¼	91½	111¾	131¼
H7	7⅜	39	49	60	75	91	107	122	149	175
H9	9⅜	48¾	61¼	75	93¾	113¾	133¾	152½	186¼	218¾
H11	11⅜	58½	73½	90	112½	136⅛	160½	183	223½	262½

Note: B.t.u. output may be found by multiplying square feet given by 240. Capacities at greater draft heads than shown mailed on request.

Continued on next page

AULBRAS INDIRECT HEATERS

Description

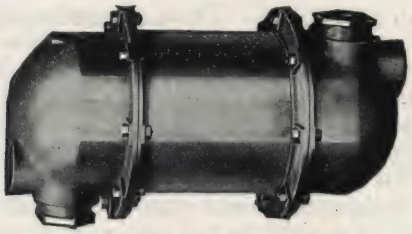
Aulbras Indirect Heaters are composed of a brass heat exchanging unit enclosed by an outer flanged shell of brass which is bolted to reversible cast bronze heads. Expansion and contraction are provided for by specially designed fittings for supporting the internal unit.

Features

Aulbras Indirect Heaters are entirely non-ferrous, thereby eliminating rust, corrosion and the resultant frequent shut-downs for cleaning. Clean domestic water is assured. Large streamlined waterways expose greatest surface to the heating element, induce rapid flow and reduce friction to a minimum. As the heads are reversible, Aulbras Water Heaters can be installed in any position without affecting their efficiency.

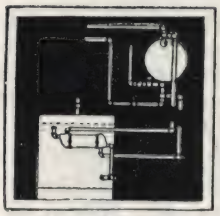
There are two types of heaters; the indirect, installed below the water line of the boiler, and the dual type, installed partly above and partly below the water line. Capacities range from 160 gal. to 5000 gal. with a temperature rise of 100° in three hours. Sizes are from 20 in. long by 5½ in. in diameter to 76⅝ in. long by 9 in. in diameter.

Descriptive circulars and further information is available on request.

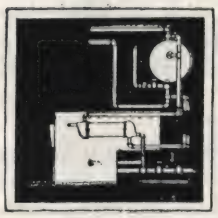


Aulbras Indirect Heater

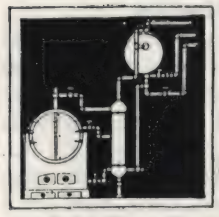
Showing Aulbrass Internal Unit



Type A



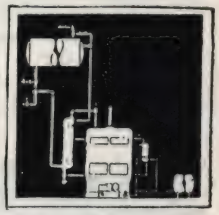
Type B



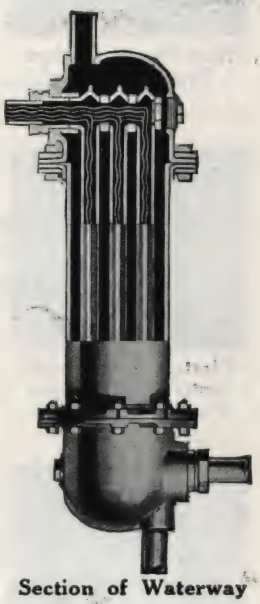
Dual Type B

CAPACITIES AND DIMENSIONS OF AULBRAS INDIRECT HEATERS

No.	Length in.	Diameter, in.	Boiler conn., in.	Tank conn., in.	Capacity live steam, gal.	Capacity temp. rise 100° in 3 hr., gal.	Capacity temp. rise 100° in 1 hr., gal.	Hot water radiation, sq. ft.	Shipping weight, lb.
Type A—5½-in. Diameter									
2-tube	L								
5–18	20	5½	1½	1¼	250	160	50	200	45
6–22	24	5½	1½	1¼	300	200	65	240	50
8–26	28	5½	1½	1¼	400	250	80	320	55
10–32	34	5½	1½	1¼	500	300	95	400	60
Dual Type A—5½-in. Diameter									
2-tube	L								
16–38	40	5½	2	2	.....	500	165	.....	65
22–44	46	5½	2	2	.....	600	200	.....	70
27–50	52	5½	2	2	.....	700	230	.....	75
31–60	62	5½	2	2	.....	800	265	.....	80
35–70	72	5½	2	2	.....	900	300	.....	85
Type B—9½-in. Diameter									
3-tube	L								
15–18	22¼	9	2	1½	700	450	150	500	78
20–22	26¼	9	2	1½	1000	550	180	600	83
29–26	30¼	9	2	2	1200	650	215	800	89
38–32	36¼	9	2	2	1400	750	250	1000	94
Dual Type B—9-in. Diameter									
3-tube	L								
52–38	44⅝	9	2½	2	.....	1200	375	.....	100
67–44	50⅝	9	2½	2½	.....	1500	475	.....	105
77–50	56⅝	9	2½	2½	.....	1700	550	.....	110
92–60	66⅝	9	2½	2½	.....	2000	650	.....	115
110–70	76⅝	9	3	2½	.....	2300	750	.....	120



Dual Type A



Section of Waterway

THE TRANE COMPANY

LA CROSSE, WIS.

BRANCHES IN

AKRON, OHIO
ALBANY, N. Y.
ATLANTA, GA.
BALTIMORE, MD.
BOSTON, MASS.
BUFFALO, N. Y.
CHICAGO, ILL.
CINCINNATI, OHIO
CLEVELAND, OHIO
COLUMBUS, OHIO
DALLAS, TEX.
DES MOINES, IOWA
FORT WORTH, TEX.
GREENSBORO, N. C.
HARRISBURG, PA.
INDIANAPOLIS, IND.
JUNEAU, ALASKA
KANSAS CITY, MO.
LOS ANGELES, CALIF.
LOUISVILLE, KY.
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OKLAHOMA CITY, OKLA
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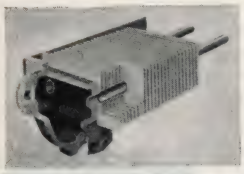
SAN FRANCISCO, CALIF.
SCRANTON, PA.
SEATTLE, WASH.
SOUTH BEND, IND.
ST. LOUIS, MO.
TACOMA, WASH.
TAMPA, FLA.
TOLEDO, OHIO
TORONTO, 2, ONT., CAN.
VANCOUVER, B. C., CAN.
WASHINGTON, D. C.
WINNIPEG, MAN., CAN.
ZANESVILLE, OHIO

The Trane Architectural Service Division

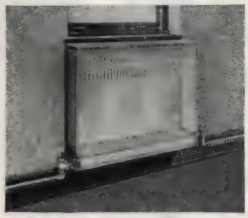
The Architectural Service Division is a group of experienced architects whose duty it is to assist designers in working out any problem which may arise in connection with the use of convection heating equipment.

A letter addressed to THE TRANE COMPANY, 15 Park Row, New York City; THE TRANE COMPANY, Palmolive Building, Chicago, or THE TRANE COMPANY, La Crosse, Wis., will put you in touch with a member of this group. This service is rendered without obligation.

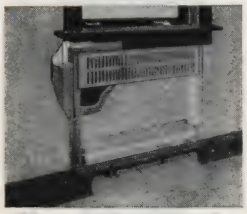


The Concealed Heater Element

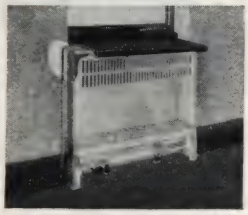
Cast iron headers. Copper tubes. Aluminum fins. Practically indestructible



Wall Hung Cabinet Type Concealed Heater



Plaster Front with Outlet Grille Type Concealed Heater



Partially Recessed Type Concealed Heater

Trane Concealed Heaters

THE TRANE COMPANY have designed a complete line of Concealed Heaters to meet the requirements of the architect for every type of building. There are seven general types:

(1) Wall Hung Cabinet Concealed Heater which is particularly suitable for use in hospitals, office, apartment, school and public buildings already built or new buildings whose wall construction does not permit concealment.

(2) Floor Type Cabinet Concealed Heater for remodeling work in old buildings.

(3) Partially Concealed Type Concealed Heater to meet conditions where the wall structure does not allow sufficient depth to completely conceal the heater.

(4) Completely Concealed Type for all classes of buildings—particularly adaptable to commercial buildings, apartments, and operation residences because of its extremely low cost.

(5) Front Metal Panel Type Concealed Heater which is preferred for some installations where low cost is an important factor and where it is practical to line the recess with wall board.

(6) Plaster Front Cabinet with Outlet Frame is one of the two ideal types of installation where to obtain the utmost beauty it is desirable to carry the same wall finish across the face of the cabinet.

(7) Plaster Front with Outlet Frame for building conditions where it is practical to eliminate the metal enclosure and, for the sake of economy, use this plaster front in conjunction with a recess framed either in the masonry or structural member of the building, and lined with wall board.

Complete literature will be furnished on request. Offices in all principal cities.

Complete Specification Data Available

Suggested Installation Details is a portfolio of details which will be valuable to the architectural draftsman in designing wall recesses into which Concealed Heaters will properly fit. *Trane Concealed Heater Data* contains a complete discussion of the dimensions, capacities, and roughing-in dimensions of each type and size of Trane Concealed Heater. *Typical Piping Details* have been prepared to assist the engineer in making the proper piping connections for each type of Concealed Heater. This data has been prepared by THE TRANE COMPANY architectural and engineering staff with the co-operation of architects and engineers from the principal building centers, and will be sent to any architect, engineer or draftsman upon request.

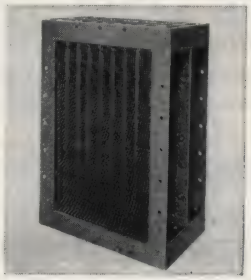
The Trane Unit Heater 22 Sizes

Trane Unit Heaters

The Trane Unit Heater line has been developed to meet architectural requirements. Careful study has brought forth the 22 sizes and styles with the proper capacities which best meet the architect's requirements for industrial buildings and special applications in commercial buildings. Capacities range from 55 sq. ft. to 1560 sq. ft. equivalent direct radiation at 5 lb. steam pressure.

Unit heaters can be furnished with recirculating boxes to meet certain heating conditions. Provision is also made for connecting outside air ducts to meet the ventilation requirements of the various state codes.

Trane Unit Heaters are built with aluminum fins and copper tubes. Same type of construction as Concealed Heater Element. No soldered or welded joints. Guaranteed pressure range up to 150 lb. steam pressure. Complete information on capacities, sizes, and types in Unit Heater Bulletin.



Trane Blast Heater Element

A size to meet all drying, ventilating, cooling and blast heating problems

Trane Blast Heaters

Trane Blast Heater elements are constructed in exactly the same manner as the Unit Heater and Concealed Heater elements. Pressure range up to 150 lb. Units for higher pressure also available. Architects will find that this type of heating surface has many advantages over the bulkier cast iron units for ventilation, tempering and cooling and drying work as well as for straight blast heating jobs

HEALY-RUFF COMPANY

Manufacturers of E-Z Radiator Hangers, Lavatory Hangers and Concrete Inserts

776 Hampden Avenue
ST. PAUL, MINN.

Products

E-Z ONE-BOLT RADIATOR HANGER or BRACKET, for hanging all makes of wall and tube radiation.

E-Z LAVATORY HANGER or BRACKET, for hanging lavatories and kitchen sinks.

E-Z CONCRETE INSERT, for all pipe hangers.

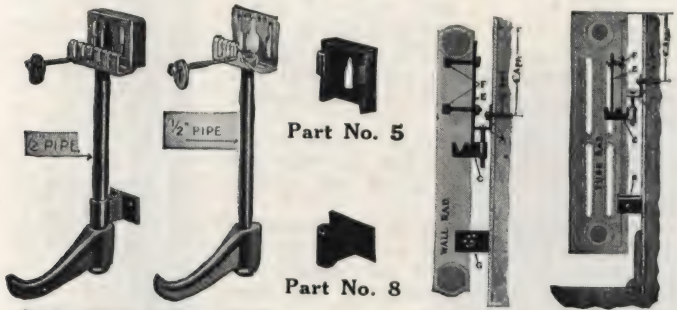
E-Z Radiator Hangers

Style "H" places radiator 2½ in. from wall and provides for baseboard adjustment.

Style "R" places radiator 1½ in. from wall, but is not adjustable for baseboard. All Style "R" hangers are convertible, with parts No. 5 and No. 8, into Style "H."

Both Styles "H" and "R" can be used for wall, column or tube radiators. All column and tube radiators are held in at the top with an invisible washer. All parts made of pressed steel, except bottom hook supports.

Style "C" will hang wall, tube and the new "Fantom and Mural" radiation. Fully adjustable horizontally and vertically, and has adjustment for irregular walls. Can be furnished for hanging either 1½ or 2½ in. from wall. Hanger is complete, no nipples required.



Style "H" with Baseboard Adjustment | **Style "R" without Baseboard Adjustment** | **Style "C" with Wall Radiator** | **Style "C" with Tube Radiator**

Typical Specifications—*General*—All radiation, unless otherwise noted, shall be supported from the wall on Style "——" E-Z Radiator Hangers, placing the radiator —— inches from the wall, as manufactured by the HEALY-RUFF COMPANY, St. Paul, Minn., or equal, and approved in writing by the architect or engineer. The heating contractor shall furnish and install for each hanger the proper type of suspension bolt. The number of hangers to be used for each radiator shall be as recommended by the manufacturer.

Advantages—Anchor bolts can be placed in walls during construction. No accurate measurements required since hangers have both horizontal and vertical adjustments. (Vertical adjustments on Styles "H" and "R" made with ½-in. pipe.)

Only one bolt is required in wall for each hanger. Expansion cannot affect anchor bolts in wall.

Entire hanger invisible when installed.

Adjustable for any height of baseboard.

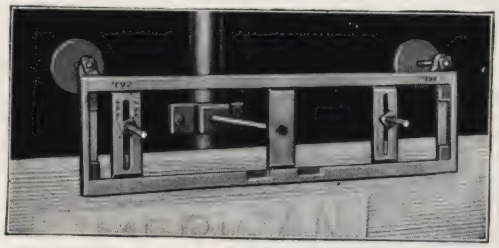
Saves time and labor installing.

Applicable to walls of wood, brick, tile, or walls of any other material.

Easy to clean under radiators.

E-Z Lavatory Hanger

E-Z Lavatory Hanger offers the practical means for hanging all lavatories and kitchen sinks. Hanger is made of malleable iron and furnished complete as shown, except ⅜-in. pipe.



E-Z Lavatory Hanger

Advantages—Easy, quick and economical to install. Can be fastened securely to form rigid hanger either with or without clamping to vent pipe.

Gives firm, substantial support permanently—cannot slip or come loose from wall. No lavatory pedestal, legs or other support necessary.

Installed in wall without extra frame of wood or other material. Can be built into wall during construction or after, as desired. It is not absolutely necessary to attach to vent pipe, but preferable when possible.

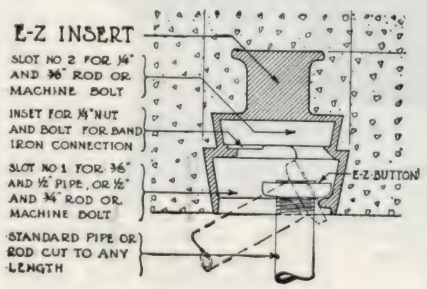
E-Z Lavatory Hanger fits all size lavatories and meets all conditions. It is fully adjustable both horizontally and vertically. Exact position need not be figured when setting.

E-Z Concrete Insert (7 in 1)

An insert with special features making it adaptable to all sizes of pipe hangers, whether supported by pipe, bolt, rod, or band iron.

Advantages—Made in just one size, and this one size accommodates ¼, ⅜ and ½-in. pipe, and ¼, ⅜, ½, ⅝ and ¾-in. rod or bolt.

Has ball and socket connection between insert and hanger.



E-Z Concrete Insert

Fully adjustable—allows play to compensate for expansion and inaccurate alignment of inserts. E-Z Button turns in the insert—no couplings or turnbuckles needed.

"Makes Pipe Hanging Easy."

THE LITTLE GIANT MFG. CO.

Manufacturer of Radiator Brackets and Hangers

1401 3rd Avenue South, MINNEAPOLIS, MINN.

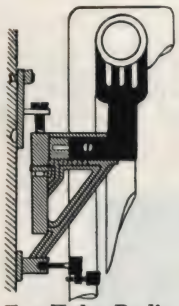
Products distributed by United States Radiator Corporation—All Leading Jobbers

Products

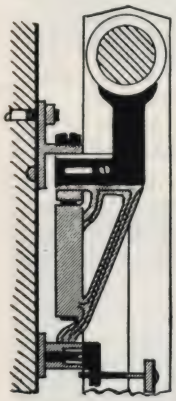
TU-BU-LUR RADIATOR BRACKETS; LITTLE GIANT RADIATOR HANGERS; LITTLE GIANT CONCRETE INSERTS.

Also Little Giant Temporary Radiator Legs.

For Sentinel Safety Sewer Valves, see Manufacturers' Index.



For Tube Radiators



For Wall Radiators

The Tu-bu-lur Radiator Bracket

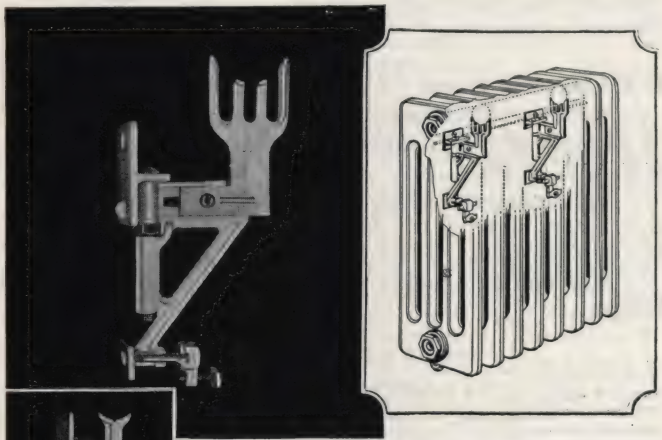
The new Tu-bu-lur Radiator Bracket fits all tube type radiators, whether rod, slip, nipple, or screw nipple, regardless of make, size or pattern.

In one style and with but two sizes, the Tu-bu-lur meets all requirements.

The Tu-bu-lur is a bracket permitting complete adjustments in any direction, level or plane. It provides for adjustment in and out from wall; for vertical alignment; for adjustment laterally in either direction; for raising or lowering radiator; for setting radiator in exact plumb. The Tu-bu-lur requires but one anchor bolt in the wall and requires no tie bolts.

Made of certified malleable iron, painted navy gray. The Tu-bu-lur is sold completely assembled, ready to install. It is designed to match the appearance of the new tube type radiators, though the bracket itself is not visible when installed.

Wall Radiator Bracket—A special Tu-bu-lur bracket has been designed for wall radiators. The principle of operation, style and manufacture is the same as with the other sizes. Where desired to hang all radiators more than one tier high, the wall spacer is furnished, which makes possible a rigid installation without danger of buckling or swinging and allows for fine adjustments and alignment.



Tu-bu-lur Radiator Bracket

Left **Tu-bu-lur Wall Bracket**

Fantom and Mural Radiator Brackets

A special Tu-bu-lar one-bolt bracket, with adjustments laterally, vertically and for plumbing with wall, is supplied for Fantom, Mural and all similar types of radiators.

Details and specifications sent on request.

Little Giant Radiator Hangers

Little Giant Radiator Hangers are used for supporting column radiation, wall and double wall radiation, and all makes of tube radiators. They are one-bolt hangers, having both vertical and lateral adjustments and providing for expansion and contraction.

Style L

The hanger plates are made of boiler plate steel. The foot pieces are of certified malleable iron and the lock nuts of steel.

Styles—Little Giant is made in three styles, L, P, and C. The L style holds the radiator 1⅞ in. from the wall, and has pipe slot and tie bolt notches below the anchor bolt.

The P style holds the radiator 2½ in. from the wall and has the pipe slot and tie bolt notches above the anchor bolt.

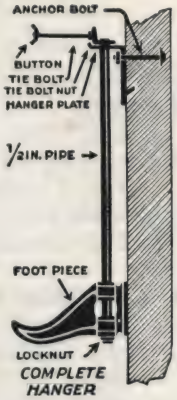
The C style hanger is a combination of P style hanger plate and L style foot piece and is furnished on installations where the foot piece rests on the baseboard.

All parts are furnished by us, except ½-in. hanger pipe and anchor bolt.

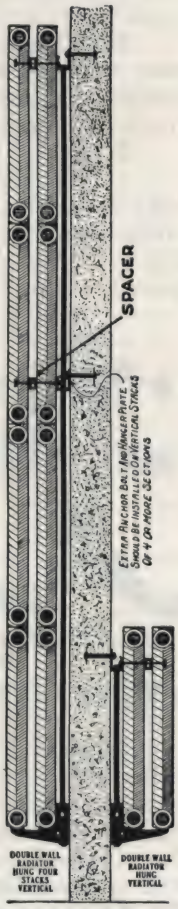
Double Wall Radiator Hangers—The adaptability of Little Giant Hangers for supporting double wall radiation is shown in the accompanying illustration.

On installations one, two, or three stacks high the wall hanger is used the same way as with the single wall installation with only one anchor bolt.

Where the installation is four or more stacks high, it is necessary to place an additional hanger plate with anchor bolt and wall spacer.



Style P



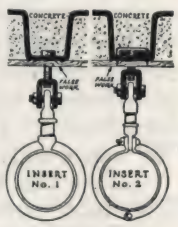
Double Wall Installation

Little Giant Concrete Inserts

Little Giant Concrete Inserts are made entirely of steel. They are extremely simple to install and are unusually practical.

They are all-purpose inserts, with which rods, band iron or pipe may be used as filler pieces. They are so designed that it is not necessary to nail them to the false work.

Little Giant Inserts come in two styles, No. 1 and No. 2.



Little Giant Concrete Inserts

BOMAR MANUFACTURING COMPANY

Manufacturers of Radiator Covers and Allied Metal Products

OFFICE AND PLANT
Campbell and Gray Streets, LOUISVILLE, KY.

Products

BOMAR "KLEAN-HEAT" RADIATOR COVERS.

BOMAR "KLEAN-HEAT" REGISTER CABINETS.

BOMAR "KLEAN-HEAT" RADIATOR SHIELDS.

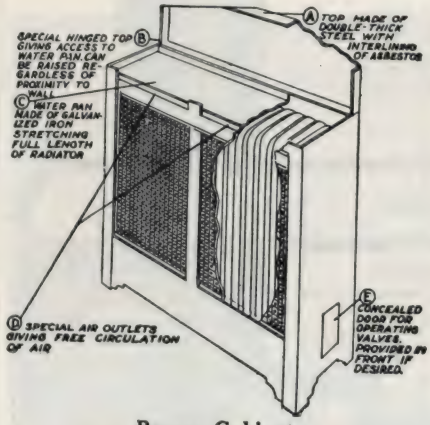
Advantages

Bomar "Klean-Heat" Radiator Covers and Shields change the unsightly radiator to a handsome and useful piece of furniture. The top can be utilized for decorative purposes. Bomar "Klean-Heat" covers, made of all metal, last indefinitely.

Construction

The top or lids of all Bomar "Klean-Heat" Covers are made of double thickness furniture steel with asbestos interlining, all joints and other principal parts being reinforced by spot-welding. The *entire* cover is made of No. 20 gauge steel and securely bolted, without the bolts being visible from the front, end or top. The back is of No. 20 gauge metal, extending to the floor and is fastened to the end of the cover so that the leakage of dirt from the radiator cannot come in contact with the walls or any object in close proximity to the radiators, and is fastened by concealed hinges—*a patented feature.* Regardless of how close the radiator may be to the wall, the lid can be raised without marring or touching the wall.

Front and Grille—The front of Bomar "Klean-Heat" Covers is so constructed that a free flow of air at the extreme top directly under the lid allows absolutely no resistance to the outlet of warm air after passing over the humidifying pan. This pan extends the full length of the radiator with sufficient width to allow a free circulation at the front and back. The humidity pan rests securely upon the brackets and can be easily removed for sanitary purposes. The bottom of the covers have a turned edge, eliminating the sharp metal from coming in contact with the floor or rugs and at the same time permitting enough space to clean underneath.



Bomar Cabinet
Illustrating the built-in quality

The Victoria—No. 209

Styles and Design

Bomar Hamilton No. 205—Shown at lower left is a highly attractive cover with a *cane metal or wiscane* front. A panel effect with center decorations add to its beauty.

Bomar President No. 211—Shown at lower right uses the staggered bar effect in grille and makes a very attractive furniture addition for office or home.

Bomar Victoria No. 209—Shown at lower center is of the straight bar grille type, the square steel channel rods being unusually distinctive.

Bomar "Klean-Heat" Shields No. 303 DeLuxe—Shown below have tops of double thickness No. 20 gauge steel with asbestos interlined lids. The back of the shield rests upon the floor and is securely fastened to the radiator. Each shield has a humidity pan of proportionate size.

"Klean-Heat" Shield No. 303 De Luxe

Finish

Bomar finish consists of eight coats of highest grade lacquer depicting reproductions of grained wood or any flat or stippled finish to harmonize with decorative scheme.

Delivery

In ordering Bomar "Klean-Heat" products, state style desired and specification blanks will be forwarded. Our Bomar modern factory facilities assure delivery three weeks after order is received.

The Hamilton—No. 205

Custom Made

All Bomar "Klean-Heat" Covers, Register Cabinets and Radiator Shields are custom built. Estimates cheerfully and promptly furnished.

The President—No. 211

AMERICAN METAL PRODUCTS CORP.

Air-Seal Radiator Furniture for Every Type of Radiation

TELEPHONE
EVergreen 6000

GENERAL OFFICES AND PLANT
8500 Goodfellow Avenue, ST. LOUIS, MO.
SALES OFFICES IN PRINCIPAL CITIES

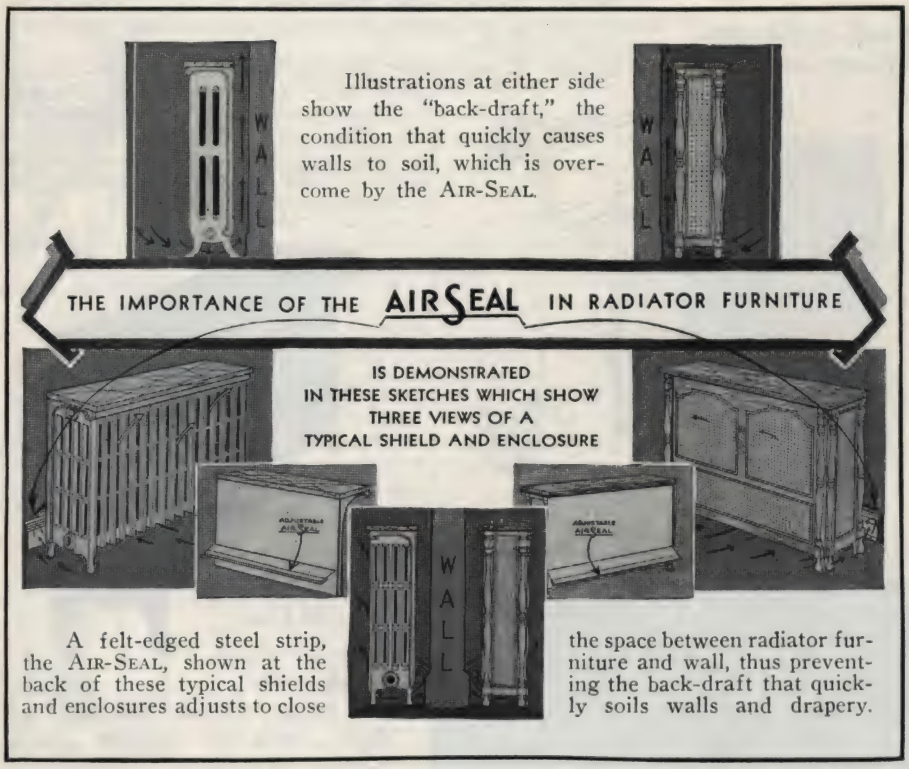
Description

AIR-SEAL Radiator Shields and Enclosures combine every essential of utility with a choice of attractive models designed to harmonize with every architectural or decorative scheme.

A few of the 50 models are pictured. Structurally they are permanent and troubleproof. Built of furniture steel, from standardized parts, electrically welded to avoid bolts and difficulties of assembling.

AIR SEAL RADIATOR FURNITURE

Shields and enclosures have insulated tops, and may be of metal, marble or glass, with or without humidifiers. Finish in finest lacquers, prime coat, solid colors, wood grains or marble patterns.



Illustrations at either side show the "back-draft," the condition that quickly causes walls to soil, which is overcome by the AIR-SEAL.

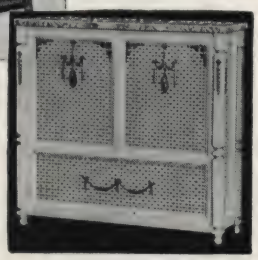
A felt-edged steel strip, the AIR-SEAL, shown at the back of these typical shields and enclosures adjusts to close the space between radiator furniture and wall, thus preventing the back-draft that quickly soils walls and drapery.

Grayshore Console

Artistic tracery of wrought iron, backed by a grill that cancels the radiator, topped with a rich marble slab

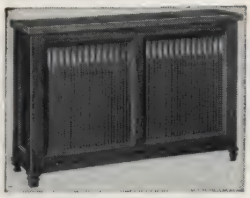
Left:
Gothic Console

Welded steel frame finished to match wood corner posts. Choice of grills



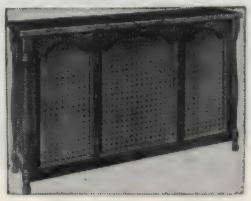
Right:
Croydon

To grace the distinguished interior, in a light or dark finish



Left:
Rod Grill

Finished in wood grain or flat color, with rod grill in harmonizing or contrasting colors

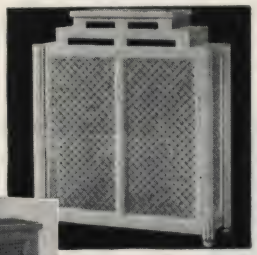


Right:
Windsor

A model that shows adaptability of multiple panels to radiators of any length

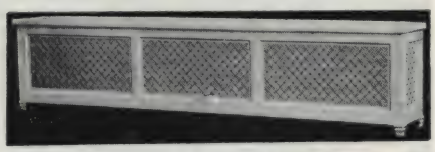
Ridgley Window Seat (Also in Console)

Attractive English lines, with wooden posts and stretchers, matching wood grain on the steel



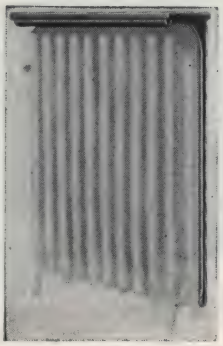
Right:
Saybrook

One of the consoles designed for the modern interior, to have any desired finish



Type X Window Seat (Also in Console)

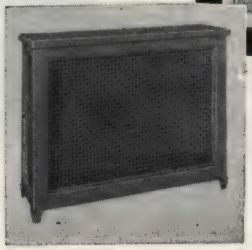
Lends itself particularly well to many interiors. All steel, with choice of grills



Air-Seal Radiator Shields

With marble, metal or glass tops. One-piece style, or with hinged top for humidifier. Each model has integral pressed steel side-brackets and is made to fit high or low radiators.

All models have easily cleaned dust trap and the AIR-SEAL.



Left:
Type X Console

An all-steel model of dignity that is attractive in any color or flat finish

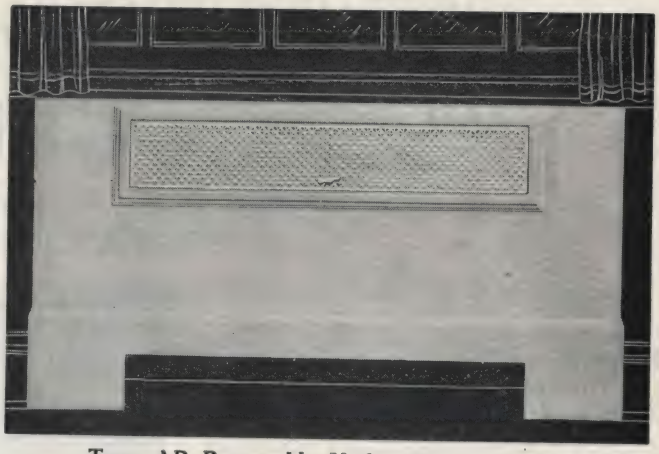
Continued on next page

Air-Seal Removable Fronts for Concealed Radiation With or Without Dampers

A standardized selection of removable, under-window fronts and linings to fit all types of concealed radiation.

Built of highest grade furniture steel, with patented knob-control damper at slight added cost on all models. Finished in prime or perfectly reproduced wood grains or solid colors to harmonize with any decorative scheme.

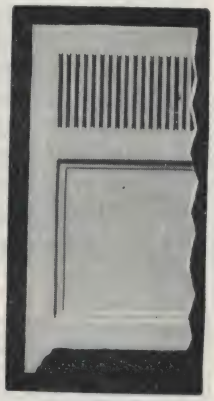
Removable fronts furnished with or without the lining, but it is recommended that each unit be supplied complete. Equipped with invisible trap doors for valve control when desired.



Type AR Removable Under-Window Front
A new type developed especially for the Park Plaza in St. Louis, attractive in a wide choice of grills

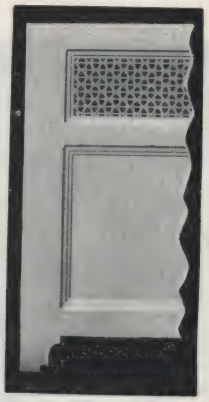
Type AP
Flush-front without paneling

Type BP
Flush-front without paneling

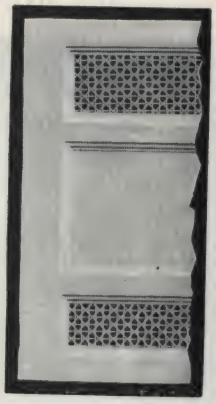


Type CX
With recessed moulding panel

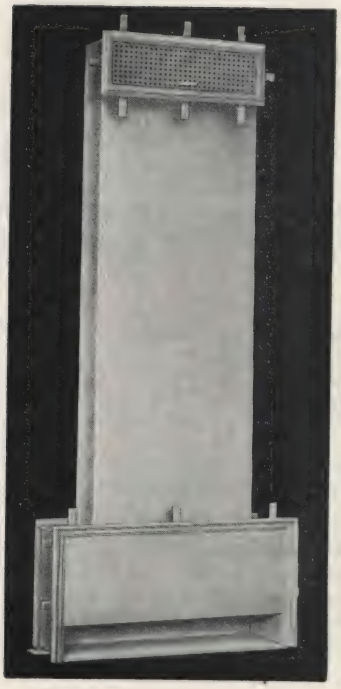
Type DX
With recessed moulding panel



Type AW
Recessed O.G. Moulding. Any type grill



Type BW
Recessed O.G. Moulding. Any type grill

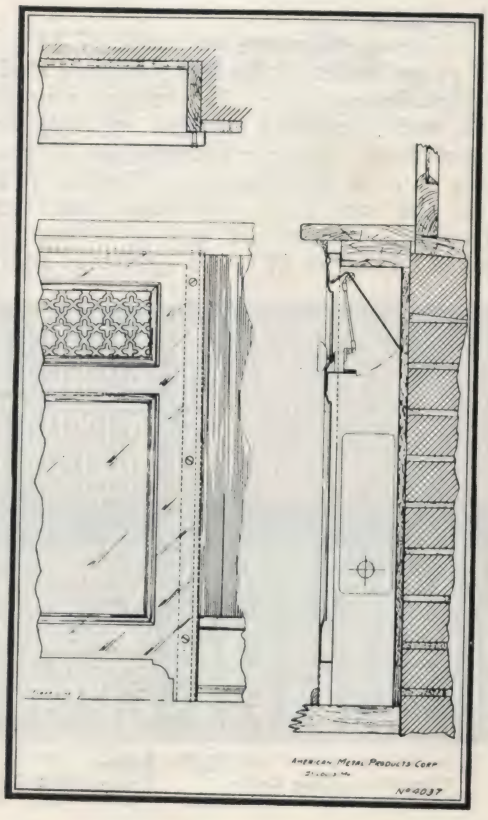


Air-Seal "Inwal" Stacks with or without Dampers

AIR-SEAL "Inwal" Stacks are built to the same exacting specifications as the other units in the line and assembled into one electrically welded unit for quick and simple installation. Base front and grill front are removable for access to radiator and for easy cleaning.

Note especially the trim appearance of the exposed lower and upper surfaces. No screws or other fastenings visible.

Patented knob-control damper supplied at slight added cost, in top grill or lower part of stack. The damper is an important feature. It effects a complete seal in either of two positions—fully open or fully closed, with only a 180° turn of the knob necessary to shift from one position to the other.



CROWN METAL PRODUCTS CO., INC.

Quantity Manufacturers of Radiator Enclosures and Grille Frames for Concealed Radiators

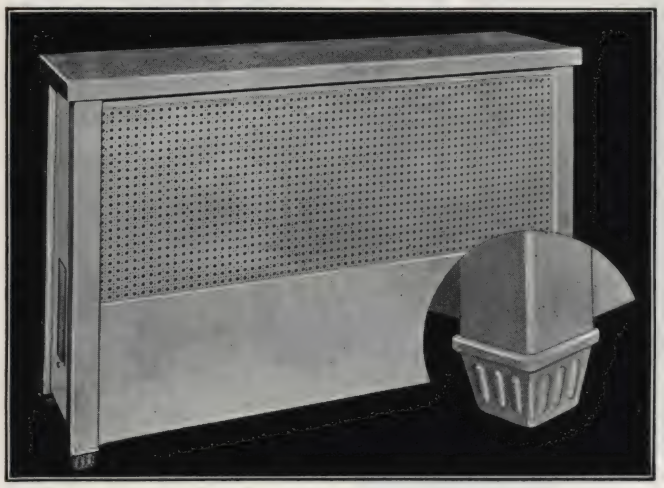
410 Willoughby Avenue
BROOKLYN, N. Y.

Products

CROWN RADIATOR ENCLOSURES.
CROWN CONCEALED RADIATOR FRONTS.

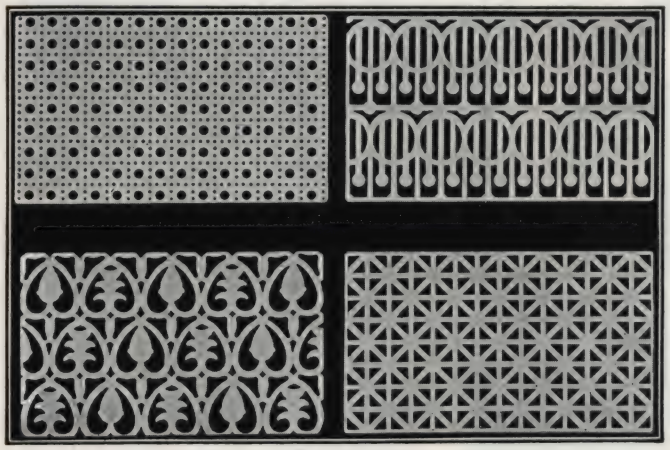
Special Feature

Crown Metal Products are for large installations. They are designed for manufacture on a mass production basis. They offer considerable savings to the user of from 50 to 5000 pieces.

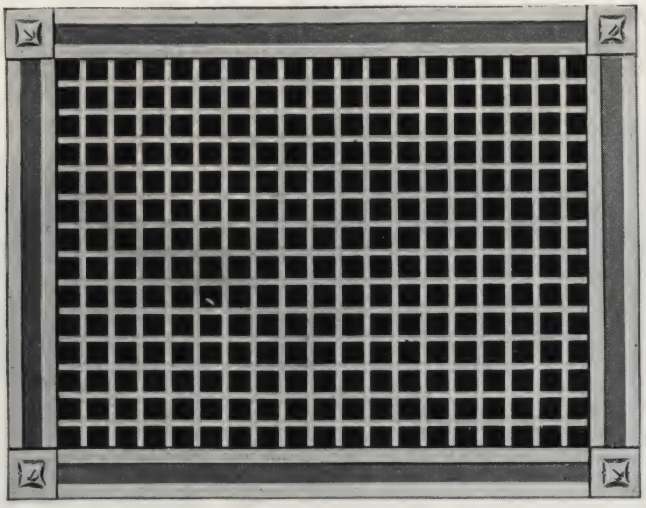


Description

Crown enclosures are made of 16 gauge tops and 20 gauge bodies of the best furniture steel in the classic design shown above. A choice of four grilles is available and a specially stamped leg adds greatly to their appearance. These enclosures are designed in accordance with the latest principles in effective heat conservation and each has a concealed humidifier. They are made for any size and type of radiator. Finishes are baked enamel in all colors, grainings and effects



Grille Styles
Upper left: Cane Grille Upper right: Tear Drop Grille
Lower left: Acorn Grille Lower right: Bank Grille



(Trade Mark)

A new patented departure in grilles featuring beauty, strength in construction and 48-hour delivery service in specified sizes. A large variety of perforation styles are available. Material is 20 to 12 gauge steel.

Catalogue showing different styles and finishes on request.

Facilities

The CROWN METAL PRODUCTS CO., INC., has recently opened a new plant in the metropolitan area especially constructed for the economical production of enclosures and grill fronts. This plant can turn out 500 enclosures a day.

Estimates

Estimates will be given from specifications or representative will be sent to "measure up" if requested.

Some Crown Installations

Hospitals

Greenville Hospital, Jersey City, N. J.
Polyclinic Hospital, New York, N. Y.

Churches

Our Lady of Refuge, New York, N. Y.
St. Peter Claver's, Brooklyn, N. Y.
Notre Dame, New York, N. Y.
Holy Innocents, Brooklyn, N. Y.

Other Installations

Leverich Towers Hotel, Brooklyn, N. Y.
Theodore Prince & Co., New York, N. Y.
Municipal Building, New York, N. Y.
New York Life Building, New York, N. Y.
American Trust Company, New York, N. Y.

MULLINS MANUFACTURING CORPORATION

Manufacturers of Radiator Enclosures and Shields

1170 South Ellsworth Avenue
SALEM, OHIO

MULLINS RADIATOR ENCLOSURES

With a high standing in the radiator furniture field Mullins extensive activities have gained recognition in all sections of the country. Exceptional facilities in sheet metal stamping, combined with the artistry of master craftsmen (for which Mullins has long been renowned) has made it possible to design, manufacture and sell quality-built radiator furniture at

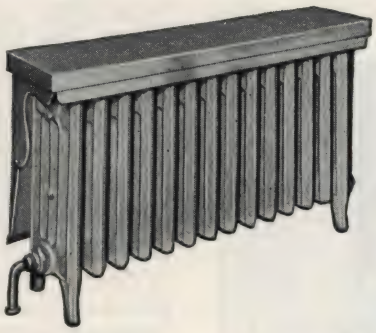
production prices, which, in smartness, beauty, style, performance and economy, stands unsurpassed.

Correctly designed to promote proper circulation of warmed, humidified air. Mullins Enclosures are healthful, a comfort and an economy —for they save walls from *"radiator smudge,"* etc., as well as showing an actual saving on fuel consumed.

MULLINS RADIATOR SHIELDS

Gracefully designed and thoroughly practical, beautifully finished and with circulatory principles correctly applied.

The adjustable lower swing panel, an exclusive Mullins feature, allows the felt retaining strip to firmly contact the wall thus preventing any secondary circulation of air from rising between the back of the shield and the wall. In the home, Mullins Shields are used in bathrooms, hallways, bedrooms and where-



ever the radiator is not a prominent fixture.

The commercial type of Mullins Shield, which is similar in design and construction to the standard product, offers unusually low cost protection against radiator smudge and is adaptable without special cutting or fitting to wall hung radiators, commonly used in office buildings, hospitals, hotels, apartments and other institutions.

CONSTRUCTION DETAILS

Mullins Radiator Shields

Top—No. 1 Grade "A" Furniture Steel, 14 gauge. Corners acetylene welded and finished smooth. Top is hinged so as to allow it to be lifted whenever the Water Pan needs filling.

Back Panel—25 gauge steel. Adjustable bottom flap with felt strip along lower edge. This flap swings back against the wall to prevent heated air from rising upward to soil wall paper or draperies.

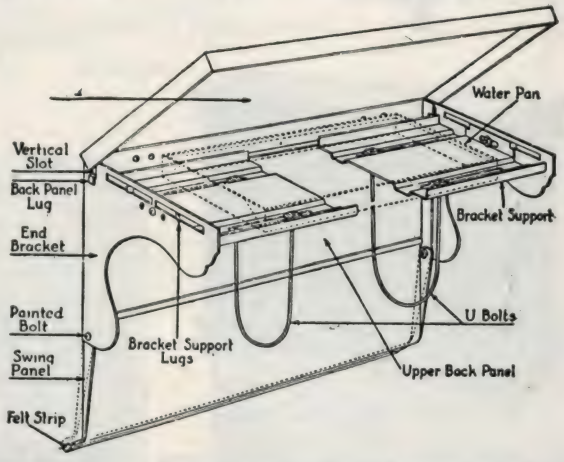
Water Pan (Humidifier)—24 gauge armco galvanized iron 1¼ in. deep.

End Supports—Heavy pressed steel brackets at each end.

Adjustable Bracket—Adjustable to locate the shield in any desired position in relation to the radiator.

Fasteners—The shield is secured to the radiator by two yokes, one at each end, which pass under the joints connecting the radiator sections.

Finish—Two coats oil-base primer baked into metal with multi-coat lacquer finish. Walnut and Mahogany enclosures reproduce wood grain by the most highly perfected process known. Finish and appearance is that of finest furniture.

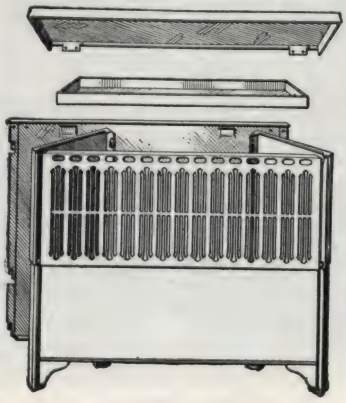


Mullins Radiator Enclosures

Top—No. 1 Grade "A" Furniture Steel, 14 gauge. Corners acetylene welded and finished smooth. Top hinged to body. Will support the weight of a heavy man without bending.

Body Panels—Front and side panels, 20 gauge. Back panel is of 24-gauge steel. Heavy reinforcements give an additional factor of strength. Special embossed shoes are spot-welded to the legs to prevent scratching floor.

Assembly—Spot-welded throughout, excepting hinge screws for attaching top. Ends attached to front panel by means of full length piano hinges.



Water Pan (Humidifier)—24-gauge armco galvanized iron 1¼ in. deep.

Construction—Both ends of the Mullins Radiator Enclosure swing inward on concealed piano hinges, and lie flat against the front panel.

Even the largest size enclosure folds and packs in a package approximately 5 in. in thickness.

There are but four bolts—these on the hinges operating the covers. The entire construction is simplicity itself.

Finish—Two coats oil-base primer baked into metal with multi-coat lacquer finish. Walnut and Mahogany enclosures reproduce wood grain by the most highly perfected process known. Finish and appearance is that of finest furniture.

W. H. JOHNSON & SON CO.

Acme Radiator Shields and Enclosures

330 East St. Joe Street, INDIANAPOLIS, IND.

Sales Offices in Practically All the Larger Cities Throughout the Country

Products

ACME RADIATOR ENCLOSURES and ACME RADIATOR SHIELDS.

Acme TRADE-MARK (Registered)

Acme Radiator Enclosure Models

Acme Radiator Enclosure Models have always been different. They have always combined the finest of materials and workmanship. They were designed, by one of the foremost designers of fine furniture in America, to harmonize in perfect taste with the interior decorations. They are custom-built and custom-finished, in twelve models, seven of which are period models—Classic, Puritan, Grecian, Gothic, Early American, Colonial and Queen Anne. The five other models are designated by number and are of simpler design. It is advisable that the architect select the design of enclosure at the time the general interior motif of the rooms is being planned.

Acme Radiator Furniture should be of special interest to the architect who is looking for something genuinely *exclusive* in this line for the *better class interior.*

Manufactured in accordance with approved tests that have been made for the A. S. H. & V. E.

Acme Radiator Shields

Acme Radiator Shields are designed to meet the requirements where a complete enclosure is not required, but the walls and ceilings are to be protected. They are made with or without humidifier.

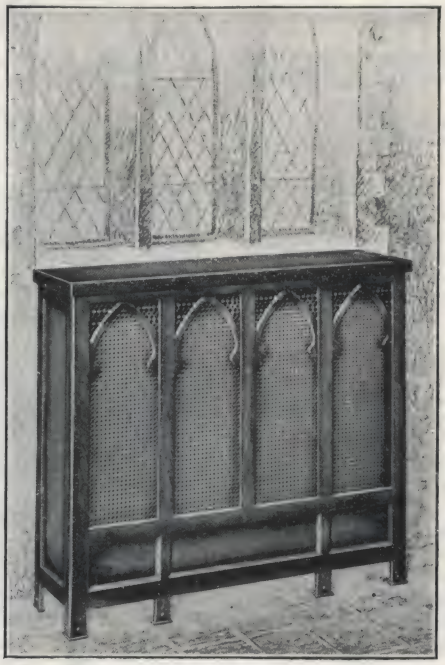
Construction of Enclosure Models

Custom-built to meet exact specifications as to size, style and finish. Top panel is made of special 14 gauge furniture steel and has a 1½-in. flange on all four sides. Rounded front corners if so desired. Equipped with humidifier—or underside of top panel is lined with "Celotex," a genuine insulating material. All panel joints are lock-seamed, and filled and rubbed to a perfectly smooth surface. Corner joints are firmly locked and fitted close. The entire absence of welds, rivets and lap joints gives the perfect finish of the finest cabinet work.

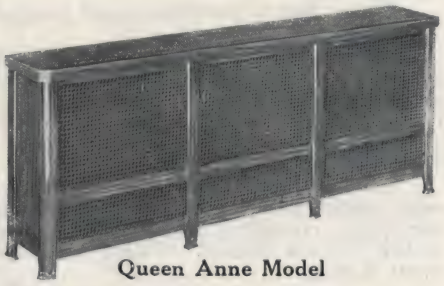
All types of enclosures are provided with adjustable legs. Convenient flush type door for operating radiator valve is placed in exactly the right location in each enclosure. Door for filling humidifier is also the inconspicuous flush type and is placed in top panel.

Grecian Model

Early American Model

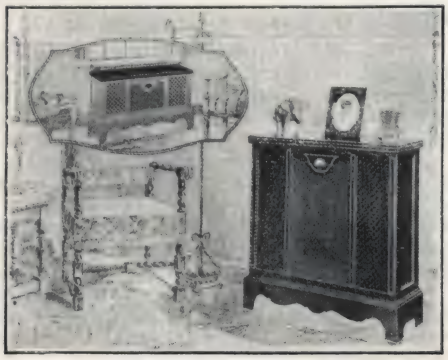


Gothic Model



Queen Anne Model

Classic Model



Puritan Model

Continued on next page

Sizes and Finishes—Custom-built to fit any size radiator. Finishes to match the color or wood finish selected by the architect. Various choices of grille; Standard cane, Metalace, Arabesque, Wiscane, Moorish and Bar may be had with different models.

The finish of the cabinet is accomplished by a multiple application of the finest quality lacquer—both in graining and enameling. Fastness of color is guaranteed. Also that it will not blister or crack. Graining is done by a photographic process and is not a hand imitation. Graining is accomplished in various shades of walnut, mahogany, oak and gum. Plain or stipple enamels may also be had in a wide assortment of colors.

Construction of Acme Radiator Shields

Acme Radiator Shields are made of high quality steel and finished in the finest manner. Back panel is made of heavy metal; ends of heavy steel stampings. Top panel is made exactly like the top panel of the Acme Enclosures, of 14 gauge furniture steel with a 1½-in. flange on all four sides. Rounded front corners furnished if desired. The shield is firmly attached to the radiator by means of special steel supports and bolts, making a very rigid installation.

Acme Radiator Shields are furnished either with or without humidifying pan beneath the top panel. When the humidifying pan is not wanted, the top panel is lined with "Celotex," a genuine insulating material.

Finishes—The top is finished in baked enamel, grained walnut, mahogany, oak, gum, ivory, white, stipple, or special colors by submitting sample with order. The back and ends are finished to match radiator finish.

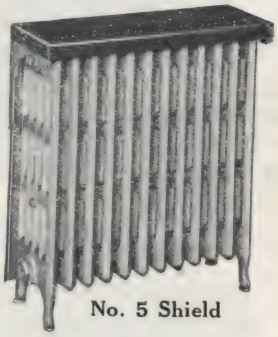
For Recessed Radiation

We furnish grille fronts as required of any of our standard models with the exception of Puritan, Grecian, Colonial and Early American models. Custom-built and completely finished, or furnished in a baked prime coat only where desired.

Catalogues

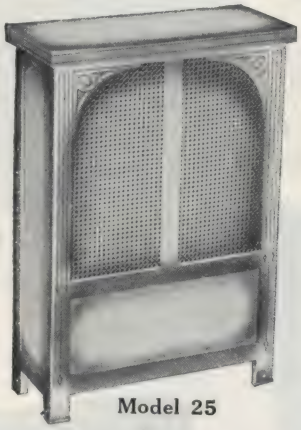
Containing descriptions, illustrations and all necessary data for specifying or ordering.

Model 35

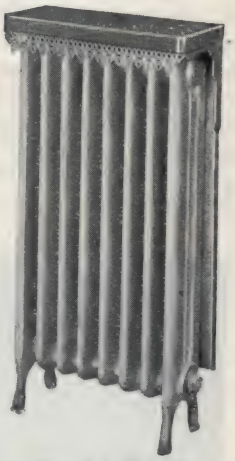


No. 5 Shield

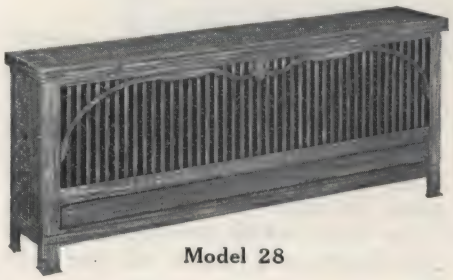
Model 20



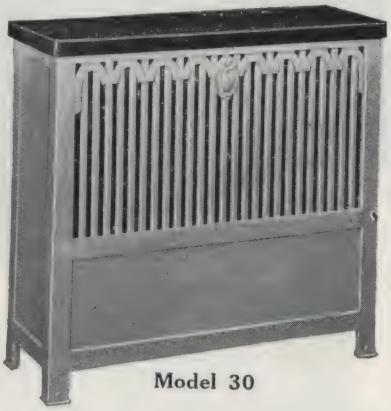
Model 25



No. 10 Shield



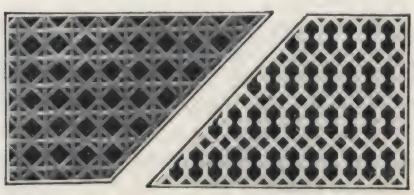
Model 28



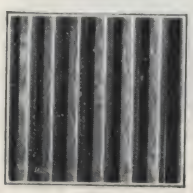
Model 30

Colonial Model

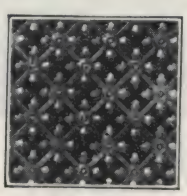
Grille Patterns



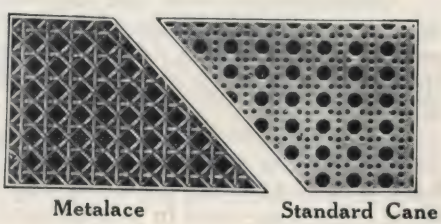
Wiscane Arabesque



Bar



Moorish



Metalace Standard Cane

RADIANT STEEL PRODUCTS CO.

Steel Radiator Enclosures

FACTORY AND EXECUTIVE OFFICE
WILLIAMSPORT, PA.

BRANCH OFFICES
NEW YORK, N. Y., 103 Park Avenue
BOSTON
PITTSBURGH
PHILADELPHIA, PA., Pennsylvania Building
WASHINGTON

Products

RADIATOR CABINETS; RADIATOR SHIELDS, STEEL LININGS and FRONTS for concealed radiators.

Other Radiant Products are Steel Access Doors; Steel Enclosures for Recessing Telephone Ringer Boxes.

Facilities

The Radiant factory is equipped with the most modern machinery, manned by skilled workmen, thus insuring consistently high grade production.

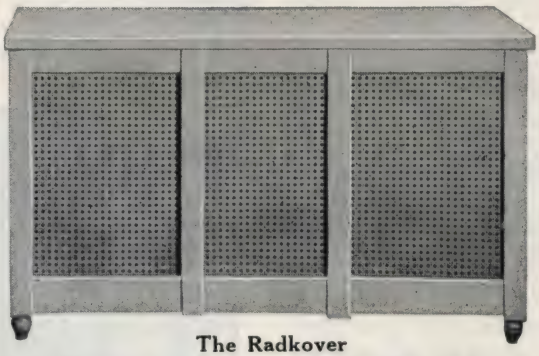
An Engineering Department is maintained to co-operate with architects and builders.

Radiant Enclosure Construction

Radiant enclosures and shields are designed to combine necessary utility features and beauty of decorative qualities.

Radiant enclosures are constructed of high grade furniture steel of different gauges—16 gauge for tops, 18 gauge for fronts and ends and 20 gauge for backs. Selected from an engineering standpoint, these different metals are fabricated in such a manner as to produce maximum strength and rigidity.

The Commercial
Especially adapted for large buildings and institutions



The Radkover
Harmonizes with any setting and widely used in all types of buildings

The Superad
A superior type enclosure with channel rod grille for elaborate installations

Tops—Flanged all around 1¼ in., corners are acetylene-welded, ground, buffed and filled before finishing. Hinged humidifier access doors 4x6 in. are installed when desired.

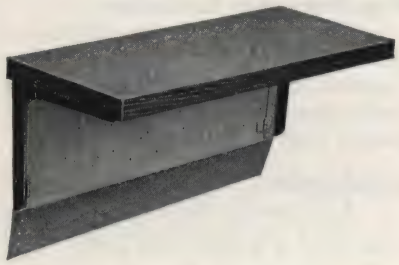
Fronts—Radkover and Superad fronts are reinforced with heavy gauge channel steel division posts every 7, 11, or 14 in., depending upon the length of the enclosure. Such strengthening renders the fronts absolutely rigid.

The front of the Commercial is paneled as illustrated. In this model, enclosures up to 26 in. in height have panels 11½ in., including top and bottom rails; 20 in. panels are used in heights above 26 in.

Backs—Upper portion of the backs is asbestos insulated.

Ends—Wide returns in the arched ends furnish additional reinforcement and strength. All ends are provided with 4x6-in. hinged valve access gates.

Feet—All Radkovers and Superads are equipped with adjustable turned hardwood feet which protect the floors and enable enclosures to be leveled perfectly on an uneven surface.



The Radshield
Furniture steel construction. Humidifier equipped. Duco finished

Humidifiers—Galvanized iron, 24 gauge, 1¼ in. deep; corners are leakproofed, lapped. These water pans rest upon heavy steel brackets 3 in. wide which are clamped into the front and back of the enclosure.

Grilles—Heavy steel perforated cane grille is standard in the Radkover. Superads are equipped with heavy channel steel rod grilles. The Commercial may be had with perforated cane or ¾-in. square lattice grilles as desired.

Finishes—All Radiant enclosures are finished in genuine duco by a process especially recommended by the Du Pont Company and can be furnished in wood grain reproductions as well as plain colors, as desired.

Assembly—Radiant enclosures arrive completely assembled; are individually packed and ready for installation.

Continued on next page

Enclosures for Concealed Radiation

The ideas of over one hundred leading architects and heating engineers have been incorporated to produce an artistic and efficient enclosure for concealed radiation.

Five standard types have been perfected.

No. 1—Steel lining with removable front. Front has upper grille and lower opening.

No. 2—Steel lining with removable front. Front has upper and lower grilles.

No. 3—Steel lining with offset front to receive metal lath and plaster. In this type the upper grille is removable.

No. 4—Steel lining with removable metal front having upper and lower grilles. This type is constructed to permit its being entirely recessed, or only partly so, to meet existing installation conditions.

No. 5—Wall type with top or front grille outlets, as desired.

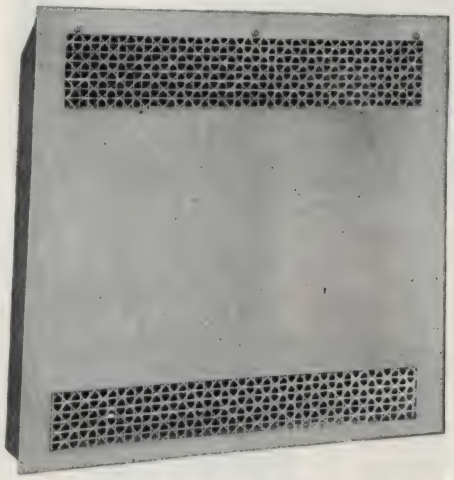
Radiant No. 1-A with Front Removed

Important Radiant Features Here Illustrated—

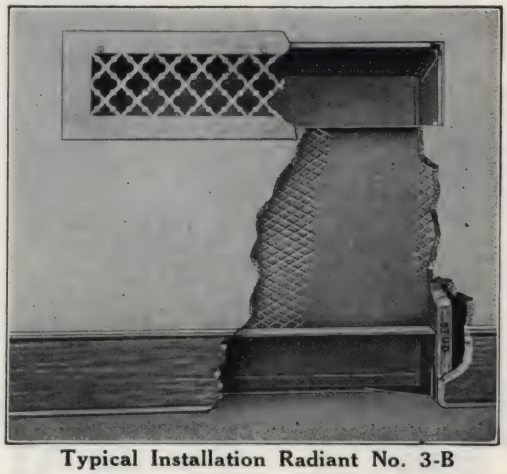
(1) Reinforcing angle at top of lining.
(2) Reinforcing angle on sides of lining.
(3) Reinforced inside bends and seams.
(4) Double angle reinforcement at bottom of lining.
(5) Triangular corner braces insure rigidity.
(6) A ½-in. metal return in arched opening.
(7) Bottom angle to eliminate buckling.
(8) Side angles to eliminate buckling.
(9) Reinforcing angle length of grille.
(10) Eccentric catches insuring quick attachment and perfect fit at front.

Construction—

Linings—20 gauge steel.
Fronts—16 gauge steel.
Grilles — Metalace No. 12—free area 57%; ¾-in. square lattice—free area 57%; Gothic—free area 60%.



Radiant No. 2-C with Front in Place



Typical Installation Radiant No. 3-B

¾-in. square lattice, gothic, No. 12 Metalace and Wiscane grilles are standard, being designated as A, B, C and D respectively.

Radiant enclosures are complete with lining and front. Separate front only, or lining only, may be had as desired. Dampers and valve access doors are furnished when specified. These enclosures are usually shipped with prime coat finish, but may also be had in wood grain reproductions.

Asbestos Lining
When specified, linings are asbestos insulated as above

Welds—All joints are electrically welded.

Finish—Prime coat baked at 300°.

In enclosures Nos. 1 and 2, fronts overlap linings by ¾ in. on each side and ½ in. on top, which covers plaster variations. The ends of linings are perforated to receive nails or screws so that they may be fastened to the studding.

Fronts are attached to linings by use of the exclusive Radiant eccentric catch which insures a perfect fit and takes care of any unevenness in plaster.

SCHLEICHER, INC.

Manufacturers of Slyker Metal Radiator Furniture

GARY, IND.

DISTRICT REPRESENTATIVES IN ALL PRINCIPAL CITIES

Products

SLYKER METAL RADIATOR FURNITURE.

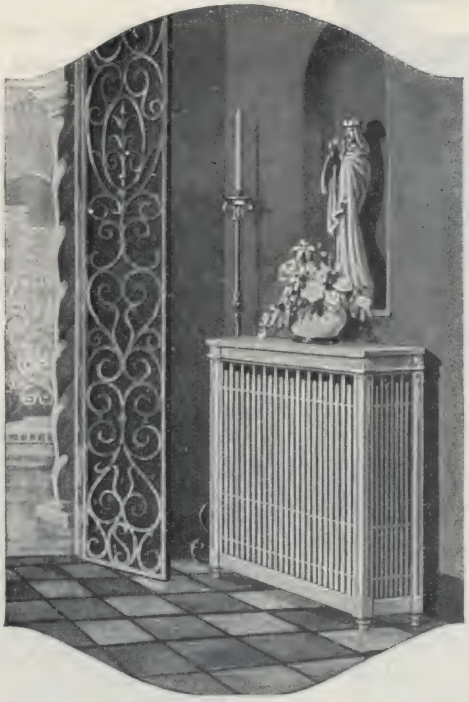
SLYKER LININGS and GRILLES for Recessed Fin Radiators.

EASY ACCESS PANELS.

Facilities

Schleicher is a pioneer manufacturer of radiator enclosures and has unlimited facilities. Every unit is guaranteed as to fit, finish and workmanship. We can meet any condition and will gladly submit drawings and prices on request.

TYPES OF SLYKER RADIATOR ENCLOSURES



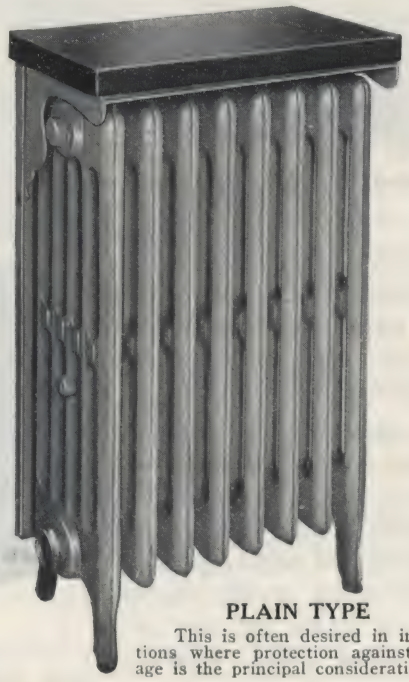
MODEL A

MODEL C

Our production model usable in moderately priced apartments, hotels, etc. Model C is limited in its application to radiators not requiring angles, curves, etc., or special finishes

MODEL B

Our medium priced unit and is applicable to use where simplicity is the keynote. Like Model A, Model B is made to the exact requirements of the radiator in shape and finish



PLAIN TYPE

This is often desired in institutions where protection against soilage is the principal consideration

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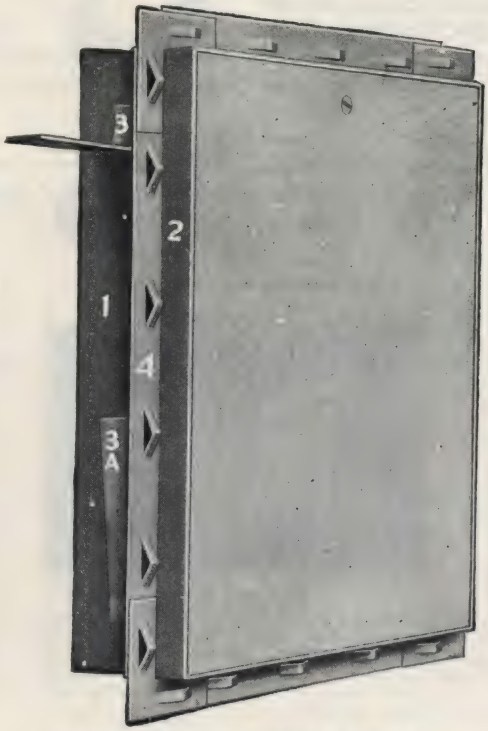
SLYKER LININGS AND GRILLES FOR RECESSED FIN RADIATORS AND SLYKER EASY ACCESS PANELS

TYPE HC-339

The type used throughout the Eldorado Apartments, 90th and 91st Streets and Central Park West, New York City, with Fintube radiators. Lithoprints of this and numerous other designs containing specifications on request

TYPE C-J7a

This design is used in the Marcus Brown Apartments, 90th Street and Park Avenue, New York City, with Robras Radiators



SLYKER EASY ACCESS PANELS

Schleicher Showrooms in all principal cities

TYPE HC-338-W

Used throughout the St. Elizabeth Hospital, Chicago, Ill., with Trane Radiators

TYPE HC-299

A FEW SELECTED INSTALLATIONS OF SLYKER EASY ACCESS PANELS

1142 Madison Avenue, New York, N. Y.
New York University School of Education, New York, N. Y.
Chrysler Building, New York, N. Y.
Dime Bank Building, Detroit, Mich.
Demmery Department Store, Detroit, Mich.
Sarah W. Fisher Home, Detroit, Mich.
Mt. Clemens Bank, Mt. Clemens, Mich.
Shell Oil Building, San Francisco, Cal.
San Francisco Stock Exchange Building, San Francisco, Cal.
3528 Old York Road, Baltimore, Md.
Paxton Hotel, Omaha, Neb.
De Paul Hospital, St. Louis, Mo.
Bethlehem Steel Co., Bethlehem, Pa.
Chicago Lying-In Hospital, Chicago, Ill.
Merchandise Mart, Chicago, Ill.
La Sita Apartments, Chicago, Ill.
2920 Commonwealth Building, Chicago, Ill.
Ryerson Building, Chicago, Ill.
Marshall Field & Co., Oak Park, Ill.
Fenway Hall Apartments, Cincinnati, Ohio
Lucerne Hotel, New York, N. Y.
52nd Street and Madison Avenue, New York, N. Y.
623 Park Avenue, New York, N. Y.
720 Park Avenue, New York, N. Y.
730 Park Avenue, New York, N. Y.
14 Sutton Place, New York, N. Y.
41-45 East 70th Street, New York, N. Y.

ESTABLISHED 1846

TUTTLE & BAILEY MFG. CO.

84 Years' Experience in Heating and Ventilating

441 Lexington Avenue, NEW YORK, N. Y.

BRANCHES

BOSTON, MASS., 36 Portland Street
CHICAGO, ILL., 407 So. Dearborn Street
KANSAS CITY, MO., 704 E. 18th Street
LOS ANGELES, CAL., 2105 So. San Pedro Street

Representatives in all the Principal Cities of the United States

Products

RADIATOR CABINETS and SHIELDS.

For Registers and Grilles, see Manufacturers' Index.

Radiator Cabinets

Tuttle & Bailey Radiator Cabinets are made to order of fine furniture metal and are properly designed to fit perfectly any radiator and adjacent condition. Our many styles permit a choice from a wide range of grilles and finishes that are a feature of their beauty. Each cabinet carries the T&B guarantee covering construction, design and efficiency.

Each Style Radiator Cabinet Has—Construction strength to use as seat, solid paneled ends (except Raleigh), solid backs for clean walls, humidifier for health, adjustable feet to overcome uneven floors and a hinged top for access to humidifier and valves.

Other Models—Other popular models and pictures of actual installations are shown in our complete catalogue—"New Artistry in Radiator Concealment."

Radiator Shields

T&B Shields are made to order of the same fine furniture metal and finishes as the cabinets. Our construction makes installing easy.

To measure for shields, give extreme length, height and depth of radiators (exclusive of valves and fittings).

Official Tests

Recent official tests show that radiator enclosures properly designed will so distribute the heat as to lower the temperature at the ceiling and increase it in the living zone, accomplishing this benefit with less steam condensation. Our standard design in these tests showed just such results.

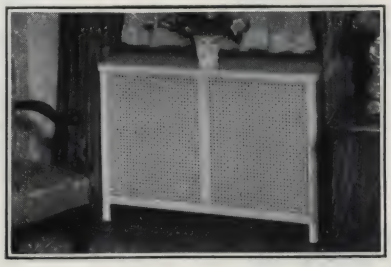
Service

Our technical men are at your service to suggest styles and assist in measuring for quotations.

Finishes

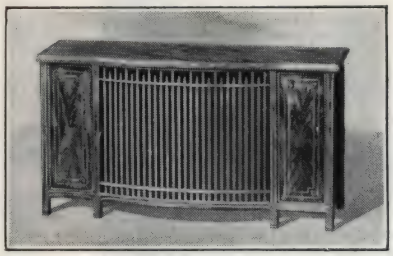
Our twelve standard finishes comprise a wide variety, harmonizing with almost any interior, or we can match samples.

Picture This Corner of a Room
Without our Antoinette Cabinet



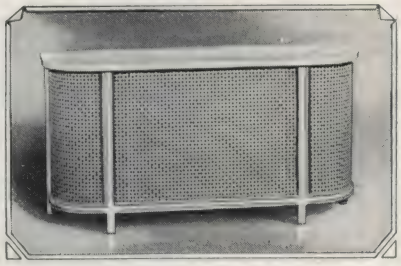
The Franklin
Our latest style, sturdy, economical, rugged and of distinctive beauty with exclusive construction. Available in any finish

A Shield Used in Bathroom
May be used in kitchen or other rooms

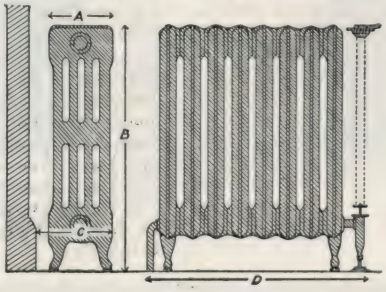


Left:
The Beaux Arts
A perfect cabinet with sturdy construction (similar to a skyscraper) and all parts welded together

Right:
The Raleigh
Another perfectly designed cabinet with rounded ends for artistic effect and same durable construction



How to Measure for Radiator Cabinets



To "B" add at least 2 in.
To "C" add at least 1 in.
To "D" add at least 2 in.

This will give approximate outside body sizes. Top overhang on ends and front is ½ in. each.

Outside body sizes as established by above dimensions will be sufficient for our estimate and further instructions will be sent.

A high valve handle in extended position must be included in "D." If conditions prevent adding 2 in. to "B" add minimum of 1 in. and order end water pans.

For unusual conditions—pipes in rear, obstructions on ends, back, etc.—send for Detail Sheet and Instructions.

ESTABLISHED 1894

THE BEATON & CADWELL MFG. CO.

Heating and Plumbing Specialties

NEW BRITAIN, CONN.

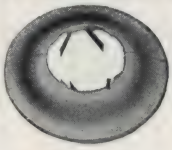
NEW YORK OFFICE: 234 Water Street—Telephone Connection

Products

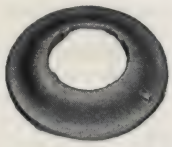
The original genuine NUMBER 10 PERFECTION FLOOR and CEILING PLATES, also various other styles for all purposes; ADJUSTABLE FLOOR SLEEVES; AIR VALVES, automatic and non-adjustable styles; PIPE HANGERS.

Also Pipe Rolls, Towel Bars, Wood Wheel and Key Radiator Air Valves.

For our page on Simplex Flush Valves, see Manufacturers' Index.



No. 1



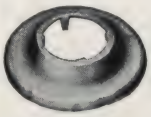
No. 2

Sectional Floor and Ceiling Plates, Cast Iron

No. 3

No. 3A

Hinged Floor and Ceiling Plates, Cast Iron or Brass

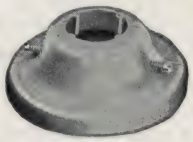


No. 3S

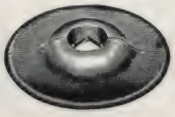
No. 6A

Solid Floor and Ceiling Plates, Cast Iron or Brass

(If required for ceiling use specify with set screws)

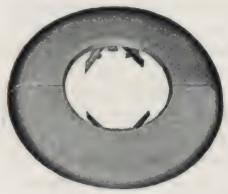


No. 6



No. 9
2 in. wide flange

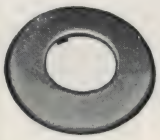
Sectional Floor and Ceiling Plates, Cast Iron or Brass



No. 10

Hinged Floor and Ceiling Plate

Reinforced, cold rolled steel or brass



No. 12

Solid Floor Plate Steel or Brass

No. 16

Ceiling Plate for 30° to 60° Angle or Circular Moulding

Jumbo Pipe Hangers, Malleable Iron

Sizes ¾ to 8 in., inclusive

Galvanized Floor Sleeve, for Fireproof Buildings

Made in 6 different styles, and for pipe from ½ to 6 in.

Floor and Ceiling Plates (Trade-name "Perfection")

"Perfection" plates are made of cast iron or brass, sheet steel or brass (according to design) and plain or nickelplated. Furnished in a variety of types and sizes.

Brass or bronze plates made to architects' specifications.

Important—We recommend brass plates for all modern buildings, especially for all risers in bathrooms, kitchens, vestibules and tile floors. We finish plates to match any hardware used and a style for every known requirement.

LIST PRICES, STANDARD FLOOR AND CEILING PLATES*

Cast Metal

Size, in.		⅛	¼	⅜	½	¾	1	1¼	1½	2	2½
No. 1	Black	$ .14	$ .14	$ .15	$ .16	$ .17	$ .20	$ .22	$ .25	$ .30	$ .50
	N. P.	.25	.25	.26	.27	.28	.32	.35	.38	.45	.65
	C. B.	1.00	1.00	1.00	1.00	1.20	1.30	1.60	1.80	2.00	2.50

Size, in.		3	3½	4	4½	5	5½	6	7	8	9	10	12
No. 1	Black	$ .65	$ .80	$1.00	$1.25	$1.50	$1.65	$1.75	$2.00	$2.25	$2.50	$2.75	$ 3.25
	N. P.	.80	1.00	1.25	1.50	1.75	1.85	2.00	2.25	2.50	2.75	3.00	3.50
	C. B.	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	12.00	14.00	16.00	18.00

The following numbers are available in the same choice of finishes as No. 1, and the same list prices apply for the respective sizes:

No. 2, same range of sizes as No. 1. No. 3, sizes ⅜ to 4 in. No. 3S, sizes ⅛ to 7 in. No. 3A, sizes ¼ to 4 in. No. 6, sizes ½ to 4 in. No. 6A, sizes ¼ to 5 in. No. 9, sizes ½ to 4 in.

Sheet Metal

Size, in.		¼	⅜	½	¾	1	1¼	1½	2
No. 10	Black	$ .14	$ .15	$ .16	$ .17	$ .20	$ .22	$ .25	$ .30
	N. P.	.25	.26	.27	.28	.32	.35	.38	.45
	S. B.	.60	.60	.62	.65	.72	.80	.85	1.00

Size, in.		2½	3	3½	4	4½	5	6
No. 10	Black	$ .50	$ .65	$ .80	$1.00	$1.25	$1.50	$1.75
	N. P.	.65	.80	1.00	1.25	1.50	1.75	2.00
	S. B.	1.50	1.80	2.25	2.75	3.25	3.75	4.25

The following numbers are available in the same choice of finishes as No. 10, and the same list prices apply for the respective sizes:

No. 10A, sizes ½ to 2 in. No. 11 (with set screw), sizes ¼ to 6 in. No. 14, sizes ⅜ to 4 in.

Size in.		¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
No. 12	Black	$ .07	$ .07	$ .08	$ .09	$ .10	$ .11	$ .12	$ .13	$ .20	$ .25	$ .30	$ .40
	Nickel	.11	.11	.12	.13	.14	.15	.16	.17	.30	.35	.42	.50
	N. P. or Pol. brass	.16	.16	.17	.18	.20	.23	.25	.30	.37	.45	.55	.65

The following numbers are available in the same choice of finishes as No. 12, and the same list prices apply for the respective sizes:

No. 13 (with set screw), same range of sizes as No. 12. No. 15, sizes ½ to 2 in.

Size, in.		½	¾	1	1¼	1½	2	2½
No. 16	Sheet Brass Only, N. P. or Pol. brass	$ .62	$ .65	$ .72	$ .80	$ .85	$1.00	$1.50

*Discounts on application. N. P.—Nickelplated; C. B.—Cast brass; S. B.—Sheet brass.

All cast brass plates made up after receipt of order not subject to return.

Bottom Outlet
⅛ and ¼-in. sizes
List price each, $1.25

Angle Type
List price each, $1.00

No. 10 Non-adjustable Thermostatic Valves

Bottom Outlet
¼-in. size
List price each, $3.50

Angle Type
List price each, $3.00

No. 20 Non-adjustable Thermostatic Vacuum Valves

Valves guaranteed for five years. All parts that would otherwise be subject to corrosion are made of nickel silver which prevents corrosion.

Valve clamps, which prevent removal of valves from radiator, can be furnished at $0.50 each list

KNOWLES PIPE SLEEVE COMPANY

Manufacturers of the Supersleeve for All Kinds of Piping

41 North Moore Street, NEW YORK, N. Y.

Products

KNOWLES SUPERSLEEVE, the new pipe sleeve, designed to be the solution of architects', builders' and piping contractors' problem for standardizing pipe sleeves to meet every condition in all types of buildings.

Knowles Supersleeve

The Supersleeve is an extensible form for providing fixed holes in concrete and other types of floors and walls for all kinds of piping. It is also used as a horizontal adjustable sleeve through steel I-beams for passage of pipes in connection with sprinkler fire extinguisher installations. It provides a form which can be *quickly* and *easily set* and *adjusted as each stage of construction progresses.* The Supersleeve is recognized by the National Board of Fire Underwriters.

Ceiling Inner Section

Inner Section

Outer Section with Nailing Lugs

Construction and Features

The Supersleeve is a *spiral corrugated galvanized iron* sleeve made in outer and inner sections, 5 and 7 in. long, to which other sections may be joined, thus providing pipe sleeves through flooring and walls of any thickness. Made to fit all sizes of pipe up to 5 in.

The Supersleeve when installed with an extension above the finished floor, provides against water passing through the floor around pipes, as caused by mopping or flushing the floor, or open sprinkler heads.

The Supersleeve is *light* and *easy to handle* and yet *strong enough* because of its corrugations to withstand the customary usage during building construction; will *remain in place as set;* is *waterproof* and *protects the pipe* from *corroding* by preventing contact with concrete, cinder fill and cement; also prevents cracked and spawled plaster at pipes. No *"cutting away"* of cement or plaster required, nor collection of dirt in sleeves during construction.

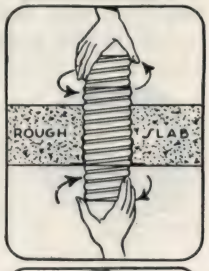
A distinctive feature of the Supersleeve is the *patented hinged escutcheon* or *plate,* for walls, ceilings and floors. This plate to which is fastened strong steel fingers shaped to engage the Supersleeve corrugations, covers the ends of the sleeve and is easily fitted *tightly* and *permanently flush* to ceilings, floors and walls, becoming an integral part of the device.

Nickeled Finish Hinged Ceiling or Floor Plate

It has heavily nickel plated finish and highly polished outside surface.

Installation of Supersleeve

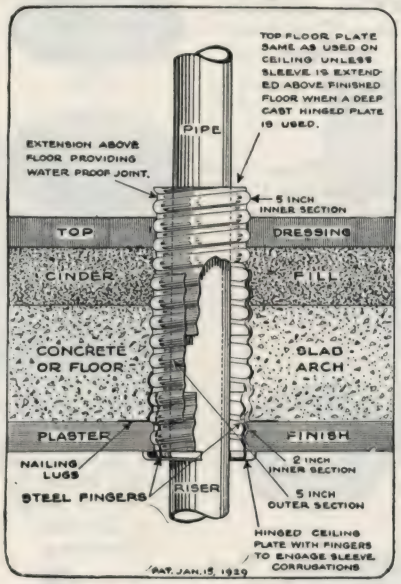
All sections of Supersleeve should be placed before pipes are run (although adjustments to length may be made as each stage of construction progresses). First, outer section is nailed to form and holds Supersleeve firmly in place until concrete slab is poured and set (top view). Both the top inner section (providing form for cinder fill and top dressing) and the bottom short inner section (providing form for plaster finish on ceiling) should be set inside of outer section at the time the latter is nailed on form, thus affording a double thickness of any exposed end of sleeve above rough slab. Later the top inner section may be conveniently raised to the desired height, i.e., to the level of the finished floor or protruding above for waterproofing, as required and the short inner section is to be extended below slab after forms are removed before ceiling plaster is laid (center view.) After all construction is completed snap around pipes our patented hinged plates which cannot open or use our new split adjustable polished N.P. cap fitting flush to ceiling and sleeve after pipe covering is in place. (Send for detail.)



Specification Form

The contractor shall furnish and set as shown on plans for each pipe passing through floor, wall or partition extending through the full depth of same, a Supersleeve as made by the KNOWLES PIPE SLEEVE COMPANY, 41 North Moore Street, New York City, with polished nickel plated hinged escutcheons with locking steel fingers for engaging Supersleeve corrugations to exactly fit escutcheons to surface and sleeve at ends. The outer section of the Supersleeve shall be set on forms for concrete and held in place by the lugs provided for this purpose; before plastering, floor fill or finish are applied, this contractor shall adjust sleeves to the required finished length.

Where required on plans extend the inner top section ..... in. above the finished floor as a protection against water on the floor passing through pipe sleeve to space below. All nickel plates are to be set on completion of building.



Detail of Supersleeve Installation

Sizes of Supersleeve Sections

Made in: Outer Sleeve Sections 3 in., 5 in. and 7 in. long (in four diameter sizes).

Inner Sleeve Sections 2 in., 5 in. and 7 in. long (in four diameter sizes) (allow minimum of ½ in. for joining each section).

For Pipe Size ¾ in., 1 in. and 1¼ in. diam.—Specify or order Supersleeve No. 2.

For Pipe Size 1½ in. and 2 in. diameter, specify or order Supersleeve No. 3.

For Pipe Size 2½ in., 3 in. and 3½ in. diameter, specify or order Supersleeve No. 4½.

For Pipe Size 4 in. and 5 in. diameter, specify or order Supersleeve No. 6.

Standard outer sections in all lengths are furnished with lugs to nail to forms—unless specified to be without lugs for use as additional Outer sections for providing longer sleeves. All inner sections are furnished without nailing lugs unless required.

Specify or Order Hinged Ceiling or Floor Plates according to diameter of pipe sizes to be fitted.

Data and Specification Book

GRINNELL

ADJUSTABLE PIPE HANGERS AND SUPPORTS

This Book Also Contains
List Prices and Dimensions
of the Grinnell Line of
Adjustable Pipe Hangers
and Supports

GRINNELL COMPANY
INC.
PROVIDENCE, R. I.

SAFEGUARDING
HEATING *and* SERVICE
PIPE LINES

A brief treatise on the correct and practical installation of piping and radiation by the use of adjustable hangers to insure the establishment and maintenance of proper alignment.

Other Grinnell Products

The Grinnell Company products include also Sprinkler Systems, Thermoliers (Unit Heaters), Equiflo Valves, Fittings, Fabricated Pipe and Thermoflex Heating Specialties. For these products see Manufacturers' Index.

Grinnell Service

A half century of experience stands in back of all Grinnell products, the benefits of which we offer freely as consultants in any matter pertaining to the use of our products. At each of our sales offices will be found an engineering staff ready to aid in the solution of problems in the various fields of industry covered by the Grinnell Company.

GRINNELL COMPANY INC.

EXECUTIVE OFFICES
PROVIDENCE, R. I.

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GRINNELL ADJUSTABLE PIPE HANGERS

WHAT ADJUSTABLE PIPE HANGERS MEAN TO THE ARCHITECT

A Pipe Hanger for Every Piping Need and Pipe Hangers for General Use

Today, more than ever before, the responsibilities of the architect and the engineer are broadening in their application to the details of construction and the mechanical equipment of buildings. This is particularly true as regards the serviceability of the building, safety in its parts and operation and permanence in its entire construction.

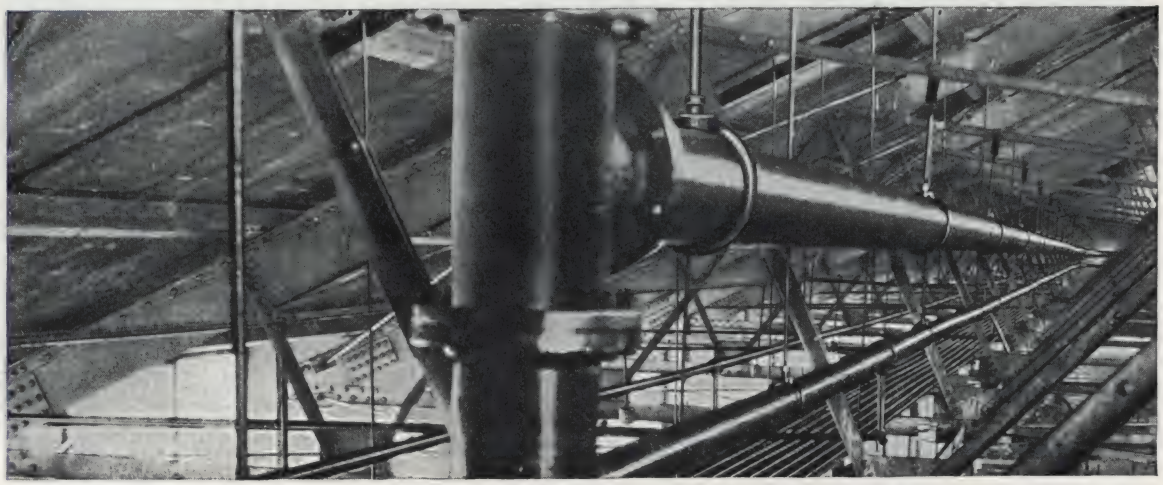
While the modern trend toward standardization is of great assistance in the work of the architect and the engineer it tends to require, if it does not altogether compel, that drawings and specifications be more specific as to the requirements for "workmanship and materials."

In times past it was more or less common to find specifications defining the quality of workmanship or materials by such clauses as "the best standards of workmanship and materials known to the trade." Clauses such as these were often justified because of the fact that, in many cases, standards of work and materials had not been definitely and commonly recognized as such.

It is characteristic of modern progress in building construction that standards are now becoming not only more refined but very specifically defined in many fields so that it becomes more and more incumbent upon both architect and engineer to know and to specify in detail standards of workmanship and material which have become of commonly recognized merit and easily available.

This illustrates the progressive and irresistible law of evolution as it applies to architecture and engineering. It is this law under which the Grinnell Company has labored for a period of more than 70 years in its various industrial fields to develop materials and methods which have reached well known standards of excellence. Among the fruits of these labors the Grinnell Adjustable Pipe Hangers have emerged as an incidental and necessary product of our piping business. They are in many respects unique and many are covered by patents.

GRINNELL ADJUSTABLE PIPE HANGERS are not new. Our Company has used them for many years on piping work installed by the Company. Our Company catalogue, with full illustrations, descriptions and specifications, however, is comparatively recent. In it we have classified and standardized information not previously available in convenient form. We offer these hangers for the benefit of architects, engineers, contractors and owners.



Perfect Alignment in a Thousand Feet of Heating Pipe Insured by the Use of Adjustable Pipe Hangers

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GRINNELL ADJUSTABLE PIPE HANGERS

PIPING EQUIPMENT OF BUILDINGS

The consistent and lasting performance of piping systems is an important factor in the functional and operating success of any building.

In the maintenance and operation of a building, the pipe lines, radiators, etc., play a most important role. Improper installation or displacement due to sagging or weak supports will mean impairment of efficiency followed by high repair bills for leaks and possibly consequent damage to the structure and its contents.

The architect intends, and should be certain that heating, service, sprinkler and power piping lines are originally adjusted to established levels and pitches. But if the circulation system is not made permanently and easily adjustable at every point, it is obvious that the contractor can hardly be expected to carry out an installation as efficient as the architect desires. Furthermore, without the adjustable factor, subsequent disturbance due to any cause must result in expensive repairs, replacements or structural damage.

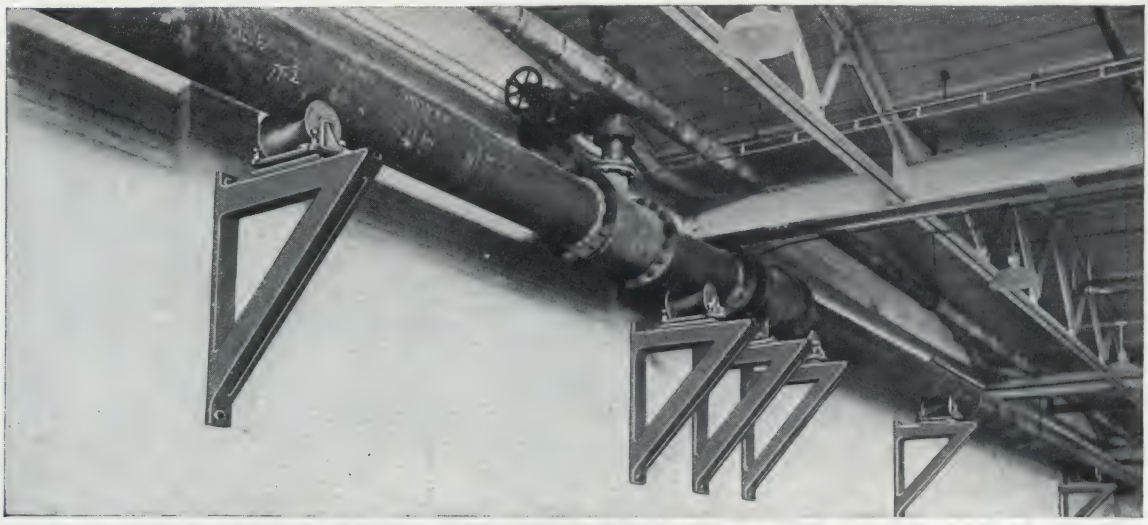
The efficiency of anchorage methods for pipe hangers is also of great importance and has a direct bearing on maintenance costs. Where nails, stove bolts and pieces of strap iron are used in the assembling of pipe hangers as is frequently done, it is obvious that pipe lines can be but poorly and insecurely hung. Any settling, warping or shifting movement in the structure may easily weaken or destroy such an anchorage.

In spite of their obvious importance, however, it has been common experience during past years to discover that piping installations did not give satisfactory performance from the standpoints of efficiency and low maintenance costs. Very often the settling of a building or the shifting or warping of structural members has caused sagging or leverage against rigid pipe lines with the result that leaks developed and piping circulation efficiency decreased. The reason for such conditions is often to be found in the lack of adjustability during installation and more often after piping was erected.

The feature of adjustability in Grinnell hangers makes it possible to install and "true up" pipe lines in less time than that represented by the old method of strap iron hangers with which it was necessary to prop up the lines and trust to good fortune that the crude adjustments possible would establish proper pitches and rigidity. Thus, through the elements of time-saving and adaptability, the use of adjustable pipe hangers represents no greater cost than the old system and carries with it positive assurance of a considerable saving in maintenance and operation cost and effectually secures the trimness of appearance which the architect finds so desirable.

It is a plain fact that the adjustable feature of any pipe line must be found in the supporting hangers and that the correct provision of this adjustment factor will not only facilitate proper installation but will afford a degree of controlled flexibility which without cost may easily eliminate sagging or improper leverage conditions as they develop.

The various types of adjustable pipe hangers illustrated herewith represent the solutions of practical piping problems of every kind.



Typical Installation of Welded Steel Brackets Anchored with Bolts Through Brick Wall and Carrying Heavy Pipe Lines on Adjustable Pipe Stands

Expansion and contraction is fully provided for and the feature of adjustability makes it possible to establish and maintain correct alignment at all times

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GRINNELL ADJUSTABLE PIPE HANGERS

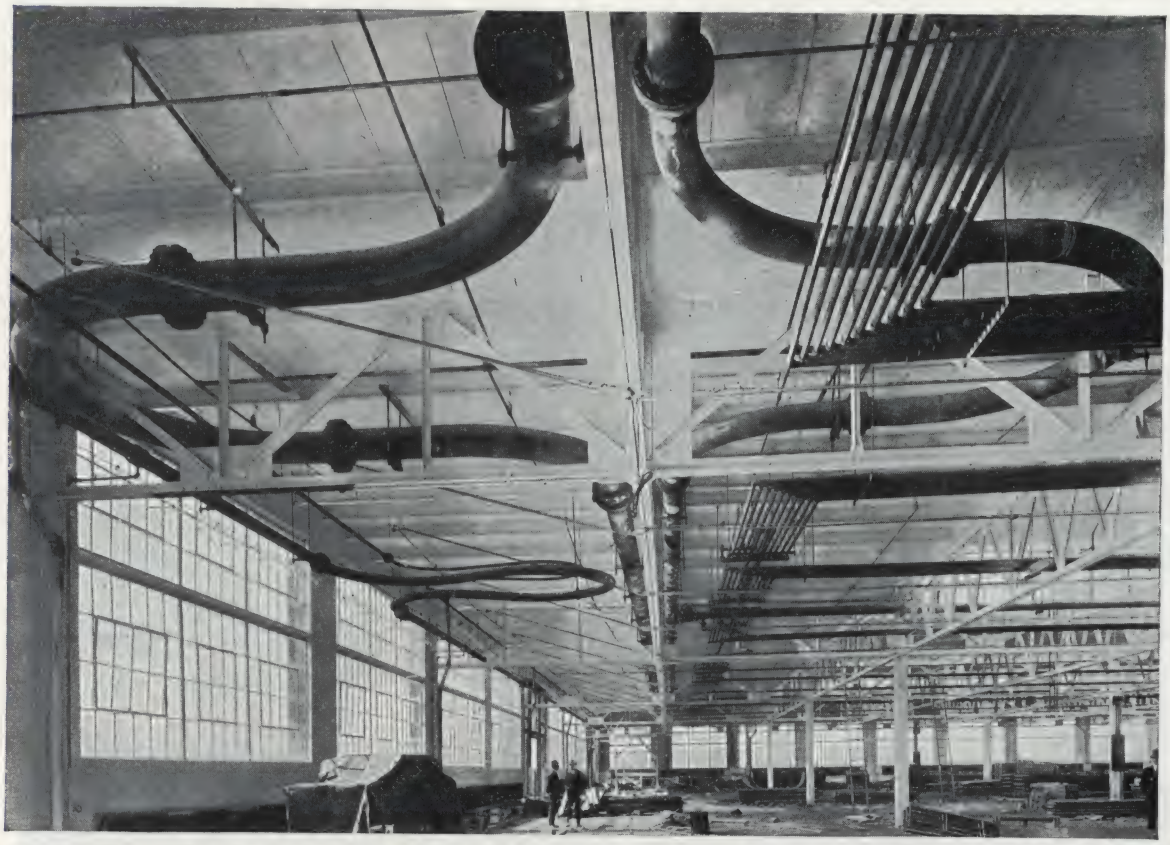
HOW ADJUSTABLE PIPE HANGERS WERE DEVELOPED

This is the most complete line of adjustable pipe hangers available and the reason for its development is interesting and convincing. Grinnell Company operates a road force of over 1300 men with 32 general foremen and 134 road foremen of long experience mostly in conjunction with automatic sprinkler installations. In the course of installing these large piping systems in every type of building, it is natural that every possible practical piping problem was faced and solved. An unbelievable number of those problems had to do with proper hangers.

At first these were met by designing and making special hangers as recommended and suggested by foremen encountering difficulties. As the scope of the installation work increased it was noted that the same problems recurred constantly. These repeated problems were hanger problems. Being manufacturers with unusual facilities, particularly from an engineering standpoint, it was not long before a basic solution was established as the answer to a great many piping problems. That solution was *adjustability,* particularly adjustability after piping was erected.

It was also found that correct types of anchorage should be provided for every structural condition encountered in floors, walls, ceilings, roofs and columns. It became obvious that the location of pipe hangers should be determined by the supporting needs rather than under the haphazard system of installing them where an easy anchorage was possible. Thus, the next development was the design of the practical installation methods for anchorage of hangers in concrete, hollow tile, brick, wood, stone and other structural forms and for attachment to structural members of concrete, steel or wood. This engineer-manufacturer solution was forced to meet the acid test of Grinnell Company as sprinkler contractors and was found to provide lower installation cost and permanent satisfaction.

This line of adjustable pipe hangers having proved entirely satisfactory for Grinnell Company's own work, the next step was to make the line available to all users of pipe and easily subject to specification by architects and engineers. It is doubtful if any manufacturing firm not itself extensively engaged in pipe engineering and installation work would have found it profitable to develop a line at once so complete and practical. It is certain that any such purely manufacturing company would have found it difficult, if not impossible, to have collected and collated, the great mass of practical field experience, without which the line could scarcely have been developed.



Adaptability of the Grinnell Line of Adjustable Pipe Hangers Clearly Illustrated in the Above Complicated Piping Installation

The heavy pipe line with its expansion bends is carried on large adjustable pipe rolls which provide for any expansion and contraction. Where there is a sideslip in the bends, an expansion type of saddle hanger is used as shown on page 23. The sprinkler lines are installed with adjustable swivel rings, while the heating coils are supported on saddle hangers

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

ADJUSTABLE PIPE HANGERS vs. STRAP HANGERS

The Old, Inefficient Method Using Strap Iron Hangers Results

1 Unsightly and careless workmanship.

2 No standard method of anchorage, resulting often in expensive and inefficient hanging.

3 Only crude adjustments are possible, affecting the efficiency of installation.

4 Ultimate sagging of pipe lines, difficult to correct.

5 Weight of pipe unevenly distributed on hangers.

6 No provision for expansion and contraction, subjecting hanger to enormous overload and strain.

7 Higher labor costs to install and maintain.

8 Damage and expense due to sagging or other disturbance to the lines.

The Modern, Efficient Method Using Adjustable Pipe Hangers Results

1 Neat and efficient installation.

2 As explained hereinafter, Grinnell Company has developed practical types of hanger anchorages.

3 Minute adjustments can be made at all times, making it possible to line up pipe quickly and exactly.

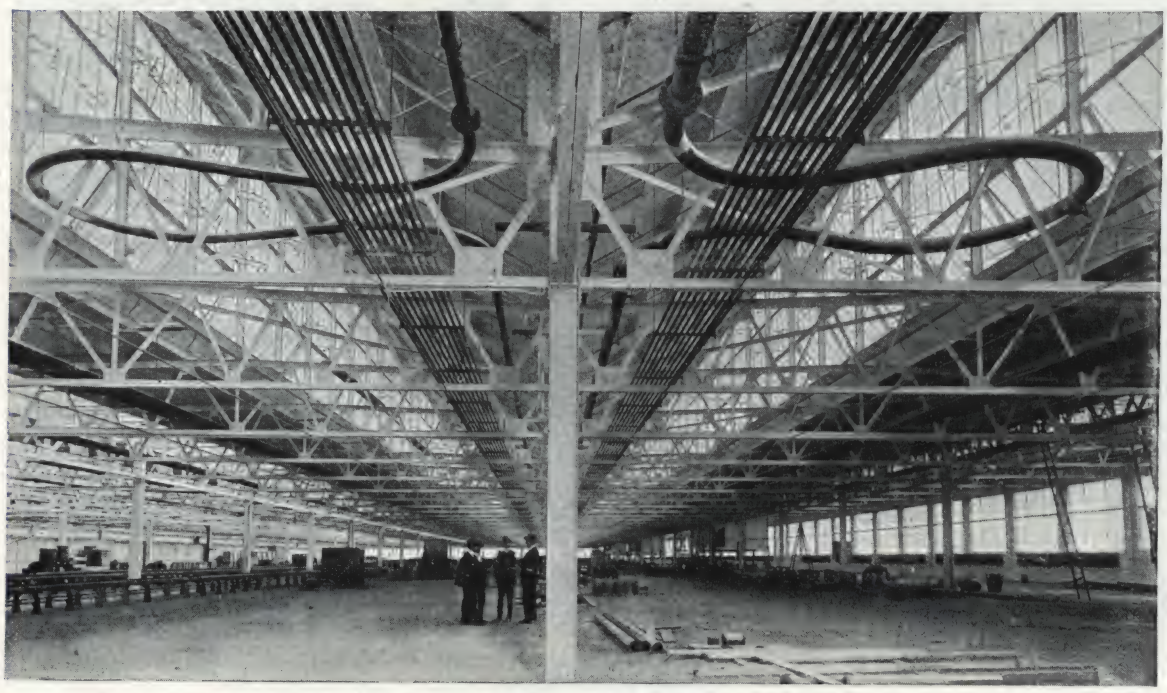
4 Sagging in pipe line can be corrected instantly.

5 Weight of pipe evenly distributed by simple adjustment.

6 Full provision for expansion and contraction.

7 Rapid installation and easy maintenance means low labor cost.

8 Damage and expensive leaks prevented by adjustability which makes it possible to keep pipe lines in correct position at all times.



Typical View of One of the Bays in the Huge Chicago Plant of the Ford Motor Company
This serves to indicate the complexity of the modern industrial piping problem and the importance of adjustable hangers, without which the piping installation would be more difficult and expensive—and far less efficient

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

EFFICIENT INSTALLATION OF HEATING AND SERVICE PIPE LINES

From the architect's viewpoint there is no reason to be interested in the involved mechanical details of heating and service piping, but there are certain prime factors which are of great importance to the architect. These include the selection of the proper kinds of piping materials which are highly resistive to corrosion or other forms of deterioration; the practical location of pipe lines, and the efficient installation of the lines, using proper pipe hangers which will provide easy adjustment and safe anchorage.

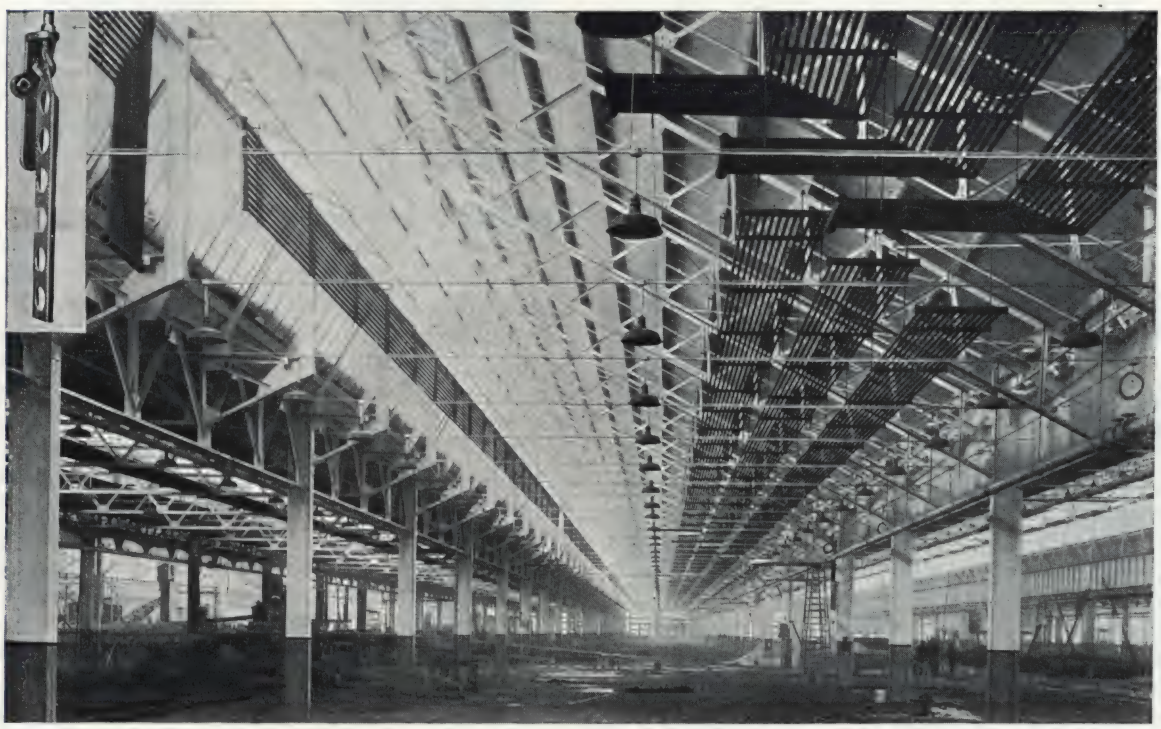
The defects of ordinary strap iron hangers and the advantages of adjustable pipe hangers have already been mentioned. The purpose now is to explain in some detail the various locations of pipe lines; the correct methods of attaching hangers to structural members of the building; the correct type of hanger rods and, finally, the appearance of the finished work which is often important, particularly where piping is exposed in well ordered surroundings such as offices, lofts, showrooms and high-class industrial plants.

Pipe Line Locations and Pipe Hanger Anchorages

The installation of heating, service and sprinkler pipe lines in any type of building and particularly in industrial buildings, calls for a variety of locations for piping of various sizes. In general, the location of pipe lines calls for a position suspended from the roof members; suspended through the ceiling from the floor above; attached to the side walls or partitions; attached to columns or, as in the case of heavy power and heating lines, mounted on special floor fixtures supporting the pipe from beneath. An examination of the photographs shown herewith will indicate that in hanging pipe lines of all kinds many types of anchorage will be encountered. It is obvious that the attachment of hangers should not be limited to points where structural conditions facilitate the anchorage, but they must *be spaced at regular intervals.*

Grinnell Company has found it necessary to develop special methods of attaching hangers to all types of wall, ceiling, roof and column construction. Thus, in hanging an overhead pipe line, it may be necessary at certain points to anchor the hangers in hollow tile, concrete or gypsum slabs. A few feet farther on it may be necessary to attach the hanger to a wood, steel or concrete beam. This condition does not imply that it is necessary for the architect to check the hangers for each pipe line and specify the special hanger necessary to meet a given structural condition, but it is important for the architect to analyze the various methods of hanger attachment as developed by Grinnell Company to assure himself that by specifying adjustable pipe hangers he will make it easy for the contractor to meet all structural requirements and will in this way make certain a dependable pipe installation.

Having once examined the following pages and having been assured of the correctness and adaptability of this line of adjustable pipe hangers, the architect can forget the detail of pipe line installation and insure its efficiency and correctness by using the simple specifications set forth at the end of this catalogue.



A Typical Side Wall Coil Is Shown at the Left and in the Upper Left Hand Corner Will Be Found the Adjustable Wall Coil Hanger Designed for This Purpose

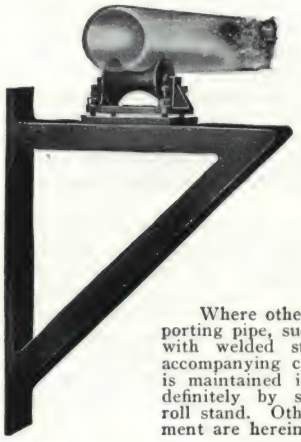
Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

ADJUSTABLE PIPE HANGERS—ADJUSTABLE DURING AND AFTER ERECTION

It will be noted through all illustrations and descriptions of various pipe hangers as shown in this catalogue, that provision is invariably made for adjustment during and after erection.

The Adjustable Swivel Pipe Ring illustrated herewith typifies the adjustable features of the entire line. Wherever this device is used, it provides for even the most minute adjustment at any time during the construction work and after the pipe line has been erected, so that exact levels and pitches can be established and maintained and each hanger can be made to carry its portion of the total load. With this adjustment feature any disturbance of the line due to the settling of the building or any other cause may be corrected immediately and at no cost, whereas in cases where the non-adjustable strap iron hanger has been used, the load is unevenly distributed on the hangers, and adjustment at all times is difficult and expensive.



Where large pipe lines are carried along side walls, welded steel brackets of this type are used with the adjustable pipe stand as described on page 29.

Where other devices are employed for supporting pipe, such as the adjustable pipe stand with welded steel bracket as illustrated by accompanying cut, the feature of adjustability is maintained in another manner but just as definitely by simply adjusting bolts on the roll stand. Other methods of obtaining adjustment are hereinafter explained in detail.

Hanger Rods

It is highly important that the architect or engineer in his specifications should very definitely state that hangers located over head shall be supported by means of threaded rods. At times the question arises as to why Grinnell Company insists on supplying strong iron hanger rods having many times the necessary factor of safety if only the dead weight of the pipe line was involved. It is interesting to note that piping installations of practically every kind are subjected to all manner of abuse and unusual loads and strains. As the provision of strong rods adds little to the cost, it is purely a measure of safety, but one which in many instances is highly important.

In the Grinnell line of Pipe Hangers, the feature of adjustability is principally obtained by the use of this adjustable swivel ring, Fig. No. 101, the unusual feature of which is the swivel shank allowing an adjustment of about 2 in. by simply turning the nut to the left or right.

Of course, in large structures where the known stresses predominate, it is quite possible to correctly calculate the requisite rod sizes, but it is the element of accidental unknown stresses which must be provided against. Many times in tightening up lock nuts or in lining up pipe, the effort is made to straighten crooked pipe or to obtain adjustment by the use of considerable force applied through wrenches and developing unknown stresses or loads.

Another reason for using strong hanger rods is to guard against the weakening of the hanger through corrosion, and it is often the case that such rods are subject to unusual conditions of corrosion, and if they are too small when erected they may weaken to a danger point within four or five years.

Appearance of Finished Work

It is a modern tendency in all types of mechanical installations to establish for each job a neat, finished appearance. This is true not only in the case of mechanical installations in buildings, but generally throughout industrial plants and the installation of machinery of all kinds, and there is much more than an aesthetic reason involved. The neat finishing of a mechanical installation has a tendency to encourage more careful mechanical work. It is the psychology of work of this character that if mechanics are making a rough or "hit and miss" installation, they will not be as careful with the final details of established levels, anchorages, etc., as in the case where a workmanlike finished appearance is required.

While every effort is made to relegate piping to less conspicuous locations, it is nevertheless true that for many types of installations such as

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

ADJUSTABLE PIPE HANGERS—ADJUSTABLE DURING AND AFTER ERECTION

sprinklers in loft buildings and in certain types of office buildings, the piping must show, and consequently, the neatest possible appearance is required. For industrial buildings there is usually an effort to place piping in a neat and inconspicuous manner and similarly in all types of installations there is usually some thought given to this phase of the problem, particularly if the pipe is hung through plastered ceilings or finished surfaces of any kind.

The use of Adjustable Pipe Hangers makes possible rapid installation with the least possible disturbance and defacement of structural surfaces or members. Where it is necessary to bore holes through plaster or other finished surfaces, simple devices have been developed such as the Spring Ceiling Plate illustrated herewith. The principle of attaching this plate to the hanger rod is unique inasmuch as the plate is so held to the rod by five steel points that can easily be pushed up against the ceiling, but cannot be pulled downward. Illustration B shows a cross sectional view of the Spring Ceiling Plate and shows how points hold against rod after plate is placed.

Illustration A
Spring Ceiling Plate on Rod

Illustration B
Spring Ceiling Plate in Cross Section

Once plate is installed in place against ceiling, it will never work loose. Eliminates entirely the need of set screws for fastening ceiling plate to hanger rod.

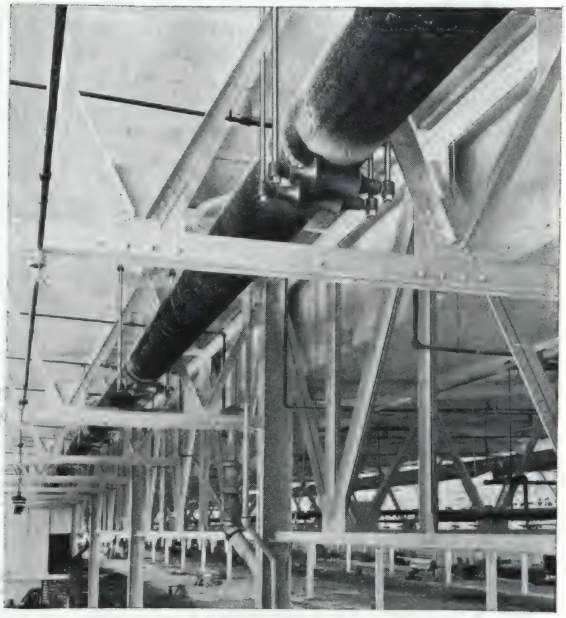
Spring and plate are stamped from sheet steel and are strongly made.

This plate is one of the finest in design and construction on the market today. In installation work it is only necessary to place plate on rod before the latter is put up (see illustration A). After rod is properly attached to the ceiling, the plate is easily pushed up against the ceiling, where it remains tight and snug indefinitely.

This entire line of Grinnell Adjustable Pipe Hangers is designed to provide neat and efficient finished work for all types of piping installation.

Adjustable Feature of the Wall Coil Hanger Makes Lining Up Easy

Adjustment is made simply by turning the adjusting nut at the top of the hanger as shown



Here It Was Found Necessary to Space the Pipe Rolls at 20 Ft. Intervals Instead of the Usual 10 Ft.

To meet this condition, two single pipe rolls were installed at each point as illustrated

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

ADJUSTABLE PIPE HANGERS FOR INDUSTRIAL WORK

Perhaps the most interesting manner in which the practical use of adjustable pipe hangers can be shown is to indicate in some detail, particularly by illustrations, the actual specification and installation of one of the largest piping installations ever made in a single factory unit in this country.

This is the Twin Cities plant of the Ford Motor Company, and the job is of interest particularly because of its enormous size and the amount of work involved.

The heating installation in this building involved approximately 830,000 ft. of 1½-in. pipe in the form of pipe coils, all located over head. Approximately 24,000 sq. ft. of cast iron wall radiation was hung with Adjustable Brackets around the outside walls under the windows. In addition, approximately 35,000 ft. of pipe, ranging from ¾ to 16 in. in size, was used for distributing mains and connections to heating units. In all, there is a total of nearly 165 miles of pipe installed completely with GRINNELL ADJUSTABLE PIPE HANGERS, selected according to the requirements at each point and to the type of structural anchorage available where hangers were necessary.

It is interesting to note that on this particular job the contractor, when originally estimating the work figured approximately $25,000 *for the steel* necessary to fabricate specially designed hangers for the work, it being his intention to install blacksmiths and forges on the job and fabricate the hangers on the job as he needed them.

The entire quantity of Grinnell Adjustable Hangers used on this job cost approximately $25,000, so that the contractor estimates that his saving in labor for the making of these clamps and installation of same was in the neighborhood of $20,000 by using standard hangers of Grinnell manufacture together with adaptations as designed by the Grinnell Engineering Service.

Standard Adjustable Hangers as illustrated in this book constitute a stock commodity at Grinnell plants, warehouses and with Grinnell jobbers throughout the country. This means that every heating and plumbing contractor can promptly secure and install Adjustable Hangers in accordance with the architect's specification. In such cases as special conditions may require special designs of hangers or clamps, the services of the Grinnell Engineering Department are available to help the architect or engineer solve the problem. All that is necessary is to get in touch with the nearest Grinnell office.

A View of One of the Large Bays in the Twin Cities Plant of the Ford Motor Company at Minneapolis
The extensive heating coil installation is shown completely in place on Grinnell Saddle Hangers

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

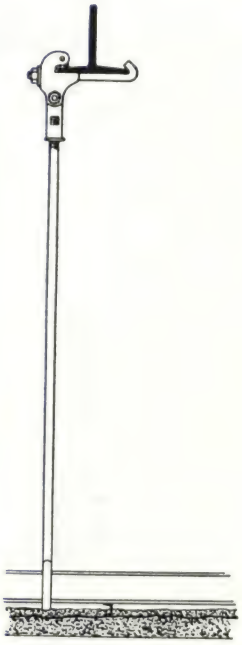
ADJUSTABLE PIPE HANGERS FOR GENERAL CONSTRUCTION PURPOSES

Grinnell Adjustable Pipe Hangers are not only useful for pipe support but they may be used for a variety of miscellaneous purposes in building construction. When put to such uses the chief consideration will be the safe load carrying capacity.

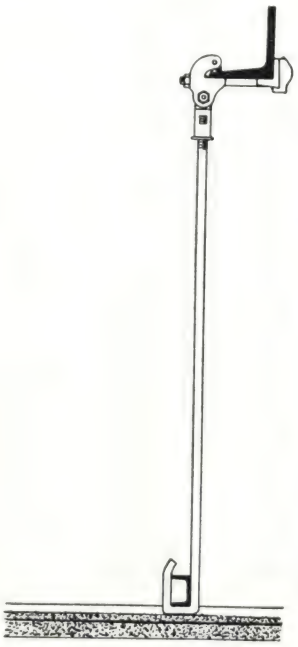
Wherever rods or bands enter into hanger combinations it is proper to figure the safe load for any such combination as the allowable working tension stress in the rod or band. Bolts, horizontal or other metal members may be figured for strength in accordance with usual engineering practice.

Among suggested miscellaneous uses of broad application where supports are required are the following:

SUSPENDED CEILINGS



Lintels, flat arches, etc.
Stair platforms and stair string.
Iron walkways, fire escapes, and ladders.
Scaffolding, particularly for interior use.
Ducts, fan platforms, unit heaters.
Heavy lighting fixtures.
Suspended floors and partitions.
Bracing for high masonry block partitions.
Store front and other heavy transoms.
Shafting.
Oil and water tanks.
Gridiron platforms.
Heavy shelving.
Concrete inserts for all hanger purposes.



CATALOGUE

The following pages contain a substantial representation of our Catalogue No. 5, entitled "Adjustable Pipe Hangers and Supports." We will be glad to send this catalogue on request. It forms a handy pocket reference.

These hangers are described briefly by text and illustration. Mechanical drawings and dimension tables on practically every item provide the engineering data necessary to a proper determination of types and sizes.

It will be noted that Grinnell hanger parts are in most cases interchangeable; this feature provides for their installation under varying conditions. When, however, some detail of construction or piping arrangement makes it necessary to deviate from standard type hangers, Grinnell Company with its unrivalled manufacturing facilities is equipped to furnish hangers and supports of any desired type. We are always pleased to co-operate with engineers and architects in the preparation of specifications covering their hanger requirements.

All orders from catalogue should be by figure number except as may be otherwise noted.

Specifications for the use of Grinnell Hangers will be found at the end of the catalogue.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Adjustable Swivel Rings—*Malleable Iron*

The accompanying illustration shows the modern efficient method of providing for the most minute adjustments in hanging pipe lines resulting in the perfect alignment of pipe. The unusual feature of this pipe ring is the swivel shank allowing an adjustment of about 2 in. by simply turning the nut on the shank to the left or right. No temporary support of the pipe line is necessary while making adjustments with this ring—a fact which insures careful and rapid installation.

The ring and shank are two separate pieces but by a special process they are cast as one unit.

The swivel shank automatically locks when pipe is in desired position, preventing loosening due to vibration and assuring proper pitch of the line at all times.

They are made of the best malleable iron and have stood up under the most severe laboratory and field tests.

This adjustable swivel ring is used with practically every type of ceiling flange, expansion case, insert, and other pipe line anchorages shown on the following pages.

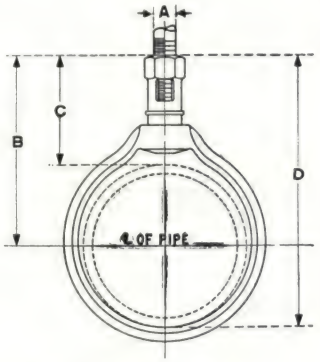
Considering its adjustable features, its appearance, its compact strength and moderate price, we are convinced by our experience covering 70 years in the piping business, that there is no other pipe ring in the market which can be compared to the adjustable swivel ring as an economical and labor saving device. The use of this ring means lower labor costs and decreased maintenance.

Adjustable Swivel Ring
Fig. No. 101

LIST PRICES AND DIMENSIONS—FIG. NO. 101

Pipe size, in.	Price each	A	B	C	D
¾	$.18	⅜	2 5/8	2 1/8	3 1/8
1	.20	⅜	2 11/16	2	3 3/8
1¼	.21	⅜	2 15/16	2 1/8	3 3/4
1½	.22	⅜	3	2 1/16	4
2	.24	⅜	3 5/16	2 1/8	4 1/2
2½	.34	½	3 13/16	2 3/8	5 1/4
3	.42	½	4 3/16	2 7/16	5 15/16
3½	.44	½	4 7/16	2 7/16	6 7/16
4	.56	⅝	5 7/16	3 3/16	7 11/16
5	.70	⅝	5 15/16	3 1/8	8 3/4
6	1.08	¾	7 1/16	3 3/4	10 3/8
8	1.92	⅞	8 11/16	4 3/8	13

Order by Figure number.



Grinnell Adjustable Coach Screw Clips and Adjustable Swivel Ring Hangers—*Malleable Iron*

Adjustable Coach Screw Clip
Fig. No. 100

Adjustable Swivel Ring Hanger
Fig. No. 102

Fig. No. 100 is a combination of adjustable swivel ring, Fig. No. 101, and coach screw rod, Fig. No. 142. It is sold complete as illustrated for hanging ¾-in. to 2-in. pipe inclusive. For other sizes of pipe, and other lengths of rods than specified in the table, order parts separately.

Fig. No. 102 is a combination of adjustable swivel ring, Fig. No. 101, machine threaded rod, Fig. No. 140, spring ceiling plate, Fig. No. 133 and U. S. expansion case, Fig. No. 117. It is sold complete as illustrated in sizes given in table. For rod lengths other than given in table, order parts separately.

LIST PRICES AND DIMENSIONS—FIG. NO. 100

Pipe size, in.	Price ea.	Coach screw rod		Min.-max. distances ceiling to center of pipe
		Diameter	Length	
¾	$.28	⅜	11	8 – 9 5/8
1	.30	⅜	11 1/4	8 1/2–10 1/8
1¼	.31	⅜	11 1/2	8 3/4–10 3/8
1½	.32	⅜	11 1/2	9 –10 5/8
2	.34	⅜	11 3/4	9 1/2–11 1/8

Fig. No. 102

Pipe size, in.	Price ea.	Diameter of rod	Length of rod
¾	$.46	⅜	8
1	.48	⅜	8
1¼	.50	⅜	8
1½	.52	⅜	8
2	.54	⅜	8

Order by Figure number.

Grinnell Adjustable Coach Screw Clips (Short)—*Malleable Iron*

Adjustable Coach Screw Clip (Short)
Fig. No. 99

Fig. No. 99 is a combination of adjustable swivel ring, Fig. No. 101, and coach screw rod, Fig. No. 142. It is sold complete as illustrated with rod lengths given in table. For other rod lengths than given in table order parts separately.

LIST PRICES AND DIMENSIONS—FIG. NO. 99

Pipe size, in.	Price ea.	Diameter of rod, in.	Length of rod, in.
¾	$.28	⅜	5
1	.30	⅜	5
1¼	.31	⅜	5
1½	.32	⅜	5
2	.34	⅜	5
2½	.47	½	6
3	.55	½	6
3½	.57	½	6
4	.73	⅝	6
5	.87	⅝	6
6	1.26	¾	6
8	2.16	⅞	7

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Adjustable Swivel Ring—Split Ring Type—*Malleable Iron*

The split ring type of adjustable swivel ring can be used with coach screw rod or with machine threaded rod in the same way as the solid ring type shown on page 10. It has the same style of swivel shank with the same adjustable and automatic locking features.

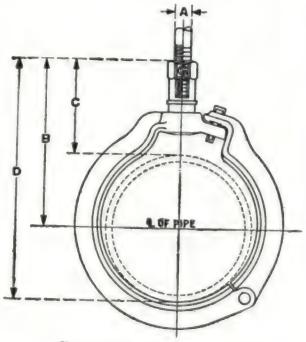
The hinging of the ring is somewhat off center, which provides sufficient seating to hold the pipe before closing the ring. A wedge type pin is loosely but inseparably cast into the hinged section for fastening this section after pipe is in place.

Adjustable Swivel Ring
Fig. No. 104. Split Ring Type

LIST PRICES AND DIMENSIONS—FIG. NO. 104

Pipe size, in.	Price, ea.	Size of rod A	B	C	D
¾	$0.18	⅜	2⅝	2 1/16	3⅛
1	.20	⅜	2¾	2 1/16	3⅜
1¼	.21	⅜	2⅞	2	3 11/16
1½	.22	⅜	3	2	4
2	.24	⅜	3⅜	2 3/16	4 9/16
2½	.34	½	3 15/16	2½	5⅜
3	.42	½	4⅜	2⅝	6⅛
3½	.44	½	4⅝	2⅝	6⅝
4	.56	⅝	5 11/16	3 7/16	7 15/16
5	.70	⅝	6⅜	3 9/16	9⅛
6	1.08	¾	7½	4 3/16	10 13/16
8	1.92	⅞	8 15/16	4⅝	13¼

Order by Figure number.



Patented Aug. 5, 1930
No. 1,772,062

Grinnell Adjustable Clips—*Malleable Iron*

Adjustable Clip Base
Fig. No. 116

Adjustable Clip
Fig. No. 106

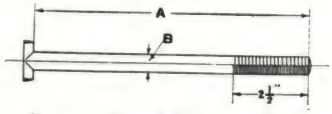
Adjustable Clip Ring
Fig. No. 105

The adjustable clip ring allows about 1½-in. adjustment, which adjustment can easily be made after pipe is installed by raising pipe until head of rod is close to ceiling and turning rod.

This hanger is made in sizes ¾ to 2-in. only. Rods are regularly furnished with a 2½-in. machine thread.

Two holes for No. 18 screws in each base.

When other lengths of square head hanger rod than given in table are wanted, order parts separately.



Square Head Hanger Rod
Fig. No. 144 (threaded)

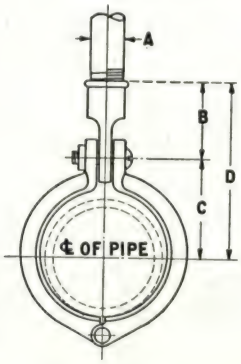
LIST PRICES AND DIMENSIONS

Pipe size	Fig. No. 106 ea.	Fig. No. 116 ea.	Fig. No. 105 ea.	Fig. No. 144 ea.	Sq. head hanger rod A	Sq. head hanger rod B	Min.-max. distances ceiling to center of pipe	Lgth. of shank	Inside dia. of ring
¾	$.18	$.10	$.10	$.05	6¼	⅜	8 – 9⅝	2	1 3/16
1	.20	.10	.11½	.05	6¾	⅜	8½–10⅛	2	1 7/16
1¼	.22	.10	.12½	.05	6¾	⅜	8¾–10⅜	2	1 13/16
1½	.25	.10	.16	.05	7	⅜	9 –10⅝	2	2 1/16
2	.28	.10	.20	.05	7¼	⅜	9½–11⅛	2	2 9/16

Order by Figure number.

Grinnell Split Pipe Rings—*Malleable Iron*

Split Pipe Ring with Socket
Fig. No. 107. Pipe thread
Fig. No. 107-R. Rod thread



Split Pipe Ring
Fig. No. 108

Socket for Split Pipe Ring
Fig. No. 110. Pipe thread
Fig. No. 110-R. Rod thread

Socket Fig. No. 110 is furnished tapped for pipe thread as given in the table. Socket Fig. No. 110-R is furnished tapped for rod thread as given in table. These sockets are used in connection with Fig. No. 108 split pipe ring and Fig. No. 131 I beam clamp.

LIST PRICES AND DIMENSIONS

Pipe size in.	Ring only			Ring and socket				Socket only			
				Pipe thread		Rod thread		Pipe thread			Rod thread
	Fig. No. 108	C in.	Bolt size, in.	Fig. No. 107	D in.	Fig. No. 107-R	D in.	Fig. No. 110	A in.	B in.	Fig. No. 110-R	A in.	B in.
½	$.08	15/16	¼x1	$.10	2 3/16	$.10	2 3/16	$.08	⅛	1¼	$.08	⅜	1¼
¾	.10	1⅛	¼x1	.12	2⅜	.12	2⅜	.08	⅛	1¼	.08	⅜	1¼
1	.10	1¼	¼x1	.12	2½	.12	2½	.08	⅛	1¼	.08	⅜	1¼
1¼	.12	1 9/16	¼x1¼	.14	3 3/16	.14	2 13/16	.10	¼	1⅝	.08	⅜	1¼
1½	.14	1 11/16	¼x1¼	.16	3 5/16	.16	2 15/16	.10	¼	1⅝	.08	⅜	1¼
2	.16	2 1/16	¼x1¼	.18	3 11/16	.18	3 5/16	.10	¼	1⅝	.08	⅜	1¼
2½	.20	2 5/16	¼x1¼	.22	3 15/16	.22	3 15/16	.10	¼	1⅝	.10	½	1⅝
3	.25	2¾	¼x1¼	.28	4 3/8	.28	4 3/8	.10	¼	1⅝	.10	½	1⅝
3½	.40	3⅛	5/16x1½	.43	4¾	.43	4¾	.12	⅜	1⅝	.10	½	1⅝
4	.50	3½	⅜x2	.53	5⅛	.53	5 7/16	.12	⅜	1⅝	.12	⅝	1 15/16
5	.60	4⅝	⅜x2	.63	6 9/16	.63	6 9/16	.15	½	1 15/16	.12	⅝	1 15/16
6	.80	5⅜	½x2	.82	7 5/16	.82	7½	.15	½	1 15/16	.15	¾	2⅛
8	1.30	6¼	½x2	1.32	8 3/16	1.32	8 9/16	.15	½	1 15/16	.15	⅞	2 5/16

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Split Rings—*Malleable Iron*

Fig. No. 127 is a combination of split pipe ring with socket, Fig. No. 107 and ceiling flange, Fig. No. 128. The nipple is not included in list prices.

Fig. No. 109 is a combination of split pipe ring, Fig. No. 107 and pipe threaded coach screw, Fig. No. 111.

Fig. No. 109-R is a combination of split pipe ring with socket and machine threaded coach screw rod, Fig. No. 142.

Split Ring with Socket and Ceiling Flange Pipe Threaded
Fig. No. 127

LIST PRICES AND DIMENSIONS

Pipe size, in.	List prices: Fig. No. 127 ea.	List prices: Fig. Nos. 109, 109-R ea.	Fig. No. 127 tapped pipe size in.	Fig. No. 109: Pipe thread size, in.	Fig. No. 109: Length of coach screw, in.	Fig. No. 109-R: Rod size, in.	Fig. No. 109-R: Length of rod in.
½	.15	.15	⅛	⅛	3½	⅜	3½
¾	.18	.18	⅛	⅛	3½	⅜	3½
1	.18	.18	⅛	⅛	3½	⅜	3½
1¼	.20	.20	¼	¼	3½	⅜	3½
1½	.22	.22	¼	¼	3½	⅜	3½
2	.25	.25	¼	¼	3½	⅜	3½
2½	.30	.30	¼	¼	3½	½	3½
3	.35	.35	¼	¼	3½	½	3½
3½	.50	.50	⅜	⅜	5	½	3½
4	.60	.60	⅜	⅜	5	⅝	5
5	.70	.70	½	½	5	⅝	5
6	.90	.90	½	½	5	¾	5
8	1.40	1.40	½	½	5	⅞	5

Order by Figure number.

Split Ring with Socket
Fig. No. 109. Pipe threaded coach screw
Fig. No. 109-R. Rod threaded coach screw

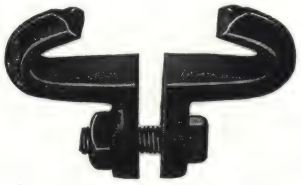
Grinnell Split Rings and I-Beam Clamps—*Malleable Iron*

Fig. Nos. 132, 132-R are combinations of I beam clamp, Fig. No. 131, split pipe ring, Fig. No. 108, and sockets, Fig. Nos. 110 or 110-R. Fig. No. 132 is used with pipe nipple, Fig. No. 132-R is used with a threaded rod.

The nipple or rod is not included in list prices, but must be ordered separately.

When ordering Fig. Nos. 131, 132 or 132-R specify width of I beam and space between halves of clamp.

I-Beam Hanger
Fig. No. 132. Pipe threaded
Fig. No. 132-R. Rod threaded



I-Beam Clamp
Fig. No. 131
Size of bolt = ⅜ in.
Distance from bottom of beam to center of bolt, approximately 1¼ in.

LIST PRICES

Pipe size, in.	Fig. Nos. 132, 132-R, ea.	Fig. No. 132 tapped for pipe size, in.	Fig. No. 132-R tapped for rod size, in.
½	.55	⅛	⅜
¾	.55	⅛	⅜
1	.58	⅛	⅜
1¼	.60	¼	⅜
1½	.62	¼	⅜
2	.65	¼	⅜
2½	.70	¼	½
3	.75	¼	½
3½	.90	⅜	½
4	1.00	⅜	⅝
5	1.10	½	⅝
6	1.30	½	¾

LIST PRICES—FIG. NO. 131

I beam flange, width, in.	2	2½	3	3½	4	4½	5	5½	6
Price, ea.	.40	.40	.40	.40	.40	.40	.40	.40	.40

Order by Figure number.

Grinnell Split Ring Hangers

Fig. No. 139 is a combination of Fig. No. 138 and a cast iron greenhouse flange, Fig. No. 1007, and is furnished with 4-in. nipple. When longer than 4-in. nipple is wanted, order parts separately.

LIST PRICES—FIG. NO. 128

Flange No.	Tapped for pipe size	Screws: Quantity	Screws: Size No.	Price plain	Price galv.
0	⅛	2	12	.10	.15
1	¼	2	12	.10	.15
2	⅜	2	14	.15	.20
3	½	4	18	.20	.25
4	¾	4	18	.22	.28

Order by Figure number.

Extension Split Ring
Fig. No. 138

Ceiling Flange Malleable
Fig. No. 128

Extension Split Ring with Ceiling Flange and Nipple
Fig. No. 139
Fig. No. 139-A. Without nipple

LIST PRICES—FIG. NOS. 138, 139, 139-A

Pipe size, in.	Tapped for pipe size, in.	Fig. No. 138 plain ea.	Fig. No. 138 galv. ea.	Fig. No. 139 plain comp. ea.	Fig. No. 139 galv. comp. ea.	Fig. No. 139-A plain without nipple	Fig. No. 139-A galv. without nipple
⅜	¼	.15	.17	.22	.25	.17	.20
½	¼	.15	.17	.22	.25	.17	.20
¾	¼	.18	.20	.27	.30	.22	.25
1	¼	.22	.25	.32	.35	.27	.30
1¼	¼	.27	.30	.35	.40	.30	.35
1½	¼	.35	.40	.40	.50	.35	.45
2	¼	.40	.50	.50	.60	.45	.55
2½	½	.45	.60	.70	.80	.65	.70
3	½	.50	.65	.90	1.00	.80	.90
4	½	.65	.80	1.10	1.25	1.00	1.15
5	¾	1.00	1.50	1.40	1.75	1.30	1.65
6	¾	1.50	2.00	1.90	2.25	1.80	2.15

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Adjustable Wrought Clevis Hangers—*Wrought Steel*

Clevis hangers provide for a vertical adjustment of at least 1½-in., which adjustment may be made either before or after pipe is in place. No temporary support of pipe line is necessary while adjustments are being made.

Hanger rods and supporting nuts may be locked into position after adjustment by use of the upper nuts.

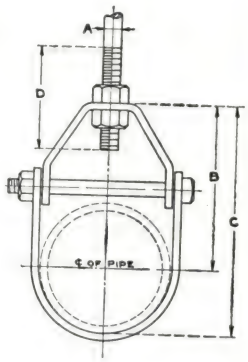
Hanger rods and nuts to be ordered separately.

Adjustable Wrought Clevis Hanger
Fig. No. 260

LIST PRICES AND DIMENSIONS—FIG. NO. 260

Pipe size, in.	Price, ea.	Rod size A	B	C	Thread length D
¾	$0.22	⅜	3 3/16	3¾	2½
1	.24	⅜	3 5/16	4	2½
1¼	.26	⅜	3 9/16	4 3/8	2½
1½	.29	⅜	3¾	4 11/16	2½
2	.33	⅜	3 15/16	5⅛	2½
2½	.40	½	4 9/16	6	3
3	.48	½	4⅞	6 5/8	3
3½	.60	½	5 3/16	7 3/16	3
4	.70	⅝	5 11/16	7 15/16	3½
5	.90	⅝	6½	9 5/16	3½
6	1.00	¾	7¼	10 9/16	4
8	1.20	⅞	8½	12 13/16	4¼

Order by Figure number.



Grinnell Adjustable Wrought U Pipe Hangers—*Wrought Steel*

Adjustable wrought U pipe hangers are designed primarily for use in hanging pipe from level ceilings or bottom of beams, and provide for 2 in. of vertical adjustment on each size. They are rugged in construction and have an ample factor of safety. Each hanger has two drilled holes for screws or bolts of size shown in table, also drilled hole for hanger rod.

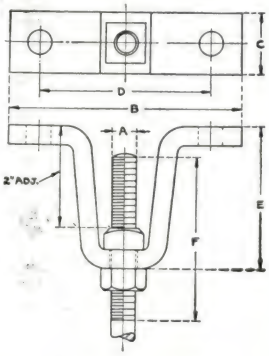
List prices include only the wrought U pipe hangers. Hanger rods, square supporting nuts and hex nuts for locking rods are to be ordered separately.

Adjustable Wrought U Pipe Hanger
Fig. No. 252

LIST PRICES AND DIMENSIONS—FIG. NO. 252

Hanger No.	Pipe size, in.	Price ea.	Rod size A	B	C	D	E	F	Size coach screws
1	¾–2	$0.15	⅜	3 11/16	1	2¾	2⅝	3⅛	5/16x1½
2	2½–3½	.20	½	4¾	1¼	3½	2⅞	3½	7/16x2
3	4 –5	.23	⅝	5¼	1½	3⅞	3	3⅞	½x2
4	6	.28	¾	6⅜	1½	4⅝	3¼	4¼	⅝x3
5	8 –12	.36	⅞	7¼	2	5¼	3⅜	4½	¾x3

Order by Figure number.



Grinnell Pipe, Swivel and Swinging Hanger Flanges—*Cast Iron*

Fig. No. 153 is designed primarily for use on level ceilings and provides an adjustment of 1-in. where rod enters flange.

Fig. No. 154 is a semi-swinging type hanger flange providing for a ceiling angle not greater than five degrees off level in any direction.

Fig. No. 158 is a full swinging type hanger flange through 180 degrees. This type is used only with special T headed swinging hanger flange rods, Fig. Nos. 146, 147.

Pipe Hanger Flange
Fig. No. 153

Swivel Hanger Flange
Fig. No. 154

Swinging Hanger Flange
Fig. No. 158

LIST PRICES

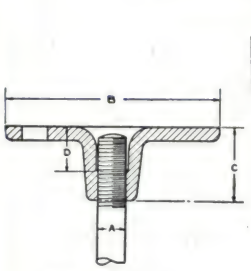
Flange No.	Pipe size, in.	Fig. No. 153 ea.	Fig. No. 154 ea.	Fig. No. 158 ea.
1	¾–1–1¼–1½–2	.08	.14	.08
2	2½–3–3½	.15	.22	.17
3	4–4½–5	.30	.40	.36
4	6–7	.36	.57	.57
5	8–9–10–12	.60	.85	.80

Order by Figure number.

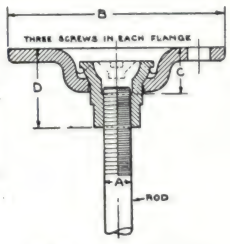
Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

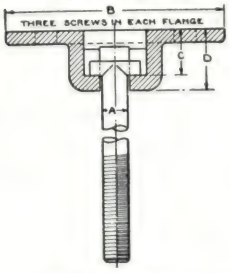
Grinnell Pipe, Swivel and Swinging Hanger Flanges *(Continued)*



Pipe Hanger Flange
Fig. No. 153



Swivel Hanger Flange
Fig. No. 154



Swinging Hanger Flange
Fig. No. 158

DIMENSIONS—FIG. NO. 154

Flange No.	Pipe size, in.	A	B	C	D	Size screws
1	¾-1-1¼-1½-2	⅜	3¼	⅞	1⅜	1½ No. 18 wood
2	2½-3-3½	½	4⅛	⅞	1½	⅜x2 coach
3	4-4½-5	⅝	5¼	⅞	1⅝	½x2 coach
4	6-7	¾	5⅞	1	1⅞	9/16x2 coach
5	8-9-10-12	⅞	6½	1⅛	2⅛	⅝x2 coach

Order by Figure number.

DIMENSIONS—FIG. NO. 153

Flange No.	Pipe size, in.	A	B	C	D	Size screws
1	¾-1-1¼-1½-2	⅜	2⅞	1⅜	⅞	1½ No. 18 wood
2	2½-3-3½	½	4	1½	15/16	⅜x2 coach
3	4-4½-5	⅝	4¾	1⅝	1	½x2 coach
4	6-7	¾	5¼	1⅞	1 1/16	9/16x2 coach
5	8-9-10-12	⅞	6	2⅛	1⅜	⅝x2 coach

Order by Figure number.

DIMENSIONS—FIG. NO. 158

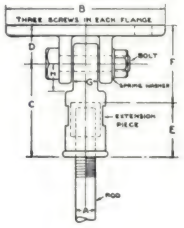
Flange No.	Pipe size, in.	A	B	C	D	Size screws
1	¾-1-1¼-1½-2	⅜	3	11/16	15/16	1½ No. 18 wood
2	2½-3-3½	½	4¼	⅞	1 3/16	⅜x2 coach
3	4-4½-5	⅝	5⅛	1 1/16	1 7/16	½x2 coach
4	6-7	¾	6	1 ¼	1 11/16	9/16x2 coach
5	8-9-10-12	⅞	6½	1 7/16	1 15/16	⅝x2 coach

Order by Figure number.
No. 1 flanges of each type have 2 holes for wood screws.
Nos. 2, 3, 4 and 5 flanges have 3 holes for coach screws.

Grinnell Adjustable Swinging Hanger Flanges—*Malleable Iron*

Adjustable Swinging Hanger Flange, Complete
Fig. No. 155

Flange with Bolt, Nut and Spring Washer
Fig. No. 156



Extension Piece Only
Fig. No. 157

Fig. No. 155 adjustable swinging hanger flange is a combination of Fig. Nos. 156, 157 and will swing through a radius of 180 deg. This type provides for a 1-in. adjustment of the rod.

No. 1 flanges have 2 holes for wood screws.
Nos. 2, 3, 4 and 5 flanges have 3 holes for coach screws.

LIST PRICES

Size No.	Price Fig. No. 155 ea.	Price Fig. No. 156 ea.	Price Fig. No. 157 ea.
1	$0.22	$0.16	$0.06
2	.37	.28	.09
3	.55	.42	.13
4	.68	.50	.18
5	1.00	.80	.20

DIMENSIONS

Flange No.	Pipe size	A	B	C	D	E	F	G	H	Size screws	Bolt
1	¾-2	⅜	2⅞	2 3/32	25/32	1¼	1 5/8	½	9/16	1½x18 wood	⅜x1½
2	2½-3½	½	4	2 11/32	31/32	1⅜	1 15/16	⅝	11/16	⅜x2 coach	⅜x1¾
3	4-5	⅝	4¾	2 17/32	1 5/32	1 9/16	2 ⅛	⅝	11/16	½x2 coach	7/16x2
4	6-7	¾	5¼	2 27/32	1 11/32	1¾	2 7/16	⅝	13/16	9/16x2 coach	7/16x2⅛
5	8-12	⅞	6	3 1/32	1 15/32	1⅞	2 ⅝	¾	⅞	⅝x2 coach	½x2⅜

Order by Figure number.

Grinnell Adjustable Swivel Coupling and Rod Couplings—*Malleable Iron*

Grinnell adjustable swivel couplings, Fig. No. 134, were designed particularly for supporting Grinnell Thermoliers, but will also prove convenient and practical for use where adjustable hanger rod couplings are desired.

These couplings have the same adjustable and self-locking features as the adjustable swivel rings, Fig. Nos. 101 and 104, shown on pages 10 and 11. When used as hanger rod couplings, the large end should be locked to rods with check nuts.

Adjustable Swivel Coupling
Fig. No. 134

Rod Coupling
Fig. No. 136

LIST PRICES AND DIMENSIONS—FIG. NO. 134

Size.....No.	1	2	3	4	5
Price.....ea.	$0.25	$0.35	$0.45	$0.60	$0.85
Size, rod tappings.....in.	⅜	½	⅝	¾	⅞
Length, overall.....in.	2⅝	3⅛	4	4⅝	5 7/16

LIST PRICES AND DIMENSIONS—FIG. NO. 136

Size.....No.	1	2	3	4	5
Price.....ea.	$0.10	$0.12	$0.14	$0.20	$0.24
Size, rod tappings.....in.	⅜	½	⅝	¾	⅞
Length, overall.....in.	1 15/16	2 7/16	2½	2¾	3

Order by Figure number.
Grinnell rod couplings, Fig. No. 136, are always furnished with right hand threads, unless otherwise specified.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Universal Concrete Inserts—*Malleable Iron*

The Grinnell Universal Insert, which has a 1½ in. lateral adjustment, is manufactured in one body size only to accommodate a special removable nut. Nut can be furnished with ⅜, ½, ⅝, or ¾ in. tapping as required.

The ½ in. thick nuts are automatically locked laterally in the insert by means of serrated teeth on both insert and nut. If vertical adjustment is not required at the insert the bolt may be seated against the V shaped top, thus providing an additional lock.

Nuts are readily inserted into body, and at either end of insert are held firmly while threaded rod is engaged in nut. This important time saving feature is not found in any other insert of this type.

To help distribute the load, the exterior ends are recessed to receive reinforcing rods up to 1 in. in diameter.

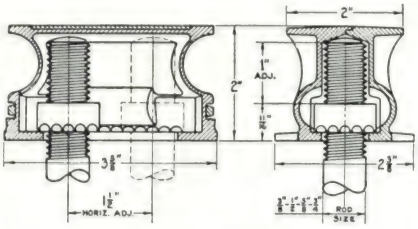
The four widely separated nail slots, the low height and large flat bottom surface all tend to minimize the chance of displacement during construction, whether nailed to wood or pasted to steel forms.

It is a quality insert made from rust resisting charcoal malleable iron and offered at an attractive price.

Order by figure number and specify tapping for nut.

List Price—Universal Insert, Fig. No. 280—Complete with one nut tapped for ⅜, ½, ⅝, or ¾ in. rod.....$0.20

Universal Concrete Insert
Fig. No. 280



Patents Pending

Grinnell Simplex Concrete Inserts—*Malleable Iron*

The Grinnell Simplex Insert is similar in design to, and has most of the advantages of, the Grinnell Universal Insert shown above.

The chief difference is that the nut in the Simplex is not removable and a different size body is furnished for each size tapping.

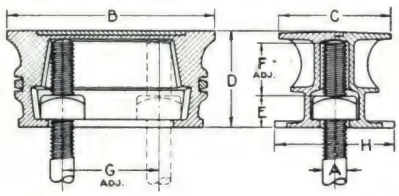
This type insert is for use on any job where the size of the tapping required can be definitely determined in advance.

The Simplex, like the Universal, is made from charcoal malleable iron.

A full range of sizes from ⅜-in. to ⅞-in. is offered at attractive prices.

*The ⅞-in. Simplex Insert should always have reinforcing rods placed under upper flange to spread the load over a greater area.

Simplex Concrete Insert
Fig. No. 281



LIST PRICES AND DIMENSIONS—FIG. NO. 281

Rod size, in.	Price ea.	A	B	C	D	E	F	G	H
⅜	$0.14	⅜	3⅜	1¾	1½	½	13/16	1½	1⅞
½	.16	½	3½	1 15/16	1⅝	⅝	13/16	1½	2 1/16
⅝	.18	⅝	3⅝	2⅛	1 13/16	¾	15/16	1½	2¼
¾	.20	¾	4½	2⅜	2	1	13/16	1⅜	2½
*⅞	.22	⅞	4⅝	2 9/16	2 3/16	1⅛	13/16	1⅜	2⅝

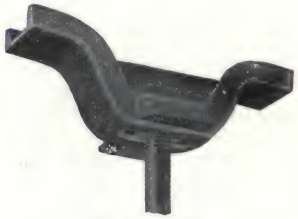
Order by Figure number.

APS Concrete Inserts—*Adjustable Pressed Steel*

The APS Concrete Insert consists of a pressed steel channel body with back of pressed steel spot-welded. This back forms a tight housing for the nut which is built into the insert. No loose parts to be lost.

Back of insert is flanged on each side with holes punched for attachment to false-work.

The APS Insert has ample vertical and lateral adjustment.

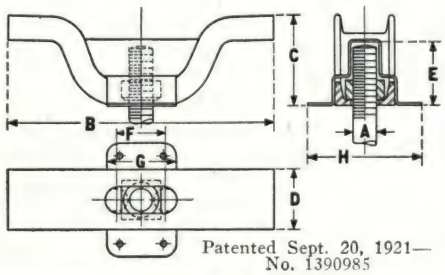


APS Insert
Fig. No. 229

LIST PRICES AND DIMENSIONS—FIG. NO. 229

Insert No.	Pipe size, in.	Price, ea.	A	B	C	D	E	Lat. adj. F	G	H
1	¾-2	$0.15	⅜	4⅛	1½	1	1⅛	¾	1⅜	2⅛
2	2½-3½	.20	½	5⅛	1⅞	1¼	1 5/16	1	1 7/16	2⅜
3	4 -5	.30	⅝	5¾	2 5/16	1½	1½	1	1 11/16	2¾
4	6 -7	.40	¾	7	2 7/16	1¾	1 11/16	1¼	2 9/16	3
5	8 -12	.60	⅞	7¼	2 7/16	1¾	1 11/16	1¼	2 9/16	3

Order by Figure number.



Patented Sept. 20, 1921—No. 1390985

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Hanger Rod Couplings—*Cast Iron*

The hanger rod coupling is designed for use under hollow tile and cinder concrete construction.

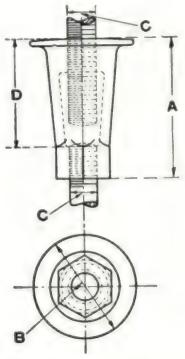
For hanging pipe up to 2 in. in size from hollow tile construction, the hanger rod coupling is used with the toggle bolt as illustrated.

For hanging pipe 2½ in. and larger from hollow tile construction and all sizes of pipe from cinder concrete construction, the hanger rod coupling is used in connection with rods which are installed in holes drilled through the entire tile or cinder concrete slab, the nut or bolt head at upper end of rod resting on a plate washer.

The hanger rod coupling allows for adjustment to take care of varying thicknesses of plaster.

← Toggle Bolt
Fig. No. 209

← Hanger Rod Coupling
Fig. No. 208



LIST PRICES—HANGER ROD COUPLING ONLY—FIG. NO. 208

Coupling No.	Pipe size, in.	Price ea.	A	B	C	D
1	¾–2	$.13	2½	2	⅜	2
2	2½–3½	.15	2¾	2¼	½	2⅛
3	4 –5	.28	3¼	2½	⅝	2½
4	6 –7	.40	3¾	2⅞	¾	2⅞
5	8 –12	.50	4¼	3⅛	⅞	3¼

LIST PRICES—TOGGLE BOLT ONLY—FIG. NO. 209

Pipe size, in.	Price ea.	Size of toggle bolt	Length of thread on toggle bolt	Length of toggle bolt
¾–2	$.20	⅜	2½	6
¾–2	.28	⅜	2½	9
¾–2	.33	⅜	2½	12
¾–2	.40	⅜	2½	15
¾–2	.50	⅜	2½	18

Order by Figure number.

Grinnell Side Beam and Side Column Brackets—*Malleable Iron*

Fig. No. 202, side beam bracket provides a simple, practical and adjustable means of securing hangers to side of beams, etc.

Fig. No. 203, side column bracket is similar to Fig. No. 202 except that its construction provides for attachment to a column as illustrated.

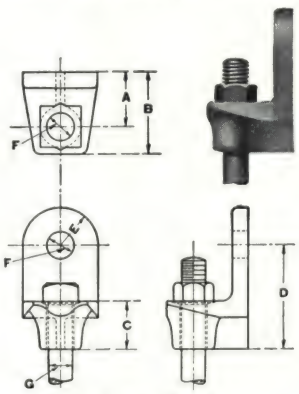
LIST PRICES AND DIMENSIONS—FIG. NO. 202

Pipe size, in.	Bracket No.	Price ea.	A	B	C	D	E	F	G
¾–2	1	$.12	⅞	1⅜	1⅝	2⅝	⅝	⅞	⅜
2½–3½	2	.15	1⅜	1⅛	1⅜	2⅛	⅝	⅞	½
4 –5	3	.35	1⅞	2⅜	1½	3	1	¾	⅝
6 –7	4	.40	1⅛	2⅝	1⅝	3⅜	1⅝	⅞	¾
8 –12	5	.60	2	3	1¾	3⅛	1⅜	1	⅞

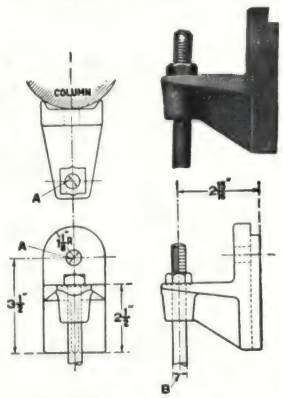
LIST PRICES—FIG. NO. 203

Pipe size, in.	Bracket No.	Price, ea.	A	B
¾–2	1	$.50	⅞	⅜
2½–3½	2	.70	⅞	½

Order by Figure number.



Side Beam Bracket
Fig. No. 202



Side Column Bracket
Fig. No. 203

Grinnell Cantilever Brackets—*Cast Iron*

Patented Nov. 4, 1913—No. 1077727

Cantilever Bracket
Fig. No. 221

Cantilever Bracket with Angle Iron Extension
Fig. No. 222

Bracket only (Fig. No. 221) is used where lines are located 4⅞ in. from walls. Where lateral extension is necessary up to 18 in. from walls, this bracket is used to support an extending angle iron (see Fig. No. 222), there being two bolt holes in the arm of the bracket for attaching the angle iron. The holes in the bracket are slotted allowing for lateral adjustment to take care of uneven wall surfaces. Dimensions on application

LIST PRICES

Pipe size, in.	Bracket only Fig. No. 221, ea.	Bracket and angle iron only Fig. No. 222, ea.
¾ to 2	$1.30	$3.00

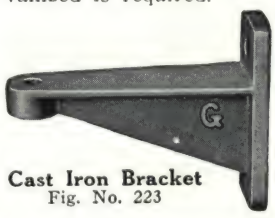
Order by Figure number.

Grinnell Cast Iron Brackets—*For 2 In. and Smaller Pipe*

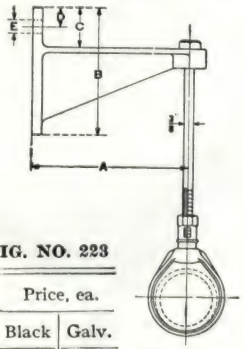
This light weight cast iron bracket, while primarily designed for use in connection with open sprinklers on the outside of buildings, is entirely suitable for use in supporting small piping in any service. It can readily be installed on walls, columns or beams.

Bracket is regularly furnished galvanized, but can be furnished black on order.

When ordering, please specify whether black or galvanized is required.



Cast Iron Bracket
Fig. No. 223



Showing Application

LIST PRICES (BRACKET ONLY)—FIG. NO. 223

Bracket No.	Dimensions					Price, ea.	
	A	B	C	D	E	Black	Galv.
1	6	4 15/16	1½	¾	½	$0.50	$0.75
2	9	5¼	1½	¾	½	.80	1.10

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Universal Side I-Beam Clamps—Universal Channel Clamps

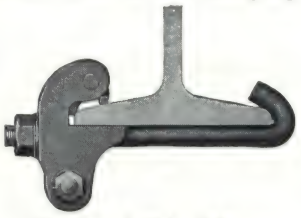
Wherever possible it is advisable to hang pipe to steel structural members such as I-beams and channels because of the firm, rigid anchorage thus available. This is particularly true in the hanging of heavy pipe. Grinnell Adjustable Clamps are easy to erect and do not require any holes to be punched in steel.

When Long Rods Are Required

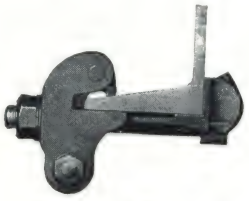
This Universal Side I-Beam Clamp has been designed in sizes to fit all Standard and Bethlehem I-beams. Where requirements call for a rod length varying from a few inches to several feet, the Universal side I-beam clamp is used with an extension piece, rod and adjustable swivel pipe ring.

When No Adjustment Is Required

When it is necessary to hang the pipe line close to the beam and no adjustment is necessary, the swivel pipe ring, Fig. 150, is attached directly to the clamp.



Universal Side I-Beam Clamp
Fig. No. 225
Patented April 6, 1915—No. 1,134,395
Jan. 5, 1926—No. 1,568,122



Universal Channel Clamp
Fig. No. 226

Application of Extension Piece
Fig. No. 157 and Hanger Rod to Universal Clamps
(See pages 14 and 42)

Application of Swivel Pipe Ring
Fig. No. 150 to Universal Clamps
(See page 19)

Application of Adjustable Swivel Ring
Fig. No. 101 and Extension Eye Bolt, Fig. No. 220 to Universal Clamps
(See pages 10 and 19)

When Pipe Is to Be Adjusted Close to Beam

In case the pipe line must be located so close to the beam that an extension piece is not practical, the proper procedure is to use an extension eye-bolt such as shown below at right. Here the adjustment is all made in the Adjustable Swivel Pipe Ring. See Fig. 101, page 10.

Universal Channel Clamp

To meet the frequently recurring need for a strong adjustable clamp for hanging pipe from channels, this Universal Channel Clamp has been developed as a standard unit in the Grinnell Adjustable Pipe Hanger Line. Long experience has shown that without such clamps, pipe installation work is constantly demanding the use of special hangers made up for the individual job, a practice which causes unwarranted delay and useless expense. This clamp and also the extension clamp shown can be used with (1) extension piece, hanger rod and adjustable swivel ring; (2) with the swivel pipe ring, and (3) with extension eye-bolt and adjustable swivel ring, all of which are shown herewith.

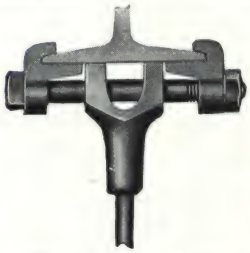
UNIVERSAL I-BEAM CLAMPS—FIG. NO. 225

Pipe sizes	List prices	Clamp numbers: Standard or Carnegie structural I beams	Carnegie supplemental I beams	Bethlehem I beams
¾–2	$0.50	1-A, B, C, D, E	1-T, U, V, W, X	1-T, U, V
	.55	2-E, F, G	2-X	2-U, V, W, X, Y
	.60	3-G, H, I	.....	3-V, W, X, Y, Z
2½–7	.85	4-A, B, C, D, E	4-S, T, U, V, W, X	4-S, T, U
	.90	5-E, F, G	5-X	5-T, U, V, W, X, Y
	.95	6-G, I	.....	6-U, V, X, Y, Z
8 –12	1.30	7-A, B, C, D, E	7-S, T, U, V, W, X	7-S, T, U, V
	1.35	8-E, F, G	8-X	8-U, V, W, X, Y
	1.40	9-G, H, I	.....	9-V, W, X, Y, Z

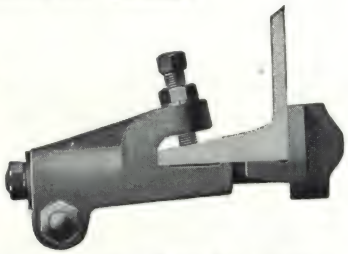
UNIVERSAL CHANNEL CLAMPS—FIG. NO. 226

Pipe sizes	List prices	Clamp numbers: Standard or Carnegie structural channels
¾–2	$0.65	1-A, B, C, D, E
2½–7	1.00	4-A, B, C, D, E
8 –12	1.50	7-A, B, C, D, E

Grinnell Center I-Beam Clamps
Grinnell Channel Extension Clamps



Center I-Beam Clamp
Fig. No. 217. For ¾ to 2-in. pipe only



Channel Extension Clamp
Fig. No. 219. For ¾ to 2-in. pipe only

CENTER I-BEAM CLAMPS—FIG. NO. 217

¾–2 Only	$0.30	1-A, B, C	1-X, Y	1-X, Y
		2-A, B	2-X, Y	2-W, X
		3-A, B	3-Y, Z	3-W, X, Y
	.40	4	4-Y	4-W, X, Y, Z
		5	.....	5-W, X, Y, Z
		6-Y	.....	6-W, X, Y

Extension Clamp for Small Pipe

This type of clamp is usually employed in sprinkler work so that the sprinkler head, which often must come under the channel iron, can be so located because the extension feature provides sufficient space for this purpose. With this clamp the extension piece with hanger rod and adjustable swivel ring is usually employed, but the other types described above may be used.

CHANNEL EXTENSION CLAMPS—FIG. NO. 219

¾-2 only	$0.90	3-A, B, C, D, E, F, G

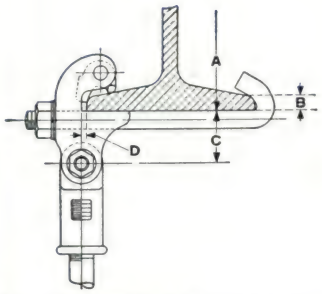
Order by Figure number.

Continued on next page

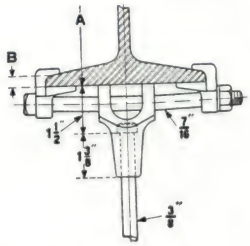
GRINNELL ADJUSTABLE PIPE HANGERS

I-Beams and Channel Clamps *(Continued)*

Dimensions and Clamp Numbers



Universal Side I-Beam Clamp
Fig. No. 225
Fig. No. 157. †Ext. piece



Center I-Beam Clamp
Fig. No. 217
For ¾ to 2-in. pipe only

Notes: Dimension C = 1⅛ in. for ¾ to 2-in. pipe; 1⅝ in. for 2½ to 7-in. pipe; 1¾ in. for 8 to 12-in. pipe.

Dimension D—Varies from ⅛ to ½ in.

STANDARD OR CARNEGIE STRUCTURAL I BEAMS				CLAMP NUMBERS			
				Fig. No. 225			Fig. No. 217
Size or Depth A	Weight per ft. in lbs.	Width of flange	B, in.	¾ to 2 in. pipe	2½ to 7 in. pipe	8 to 12 in. pipe	¾ to 2 in. pipe
3	5.7	2 21/64	.17	1-A	4-A	7-A	....
	6.5	2 13/32		1-A	4-A	7-A	....
	7.5	2 33/64		1-A	4-A	7-A	....
4	7.7	2 21/32	.19	1-A	4-A	7-B	....
	8.5	2 25/32		1-B	4-A	7-B	....
	9.5	2 51/64		1-B	4-A	7-B	....
	10.5	2 7/8		1-B	4-B	7-B	....
5	10.0	3	.21	1-B	4-B	7-B	....
	12.25	3 9/64		1-B	4-B	7-B	....
	14.75	3 9/32		1-B	4-B	7-C	....
6	12.5	3 21/64	.23	1-B	4-B	7-C	....
	14.75	3 7/16		1-C	4-C	7-C	....
	17.25	3 9/16		1-C	4-C	7-C	....
7	15.3	3 21/32	.25	1-C	4-C	7-C	1-B
	17.5	3 3/4		1-C	4-C	7-C	1-B
	20.0	3 55/64		1-C	4-C	7-D	1-B
8	18.4	4	.27	1-C	4-C	7-D	1-C
	20.5	4 5/64		1-C	4-C	7-D	1-C
	23.0	4 11/64		1-D	4-D	7-D	1-C
	25.5	4 17/64		1-D	4-D	7-D	1-C
9	21.8	4 21/64	.29	1-D	4-D	7-D	2-A
	25.0	4 7/16		1-D	4-D	7-D	2-A
	30.0	4 19/32		1-D	4-D	7-E	2-A
	35.0	4 49/64		1-D	4-D	7-E	2-A
10	25.4	4 21/32	.31	1-D	4-D	7-E	2-B
	30.0	4 51/64		1-E	4-D	7-E	2-B
	35.0	4 15/16		1-E	4-E	7-E	2-B
	40.0	5 3/32		1-E	4-E	7-E	2-B
12	31.8	5	.35	1-E	4-E	7-E	2-B
	35.0	5 5/64		1-E	4-E	7-E	2-B
12	40.8	5 1/4	.46	2-E	5-E	8-E	3-A
	45.0	5 25/64		2-E	5-E	8-E	3-A
	50.0	5 31/64		2-E	5-E	8-F	3-A
	55.0	5 19/32		2-E	5-E	8-F	3-A
15	42.9	5 1/2	.41	2-E	5-E	8-F	3-A
	45.0	5 35/64		2-E	5-E	8-F	3-A
	50.0	5 41/64		2-E	5-E	8-F	3-A
	55.0	5 47/64		2-F	5-E	8-F	3-A
15	60.8	6	.59	2-F	5-F	8-G	4
	65.0	6 5/64		2-F	5-F	8-G	4
	70.0	6 5/16		2-G	5-F	8-G	4
	75.0	6 9/32		2-G	5-F	8-G	4
18	54.7	6	.46	2-F	5-F	8-F	3-B
	60.0	6 3/32		2-F	5-F	8-F	3-B
	65.0	6 11/64		2-F	5-F	8-F	3-B
	70.0	6 1/4		2-F	5-F	8-G	3-B
18	75.6	7	.659	3-G	6-G	9-G	5
	80.0	7 5/64		3-G	6-G	9-H	5
	85.0	7 5/32		3-H	6-G	9-H	5
	90.0	7 15/64		3-H	6-G	9-H	5
20	65.4	6 1/4	.55	2-G	5-F	8-G	4
	70.0	6 5/16		2-G	5-F	8-G	4
	75.0	6 25/64		2-G	5-G	8-G	4
20	81.4	7	.65	3-G	6-G	9-G	5
	85.0	7 3/64		3-G	6-G	9-H	5
	90.0	7 1/8		3-G	6-G	9-H	5
	95.0	7 13/64		3-G	6-G	9-H	5
	100.0	7 17/64		3-H	6-G	9-H	5

†Extension piece, Fig. No. 157, is not part of clamp.
Order by Figure number and clamp number.

STANDARD OR CARNEGIE STRUCTURAL I BEAMS				CLAMP NUMBERS			
				Fig. No. 225			Fig. No. 217
Size or Depth A	Weight per ft. in lbs.	Width of flange	B, in.	¾ to 2 in. pipe	2½ to 7 in. pipe	8 to 12 in. pipe	¾ to 2 in. pipe
24	79.9	7	.60	3-G	6-G	9-G	5
	85.0	7 1/16		3-G	6-G	9-G	5
	90.0	7 1/8		3-G	6-G	9-G	5
	95.0	7 3/16		3-G	6-G	9-H	5
	100.0	7 1/4		3-G	6-G	9-H	5
24	105.9	7 7/8	.80	3-I	6-I	9-I	6-Y
	110.0	7 59/64		3-I	6-I	9-I	6-Y
	115.0	7 63/64		3-I	6-I	9-I	6-Y
	120.0	8 3/64		3-I	6-I	9-I	6-Y

CARNEGIE SUPPLEMENTAL I BEAMS				CLAMP NUMBERS			
8	17.5	5	.24	1-T	4-S	7-S	1-X
10	22.4	5 1/2	.26	1-T	4-S	7-T	1-Y
12	27.9	6	.28	1-U	4-T	7-T	2-X
15	37.3	6 3/4	.31	1-V	4-U	7-U	2-X
18	48.2	7 1/2	.34	1-W	4-V	7-V	2-Y
21	60.4	8 1/4	.37	1-X	4-W	7-W	3-Y
24	74.2	9	.40	1-X	4-X	7-X	3-Z
27	90.0	9	.515	2-X	5-X	8-X	4-Y

BETHLEHEM I BEAMS				CLAMP NUMBERS			
				Fig. No. 225			Fig. No. 217
Size or Depth A	Weight per ft. in lbs.	Width of flange	B, in.	¾ to 2 in. pipe	2½ to 7 in. pipe	8 to 12 in. pipe	¾ to 2 in. pipe
8	17.5	5 1/4	.21	1-T	4-S	7-S	1-X
	19.0	5 17/64	.24	1-T	4-S	7-S	1-X
9	20.5	5 1/2	.25	1-T	4-S	7-T	1-Y
	22.0	5 33/64	.28	1-T	4-S	7-T	1-Y
10	23.5	5 3/4	.285	1-U	4-T	7-T	1-Y
	26.0	5 49/64	.330	1-U	4-T	7-T	2-W
12	28.5	6 1/4	.325	1-U	4-T	7-U	2-X
	31.0	6 17/64	.355	1-U	4-T	7-U	3-W
12	36.5	6 3/8	.440	2-U	5-T	8-U	3-W
15	38.5	6 3/4	.400	1-V	4-U	7-V	3-X
	40.0	6 49/64	.415	2-V	5-U	8-U	3-X
	42.5	6 25/32	.445	2-V	5-U	8-U	3-X
15	50.5	6 31/32	.540	2-V	5-U	8-V	4-X
	54.5	7	.600	2-V	5-V	8-V	4-X
	59.5	7 3/64	.660	3-V	6-U	9-V	5-Z
15	71.5	7 1/2	.785	3-W	6-V	9-W	6-Y
18	49.0	7 1/2	.435	2-W	5-V	8-V	3-Y
	52.0	7 17/32	.465	2-W	5-V	8-V	3-Y
	54.5	7 35/64	.495	2-W	5-V	8-V	4-X
18	64.5	8 47/64	.525	2-X	5-X	8-X	4-Y
	69.0	8 3/4	.585	2-X	5-X	8-X	4-Y
	74.0	8 49/64	.645	3-X	6-X	9-X	5-W
20	59.5	8	.485	2-W	5-W	8-W	4-W
	62.0	8 1/64	.515	2-W	5-W	8-W	4-W
	64.5	8 1/32	.545	2-X	5-W	8-W	4-W
20	73.0	8 7/8	.580	2-X	5-X	8-X	4-Y
	78.0	8 25/32	.625	3-X	6-X	9-X	5-W
22	65.5	8 1/2	.485	2-X	5-W	8-X	4-Y
	68.5	8 35/64	.515	2-X	5-W	8-X	4-Y
	71.5	8 17/32	.545	2-X	5-W	8-X	4-Y
24	73.5	9	.520	2-X	5-X	8-X	4-Y
	79.5	9 1/32	.565	2-X	5-X	8-Y	4-Y
24	84.5	9 1/2	.570	2-Y	5-Y	8-Y	4-Z
24	95.5	9 47/64	.660	3-Y	6-Y	9-Y	5-Y
	99.5	9 3/4	.705	3-Y	6-Y	9-Y	6-W
	104.5	9 25/32	.750	3-Z	6-Z	9-Z	6-X
26	85.5	9 31/64	.545	2-Y	5-Y	8-Y	4-Z
	91.0	9 1/2	.605	2-Y	5-Y	8-Y	5-Y
	98.0	9 17/32	.665	3-Y	6-Y	9-Y	5-Y
28	100.0	9 63/64	.620	3-Y	6-Y	9-Z	5-Y
	106.0	10	.680	3-Z	6-Y	9-Z	5-Y
	113.0	10 1/32	.740	3-Z	6-Z	9-Z	6-X
30	115.0	10 31/64	.680	3-Z	6-Z	9-Z	5-Y
	121.0	10 1/2	.740	3-Z	6-Z	9-Z	6-X
	129.0	10 17/32	.800	3-Z	6-Z	9-Z	6-X

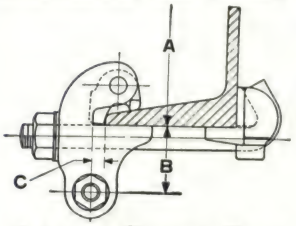
Order by Figure number and clamp number.

Continued on next page

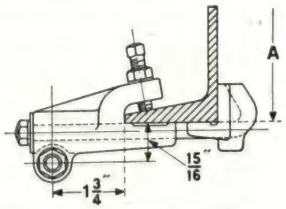
GRINNELL ADJUSTABLE PIPE HANGERS

I-Beams and Channel Clamps *(Continued)*

Dimensions and Clamp Numbers (Continued)



Universal Channel Clamp
Fig. No. 226

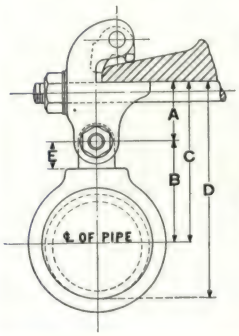


Channel Extension Clamp
Fig. No. 219
For ¾ to 2-in. pipe only

Notes: Dimension B = 1⅛ in. for ¾ to 2-in. pipe; 1⅝ in. for 2½ to 7-in. pipe; 1¾ in. for 8 to 12-in. pipe.
Dimension C—Varies from ⅛ to ½ in.

STANDARD OR CARNEGIE STRUCTURAL CHANNELS			CLAMP NUMBERS			
			Fig. No. 226			Fig. No. 219
Size or depth A	Weight per foot in pounds	Width of flange	¾ to 2-in. pipe	2½ to 7-in. pipe	8 to 12-in. pipe	¾ to 2-in. pipe
3	4.1	1 13/32	1-A	4-A	7-A	3-A
	5.0	1 1/2	1-A	4-A	7-A	3-A
	6.0	1 19/32	1-A	4-A	7-A	3-A
4	5.40	1 37/64	1-A	4-A	7-A	3-A
	6.25	1 41/64	1-A	4-A	7-A	3-A
	7.25	1 23/32	1-A	4-A	7-A	3-A
5	6.7	1 3/4	1-A	4-A	7-A	3-B
	9.0	1 57/64	1-A	4-A	7-B	3-B
	11.5	2 1/32	1-A	4-A	7-B	3-B
6	8.2	1 59/64	1-A	4-A	7-B	3-B
	10.5	2 1/32	1-A	4-A	7-B	3-B
	13.0	2 5/32	1-B	4-A	7-B	3-B
	15.5	2 9/32	1-B	4-B	7-B	3-B
7	9.80	2 3/32	1-A	4-A	7-B	3-B
	12.25	2 5/16	1-B	4-B	7-B	3-B
	14.75	2 19/64	1-B	4-B	7-B	3-B
	17.25	2 13/32	1-B	4-B	7-B	3-B
	19.75	2 33/64	1-B	4-B	7-B	3-B
8	11.50	2 17/64	1-B	4-B	7-B	3-C
	13.75	2 11/32	1-B	4-B	7-B	3-C
	16.25	2 7/16	1-B	4-B	7-B	3-C
	18.75	2 17/32	1-B	4-B	7-B	3-C
	21.25	2 5/8	1-B	4-B	7-C	3-C
9	13.4	2 7/16	1-B	4-B	7-B	3-C
	15.0	2 31/64	1-B	4-B	7-B	3-C
	20.0	2 41/64	1-B	4-B	7-C	3-C
	25.0	2 13/16	1-B	4-B	7-C	3-C
10	15.3	2 19/32	1-B	4-B	7-C	3-D
	20.0	2 47/64	1-B	4-B	7-C	3-D
	25.0	2 57/64	1-C	4-C	7-C	3-D
	30.0	3 1/32	1-C	4-C	7-C	3-D
	35.0	3 5/16	1-C	4-C	7-C	3-D
12	20.7	2 15/16	1-C	4-C	7-C	3-E
	25.0	3 3/64	1-C	4-C	7-C	3-E
	30.0	3 11/64	1-C	4-C	7-C	3-E
	35.0	3 19/64	1-C	4-C	7-D	3-E
	40.0	3 27/64	1-C	4-C	7-D	3-E
13	31.8	4	1-D	4-D	7-E	3-G
	35.0	4 5/64	1-D	4-D	7-E	3-G
	37.0	4 7/64	1-D	4-D	7-E	3-G
	40.0	4 3/16	1-E	4-E	7-E	3-G
	45.0	4 19/64	1-E	4-E	7-E	3-G
	50.0	4 13/32	1-E	4-E	7-E	3-G
15	33.9	3 13/32	1-D	4-D	7-D	3-F
	35.0	3 27/64	1-D	4-D	7-D	3-F
	40.0	3 33/64	1-D	4-D	7-D	3-F
	45.0	3 5/8	1-D	4-D	7-D	3-F
	50.0	3 23/32	1-D	4-D	7-D	3-F
	55.0	3 13/16	1-D	4-D	7-E	3-F

Order by Figure number and clamp number.



Grinnell Swivel Pipe Ring

For use where room is limited vertically and no adjustment is necessary.

Swivel Pipe Ring
Fig. No. 150

Grinnell Extension Eye Bolts

Extension Eye Bolt
Fig. No. 220

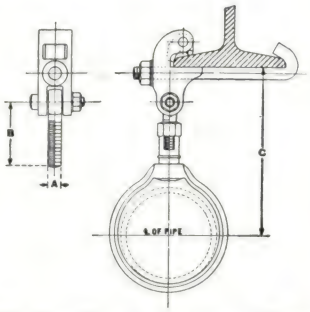


Fig. No. 101. Application of Extension Eye Bolt and Adj. Swivel Ring to Universal I-Beam and Channel Clamps

Extension eye bolt A	Pipe size	List prices	B	C Min.	C Max.	Length of thread
⅜	¾	$0.25	2½	4¼	5¾	2
		.28	4	5⅝	7¼	2¼
		.30	5½	7⅛	8¾	2¼
	1	.25	2½	4⅜	6	2
		.28	4	5¾	7⅜	2¼
		.30	5½	7⅜	9	2¼
	1¼	.25	2½	4½	6⅛	2
		.28	4	6	7⅝	2¼
		.30	5½	7½	9⅛	2¼
	1½	.25	2½	4⅝	6¼	2
		.28	4	6⅛	7¾	2¼
		.30	5½	7⅝	9¼	2¼
	2	.25	2½	4⅞	6½	2
		.28	4	6⅜	8	2¼
		.30	5½	7⅞	9½	2¼
½	2½	.30	2¾	6⅛	7⅝	2
		.32	4¼	7⅜	9⅛	2½
		.35	5¾	8⅞	10⅝	2½
	3	.30	2¾	6½	8	2
		.32	4¼	7⅝	9½	2½
		.35	5¾	9⅛	11	2½
	3½	.30	2¾	6¾	8¼	2
		.32	4¼	8	9¾	2½
		.35	5¾	9⅜	11¼	2½
	4	.35	3	7⅞	9⅜	2⅛
		.38	4½	8⅜	10⅞	3¼
		.40	6	9⅞	12⅜	3¼
5/8	4½	.35	3	8	9½	2⅛
		.38	4½	8⅝	11	3¼
		.40	6	10⅛	12½	3¼
	5	.35	3	8¼	9¾	2⅛
		.38	4½	9	11¼	3¼
		.40	6	10½	12¾	3¼
¾	6	.50	3	9½	10⅞	2⅛
		.55	4½	9⅝	12⅜	3½
		.60	6	11	13⅞	3¾
	7	.50	3	10¼	11⅝	2⅛
		.55	4½	10⅜	13⅛	3½
		.60	6	11⅝	14⅝	3¾
⅞	8	.70	3¼	11⅝	13	2¼
		.80	4¾	11⅝	14½	3¾
		.90	6¼	12⅜	16	4½

Order by Figure number.

Pipe size	List prices	No. of swivel piece	A	B	C	D	E
¾	$0.10	1	1⅛	2 1/32	3 5/32	3 11/16	17/32
1	.12	1	1⅛	2 5/32	3 9/32	3 15/16	17/32
1¼	.13	1	1⅛	2 9/32	3 13/32	4 1/8	17/32
1½	.15	1	1⅛	2 15/32	3 19/32	4 9/16	17/32
2	.17	1	1⅛	2 11/16	3 13/16	5	17/32
2½	.22	2	1⅝	2 29/32	4 17/32	5 31/32	¾
3	.26	2	1⅝	3 7/32	4 27/32	6 19/32	¾
3½	.28	2	1⅝	3 15/32	5 3/32	7 3/32	¾
4	.43	3	1⅝	3 7/8	5 1/2	7 3/4	¾
4½	.52	3	1⅝	4 1/8	5 3/4	8 1/4	¾
5	.55	3	1⅝	4 3/8	6	8 25/32	23/32
6	.60	4	1⅝	5 1/16	6 11/16	10	¾
7	.95	4	1⅝	5 5/16	7 3/16	11	¾
8	1.40	5	1¾	6 3/16	7 11/16	12 1/4	13/16

Sketch at left shows application of swivel pipe ring to Universal I-beam and channel clamps.
Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Adjustable Wrought Radiator Brackets For Tube Type Radiators

Grinnell Adjustable Wrought Radiator Brackets, Fig. No. 192, are designed for supporting legless radiators of the new tube type.

These brackets are made in but one size and will take all widths of this type of radiator from 3-tube to 7-tube inclusive. Four lengths of supporting rod B take care of all heights of radiators from 20 in. to 38 in., inclusive. (See table herewith.)

When installed the bracket is practically out of sight as the steel plates on tie rods E bear against the front of second tube to hold radiator in place.

Only one bolt is necessary to securely fasten the bracket to the wall. When hook bolt is used, it can be set without extremely accurate measurements because there is a liberal adjustment of the bracket vertically by means of rod B.

DIMENSIONS

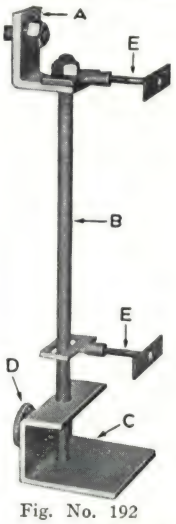
Nominal height of radiators, in.	Maximum A, in.	Length of rod B, in.
20, 21, 22, 23, 25	12¾	12
26, 27, 30, 31	18¾	18
32, 34	24¾	24
36, 37, 38	27¾	27

Order by Figure number and specify nominal height of radiators.

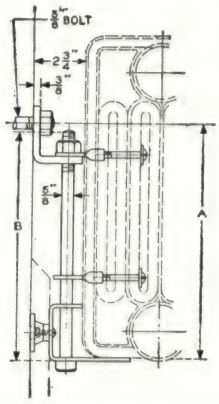
Note: The ⅝-in. bolt and nut for fastening bracket A to wall are not included in the price of the radiator bracket, and will have to be ordered separately.

Ample horizontal adjustment is provided for by the slotted cleats on tie rods E, and by the width of foot C, as the tie rods will always strike between the sections of the radiator no matter where the bracket is placed.

The back stop D is for use on walls where there is no baseboard or where the entire bracket is above the baseboard. When foot C will rest against a baseboard, the back stop is to be discarded.



List Price
Fig. 192, each $2.00



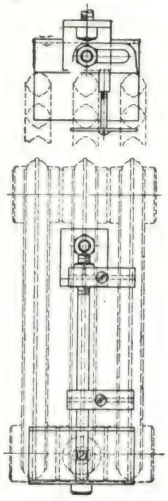


Fig. No. 192

Adjustable Wrought Radiator Brackets

Grinnell Adjustable Wall Coil Hangers

Adjustable Wall Coil Hangers
Fig. No. 160

Adjustable wall coil hangers are furnished with four separate brackets—two for single coils and two for double coils as follows:

Fig. No. 160—single coil—2¼ in. wall to center line of coil.
Fig. No. 161—single coil—6¼ in. wall to center line of coil.
Fig. No. 162—double coil—2¼ in. wall to center line of first coil.
Fig. No. 163—double coil—6¼ in. wall to center line of first coil.

Brackets for double coils place the second coil 3½ in. center to center in front of first coil.

The hangers with the short brackets, Fig. Nos. 160 and 162, are usually used on flush or straight walls. Those with long brackets, Fig. Nos. 161 and 163, are used on walls with pilasters 4 in. deep, allowing the coils to run straight past the pilasters. It is often desirable, however, to place alternate hangers on the pilasters, in which case the short brackets can be used on the pilasters and the long brackets on the walls.

The adjustable feature is the principal advantage of these hangers. By turning the adjusting nut A, hanger plate can be raised or lowered 1 in. or less so as to secure perfect alignment of piping and to make each hanger carry its own proportion of the total weight of the heating coil.

Besides their adjustable advantages these hangers can be installed with great saving of labor. It is only necessary to fasten the individual bracket in place by two bolts. On brick or concrete construction one of the bolts, preferably the upper one, can be set in wall during construction or both may be set in wall if template is used.

Grinnell Wall Coil Hangers are all metal—a most desirable feature especially in buildings of fire resistant construction. The adjustable hanger plates are of steel, channel shaped and offer very little resistance to expansion.

The adjustable hanger plate can be fastened to wood or steel framework of saw-tooth skylights, also to steel columns or struts of trusses when coils are placed vertically in overhead position. ½-in. hook bolts are used in supporting the plate from clamp or bracket.

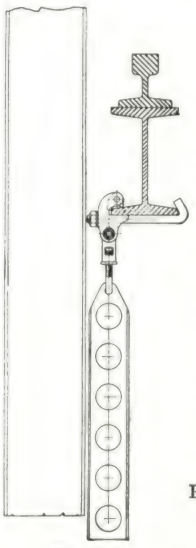


Fig. Y

Coil hung from purlin (right). Adjustable hanger plate attached to roof purlin with side beam bracket and hanger rod, providing the adjustment.

Coil hung from crane rail girder (left). Adjustable hanger plate used with side I-beam clamp and extension piece for attachment to crane rail girder.

Patented May 20, 1913—
No. 1,062,372

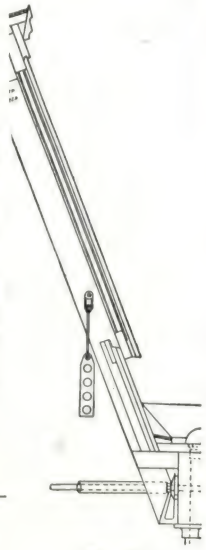


Fig. X

LIST PRICES

No. of branches	Adj. wall coil hanger—complete								Adj. hanger plate only	
	Fig. No. 160		Fig. No. 161		Fig. No. 162		Fig. No. 163		Fig. No. 159	
	1¼ in. pipe	1½ in. pipe	¼ in. pipe	1½ in. pipe	1¼ in. pipe	1½ in. pipe	1¼ in. pipe	1½ in. pipe	1¼ in. pipe	1½ in. pipe
4	2.00	2.10	2.35	2.45	2.60	2.85	4.55	4.75	.52	.60
5	2.10	2.20	2.45	2.55	2.85	3.00	4.75	5.00	.60	.72
6	2.20	2.30	2.55	2.70	3.00	3.30	5.00	5.30	.72	.88
7	2.30	2.40	2.75	2.85	3.40	3.55	5.35	5.50	.92	1.00
8	2.40	2.50	2.85	3.00	3.55	3.90	5.50	5.85	1.00	1.16
9	2.50	2.70	2.95	3.10	3.80	4.10	5.75	6.10	1.12	1.30
10	2.60	2.80	3.10	3.30	4.00	4.45	6.00	6.40	1.25	1.44
11	2.75	3.00	3.20	3.40	4.25	4.70	6.15	6.65	1.36	1.56
12	2.85	3.25	3.40	3.50	4.70	4.95	6.65	6.90	1.56	1.70

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Adjustable Wall Coil Hangers *(Continued)*

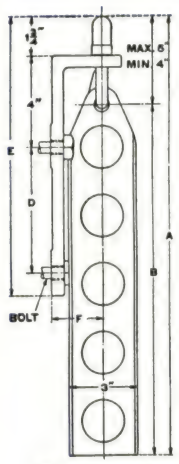


Fig. No. 160

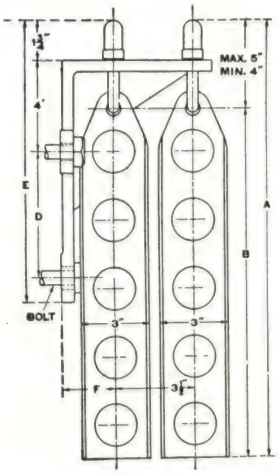


Fig. No. 162

Pressed Steel Plates—Cast Iron Brackets

DIMENSIONS—HANGER PLATES

Number of branches	1¼ in. hanger plates Dimensions A Max.	1¼ in. hanger plates Dimensions A Min.	1¼ in. hanger plates B	1½ in. hanger plates Dimensions A Max.	1½ in. hanger plates Dimensions A Min.	1½ in. hanger plates B
4	17 3/8	16 3/8	12 3/8	19 1/8	18 1/8	14 1/8
5	20 3/8	19 3/8	15 3/8	22 5/8	21 5/8	17 5/8
6	23 3/8	22 3/8	18 3/8	26 1/8	25 1/8	21 1/8
7	26 3/8	25 3/8	21 3/8	29 5/8	28 5/8	24 5/8
8	29 3/8	28 3/8	24 3/8	33 1/8	32 1/8	28 1/8
9	32 3/8	31 3/8	27 3/8	36 5/8	35 5/8	31 5/8
10	35 3/8	34 3/8	30 3/8	40 1/8	39 1/8	35 1/8
11	38 3/8	37 3/8	33 3/8	43 5/8	42 5/8	38 5/8
12	41 3/8	40 3/8	36 3/8	47 1/8	46 1/8	42 1/8

DIMENSIONS—BRACKETS

Fig. No.	C	D	E	F	G	Hook bolts	Wall bolts
160	2¼	5½	12¼	2¼	3¾	½	½
161	0	9½	16½	6¼	2⅜	½	⅝
162	2⅜	5½	12¼	2¼	3¾	½	⅝
163	0	9½	16½	6¼	2⅜	½	⅝

Order by Figure number.

Grinnell Hook Plates—*Cast Iron*

Standard Type
Fig. No. 166

Expansion Type
Fig. No. 167

Grinnell Hook Plates, while cheaper than our adjustable wall coil hangers shown on preceding pages, have neither the strength nor adjustability of that product.

The difference in price is in most cases more than offset by the installation cost.

Grinnell Expansion Hook Plates are designed for supporting wall coils in corners to provide for expansion whereas hook plates are used in the ordinary work.

Grinnell Hook Plates are listed up to six branch only, but when a greater number than six branches are required, order two plates of six branch or less.

The following list shows how these combinations can best be made.

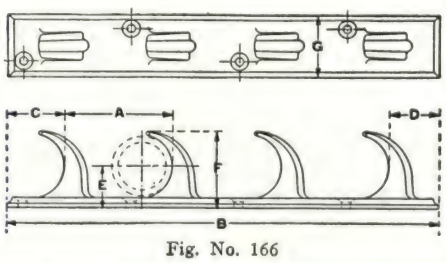


Fig. No. 166

Standard and Expansion Types

For 7 Branch plate use—one 3 branch and one 4 branch.

For 8 Branch plate use—two 4 branch.

For 9 Branch plate use—one 5 branch and one 4 branch.

For 10 Branch plate use—two 5 branch.

For 12 Branch plate use—two 6 branch.

LIST PRICES—FIG. NO. 166, 167

Number of branches	2	3	4	5	6
1 in. hook plates	.18	.23	.26	.32	.38
1¼ in. hook plates	.21	.27	.32	.41	.52
1½ in. hook plates	.28	.43	.58	.72	.88
2 in. hook plates	.43	.65	.90	1.15	1.35
1 in. expansion hook plates	.25	.35	.50	.60	.70
1¼ in. expansion hook plates	.27	.40	.60	.70	.80
1½ in. expansion hook plates	.40	.60	.75	.90	1.00
2 in. expansion hook plates	.60	.85	1.00	1.35	1.55

DIMENSIONS—STANDARD TYPE

Number branch	Pipe size	A	B	C	D	E	F	G	Number screws
2		2½	5	1½	1	31/32	1 13/16	1¾	2
3		2½	7½	1½	1	31/32	1 13/16	1¾	3
4	1	2½	10	1½	1	31/32	1 13/16	1¾	4
5		2½	12½	1½	1	31/32	1 13/16	1¾	5
6		2½	15	1½	1	31/32	1 13/16	1¾	6
2		3	6	1 5/8	1 3/8	1 5/32	2 3/16	1 7/8	2
3		3	9	1 5/8	1 3/8	1 5/32	2 3/16	1 7/8	3
4	1¼	3	12	1 5/8	1 3/8	1 5/32	2 3/16	1 7/8	4
5		3	15	1 5/8	1 3/8	1 5/32	2 3/16	1 7/8	5
6		3	18	1 5/8	1 3/8	1 5/32	2 3/16	1 7/8	6
2		3½	7	1 7/8	1 5/8	1 11/32	2½	2	2
3		3½	10½	1 7/8	1 5/8	1 11/32	2½	2	3
4	1½	3½	14	1 7/8	1 5/8	1 11/32	2½	2	4
5		3½	17½	1 7/8	1 5/8	1 11/32	2½	2	5
6		3½	21	1 7/8	1 5/8	1 11/32	2½	2	6
2		4½	9	2½	2	1 5/8	3 1/8	2 3/8	2
3		4½	13½	2½	2	1 5/8	3 1/8	2 3/8	3
4	2	4½	18	2½	2	1 5/8	3 1/8	2 3/8	4
5		4½	22½	2½	2	1 5/8	3 1/8	2 3/8	5
6		4½	27	2½	2	1 5/8	3 1/8	2 3/8	6

Order by Figure number.
Note: Use 1½ in. No. 18 screws.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Hook Plates *(Continued)*

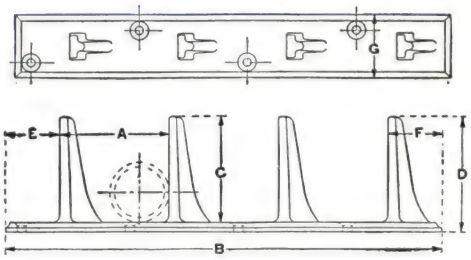


Fig. No. 167

Note: Use 1½ in. No. 18 screws.
Order by Figure number.

DIMENSIONS—EXPANSION TYPE

Number branch	Pipe size	A	B	C	D	E	F	G	Number screws
2		2½	5	2¾	3	1¼	1¼	1¾	2
3		2½	7½	2¾	3	1¼	1¼	1¾	3
4	1	2½	10	2¾	3	1¼	1¼	1¾	4
5		2½	12½	2¾	3	1¼	1¼	1¾	5
6		2½	15	2¾	3	1¼	1¼	1¾	6
2		3	6	3¼	3½	1¼	1¾	1⅞	2
3		3	9	3¼	3½	1¼	1¾	1⅞	3
4	1¼	3	12	3¼	3½	1¼	1¾	1⅞	4
5		3	15	3¼	3½	1¼	1¾	1⅞	5
6		3	18	3¼	3½	1¼	1¾	1⅞	6
2		3½	7	3 7/16	3¾	1¾	1¾	2	2
3		3½	10½	3 7/16	3¾	1¾	1¾	2	3
4	1½	3½	14	3 7/16	3¾	1¾	1¾	2	4
5		3½	17½	3 7/16	3¾	1¾	1¾	2	5
6		3½	21	3 7/16	3¾	1¾	1¾	2	6
2		4½	9	3 11/16	4	2⅜	2⅛	2⅜	2
3		4½	13½	3 11/16	4	2⅜	2⅛	2⅜	3
4	2	4½	18	3 11/16	4	2⅜	2⅛	2⅜	4
5		4½	22½	3 11/16	4	2⅜	2⅛	2⅜	5
6		4½	27	3 11/16	4	2⅜	2⅛	2⅜	6

Order by Figure number.

Grinnell Single Hooks—*Cast Iron*

Single Hook
Fig. No. 168

For supporting ½ to 3-in. pipe this single hook has two distinct advantages—strength and neatness of appearance when installed. It is used mainly from side of beams where no adjustment is necessary, and in cases where there is no expansion or contraction. They are applied directly to beams with wood or coach screws.

They are useful for hanging small lines from walls, such as heating return mains, gas, water lines, etc. When put to such use, they are attached to wooden block fastened to wall.

The sketch (Fig. A) illustrates how the single books are used in conjunction with hook plate carrying wall coil. Note that hook plate and single hook in this sketch are shown screwed to wood block. Wood block is affixed to wall with bolts and expansion cases.

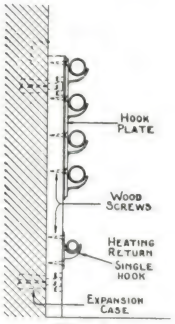
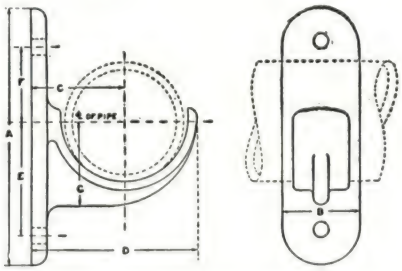


Fig. A



LIST PRICES AND DIMENSIONS—FIG. NO. 168

Pipe size	Price ea.	A	B	C	D	E	F	G	Size screws
½	.08	2 11/16	15/16	23/32	1 5/16	17/32	5/8	25/32	No. 14
¾	.08	3 1/16	1	27/32	1 19/32	1 13/32	23/32	31/32	No. 14
1	.09	3½	1⅛	1 1/64	1 29/32	1 5/8	13/16	1 3/16	No. 14
1¼	.10	4⅛	1¼	1 7/32	2 5/16	1 15/16	1 1/16	1⅜	No. 18
1½	.15	4 9/16	1⅜	1⅜	2 19/32	2⅛	1 3/16	1 17/32	No. 18
2	.22	5½	1⅝	1 21/32	3⅛	2 15/32	1 13/32	1 27/32	No. 18
2½	.35	6⅝	2	2 5/16	4⅛	3 1/16	1¾	2 3/16	⅜
3	.50	7½	2¼	2 11/16	4 13/16	3 7/16	2 1/16	2 9/16	⅜

Order by Figure number.

Grinnell Ring Plates—*Cast Iron*

Standard and Expansion Types

Standard Type
Fig. No. 164

Expansion Type
Fig. No. 165

Although we do not recommend these ring plates for general use there are cases where they can be used to advantage.

For general use, the adjustable wall coil hanger shown on pages 20 and 21 is preferable—the adjustable features of that hanger making it a practical and adaptable device for hanging coils.

When heating circulation is to be installed in saw-tooth monitor or from crane rail, adjustable hanger plate should be used as shown on page 20, illustrations X and Y.
Order by Figure number.

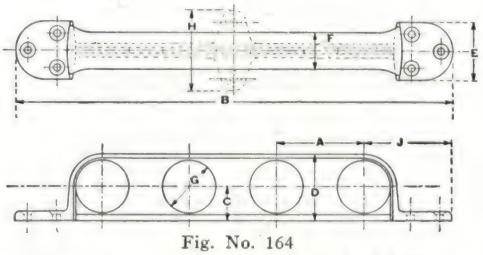


Fig. No. 164

Note: Lugs midway between ends on 2 in.-8 branch and over. 1½ in.-9 branch and over. 1¼ in.-12-16 branch. 18 branch has 4 lugs.
Use 1½ in. No. 18 screws.
Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Ring Plates *(Continued)*

LIST PRICES—DIMENSIONS—STANDARD TYPE—FIG. NO. 164

Number branch	Pipe size	Price ea.	A	B	C	D	E	F	G	H	J	Number screws
1	1¼	$.21	....	6	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	.25	....	6	1 11/16	3 1/16	2	1½	2⅛	....	3	6
2	1¼	.35	3	9	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	.45	3½	10½	1⅜	2 11/16	2⅜	1½	2⅛	....	3½	6
3	1	.41	2½	10	1⅛	2⅛	1⅞	1¼	1½	....	2½	6
	1¼	.50	3	12	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	.60	3½	14	1⅜	2 11/16	2⅜	1½	2⅛	....	3½	6
4	1	.50	2½	12½	1⅛	2⅛	1⅞	1¼	1½	....	2½	6
	1¼	.62	3	15	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	.72	3½	17½	1⅜	2 11/16	2⅜	1½	2⅛	....	3½	6
5	1	.62	2½	15	1⅛	2⅛	1⅞	1¼	1½	....	2½	6
	1¼	.75	3	18	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	.90	3½	21	1⅜	2 11/16	2⅜	1½	2⅛	....	3½	6
	2	1.05	4½	25⅝	1⅝	3 3/16	2⅜	1½	2⅝	....	3 13/16	6
6	1	.72	2½	17½	1⅛	2⅛	1⅞	1¼	1½	....	2½	6
	1¼	1.10	3	21	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	1.35	3½	24½	1⅜	2 11/16	2⅜	1½	2⅛	....	3½	6
	2	1.55	4½	30⅛	1⅝	3 3/16	2⅜	1½	2⅝	....	3 13/16	6
7	1	.96	2½	20	1⅛	2⅛	1⅞	1¼	1½	....	2½	6
	1¼	1.25	3	24	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	1.55	3½	28	1⅜	2 11/16	2⅜	1½	2⅛	....	3½	6
	2	1.90	4½	34⅝	1⅝	3 3/16	2⅜	1½	2⅝	....	3 13/16	6
8	1	1.00	2½	22½	1⅛	2⅛	1⅞	1¼	1½	....	2½	6
	1¼	1.40	3	27	1¼	2½	2⅛	1½	1⅞	....	5	6
	1½	1.65	3½	31½	1⅜	2 11/16	2⅜	1½	2⅛	....	3½	6
	2	2.10	4½	39⅛	1⅝	3 3/16	2⅜	1½	2⅝	2 9/16	3 13/16	8
9	1¼	1.55	3	30	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	1.95	3½	35	1⅜	2 11/16	2⅜	1½	2⅛	3¼	3½	8
10	1¼	1.75	3	33	1¼	2½	2⅛	1½	1⅞	....	3	6
	1½	2.15	3½	38½	1⅜	2 11/16	2⅜	1½	2⅛	3¼	3½	8
	2	3.50	4½	48⅛	1⅝	3 3/16	2⅜	1½	2⅝	2 9/16	3 13/16	8
12	1¼	2.35	3	39	1¼	2½	2⅛	1½	1⅞	3⅜	3	8
	1½	4.50	3½	45½	1⅜	2 11/16	2⅜	1½	2⅛	3¼	3½	8
16	1¼	4.25	3	51	1¼	2½	2⅛	1½	1⅞	3⅜	3	8
18	1¼	6.00	3	57	1¼	2½	2⅛	1½	1⅞	3⅜	3	10

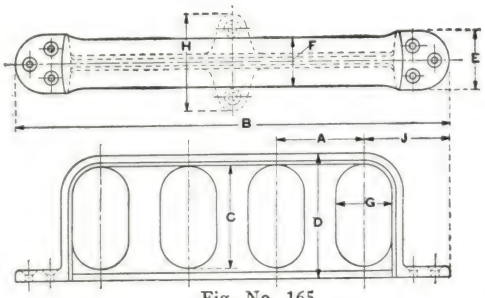


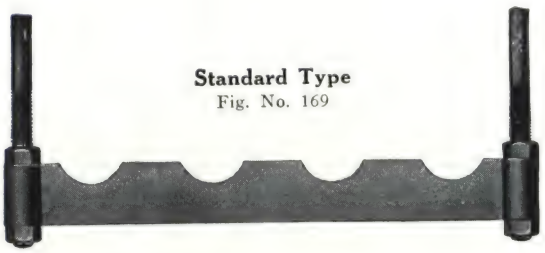
Fig. No. 165

Note: Lugs midway between ends on 1¼ in. 12-16 branch. 18 branch has 4 lugs. Use 1½ in. No. 18 screws.

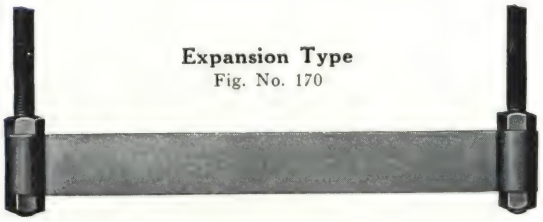
LIST PRICES AND DIMENSIONS—EXPANSION TYPE—FIG. NO. 165

Number branch	Pipe size	Price ea.	A	B	C	D	E	F	G	H	J	Number screws
2	1¼	$.40	3	8⅞	3½	4⅛	2	1 11/16	1⅞	....	2 15/16	6
	1½	.50	3½	10½	4⅛	4⅞	2⅜	1½	2⅛	....	3½	6
3	1¼	.60	3	11½	3½	4⅛	2	1½	1⅞	....	2¾	6
	1½	.70	3½	14	4⅛	4⅞	2⅜	1½	2⅛	....	3½	6
4	1¼	.75	3	14⅞	3½	4⅛	2	1 11/16	1⅞	....	2 15/16	6
	1½	.85	3½	17½	4⅛	4⅞	2⅜	1½	2⅛	....	3½	6
5	1¼	.90	3	17 13/16	3½	4⅛	2	1⅝	1⅞	....	2 29/32	6
	1½	1.05	3½	21	4⅛	4⅞	2⅜	1½	2⅛	....	3½	6
6	1¼	1.25	3	20 9/16	3½	4⅛	2	1 11/16	1⅞	....	2 25/32	6
	1½	1.50	3½	24½	4⅛	4⅞	2⅜	1½	2⅛	....	3½	6
7	1¼	1.50	3	23⅞	3½	4⅛	2	1⅝	1⅞	....	2 15/16	6
	1½	1.80	3½	28	4⅛	4⅞	2⅜	1½	2⅛	....	3½	6
8	1¼	1.70	3	26⅞	3½	4⅛	2	1 11/16	1⅞	....	2 15/16	6
9	1¼	2.00	3	29 9/16	3½	4⅛	2	1⅝	1⅞	....	2 25/32	6
10	1¼	2.50	3	32 11/16	3½	4⅛	2	1 11/16	1⅞	....	2 27/32	6
12	1¼	3.25	3	39	3⅝	4½	2	1½	1⅞	3⅜	3	8
16	1¼	4.25	3	51	3⅝	4 7/16	2	1½	1⅞	3⅜	3	8
18	1¼	6.00	3	57	3 9/16	4 7/16	2	1½	1⅞	3⅜	3	10

Grinnell Saddle Hangers—*Steel*



Standard Type
Fig. No. 169



Expansion Type
Fig. No. 170

Grinnell Saddle Hangers are made of steel instead of cast iron. The steel bar is shaped at both ends to take the hanger rods. Hex nuts at bottom of rods support the hanger and allow vertical adjustment by turning nuts to right or left.

The standard type of Grinnell Saddle Hanger has recesses punched out for holding the pipe. The expansion type is a plain steel bar for use at corners of coils to take care of sidewise movement due to expansion.

The saddle hanger is used in connection with ½-in. rods and hex nuts on 2 to 8 branch hangers—⅝-in. rods and hex nuts on 9 to 12 branch hangers—and with expansion cases, Grinnell Hanger Flanges, side I-beam clamps, etc., for supporting overhead coils.

These saddle hangers are exceptionally strong and will not sag. Labor cost of installation is considerably less than with branch rolls and rods.

Note: Order separately, the hanger rods and nuts, giving diameter, length, and length of thread at each end of rod.

List prices and dimensions on following page.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Saddle Hangers *(Continued)*

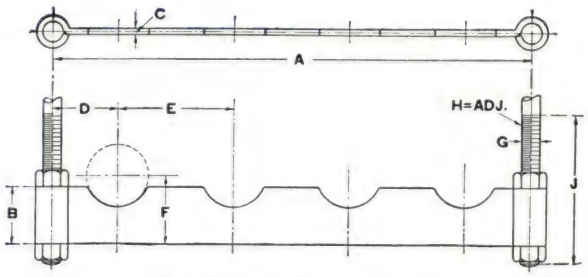


Fig. No. 169. Standard Type

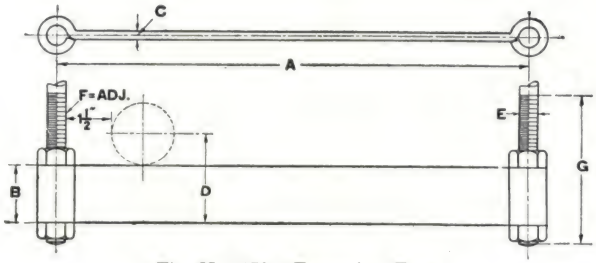


Fig. No. 170. Expansion Type

LIST PRICES AND DIMENSIONS—FIG. NO. 169

Pipe size	Number of brauches	Price ea.	A	B	C	D	E	F	G	H	J
	2	$0.20	6	1 1/2	3/16	1 3/4	2 1/2	1 11/16	1/2	2 1/2	5
	3	.25	8 1/2	1 1/2	3/16	1 3/4	2 1/2	1 11/16	1/2	2 1/2	5
	4	.30	11	1 1/2	3/16	1 3/4	2 1/2	1 11/16	1/2	2 1/2	5
	5	.35	13 1/2	1 1/2	3/16	1 3/4	2 1/2	1 11/16	1/2	2 1/2	5
1	6	.40	16	1 1/2	3/16	1 3/4	2 1/2	1 11/16	1/2	2 1/2	5
	7	.45	18 1/2	1 3/4	1/4	1 3/4	2 1/2	1 15/16	1/2	2 1/4	5
	8	.55	21	1 3/4	1/4	1 3/4	2 1/2	1 15/16	1/2	2 1/4	5
	9	.60	23 1/2	1 3/4	1/4	1 3/4	2 1/2	1 15/16	5/8	2 3/4	5 3/4
	10	.65	26	1 3/4	1/4	1 3/4	2 1/2	1 15/16	5/8	2 3/4	5 3/4
	12	.80	31	1 3/4	1/4	1 3/4	2 1/2	1 15/16	5/8	2 3/4	5 3/4
	2	.25	6 3/4	1 3/4	3/16	1 7/8	3	2	1/2	2 1/4	5
	3	.30	9 3/4	1 3/4	3/16	1 7/8	3	2	1/2	2 1/4	5
	4	.35	12 3/4	1 3/4	3/16	1 7/8	3	2	1/2	2 1/4	5
	5	.40	15 3/4	1 3/4	3/16	1 7/8	3	2	1/2	2 1/4	5
1 1/4	6	.45	18 3/4	1 3/4	3/16	1 7/8	3	2	1/2	2 1/4	5
	7	.50	21 3/4	2	1/4	1 7/8	3	2 1/4	1/2	2	5
	8	.60	24 3/4	2	1/4	1 7/8	3	2 1/4	1/2	2	5
	9	.75	27 3/4	2	1/4	1 7/8	3	2 1/4	5/8	2 1/2	5 3/4
	10	.90	30 3/4	2	1/4	1 7/8	3	2 1/4	5/8	2 1/2	5 3/4
	12	1.20	36 3/4	2	1/4	1 7/8	3	2 1/4	5/8	2 1/2	5 3/4

List prices do not include hanger rods and nuts.
Order by Figure number.

LIST PRICES AND DIMENSIONS—FIG. NO. 169

Pipe size	Number of branches	Price ea.	A	B	C	D	E	F	G	H	J
	2	$0.35	7 1/2	1 3/4	3/16	2	3 1/2	2 1/16	1/2	2 1/4	5
	3	.40	11	1 3/4	3/16	2	3 1/2	2 1/16	1/2	2 1/4	5
	4	.45	14 1/2	1 3/4	3/16	2	3 1/2	2 1/16	1/2	2 1/4	5
	5	.50	18	1 3/4	3/16	2	3 1/2	2 1/16	1/2	2 1/4	5
	6	.55	21 1/2	1 3/4	3/16	2	3 1/2	2 1/16	1/2	2 1/4	5
1 1/2	7	.60	25	2	1/4	2	3 1/2	2 5/16	1/2	2	5
	8	.70	28 1/2	2	1/4	2	3 1/2	2 5/16	1/2	2	5
	9	.85	32	2	1/4	2	3 1/2	2 5/16	5/8	2 1/2	5 3/4
	10	1.05	35 1/2	2 1/2	1/4	2	3 1/2	2 13/16	5/8	2	5 3/4
	12	1.40	42 1/2	2 1/2	1/4	2	3 1/2	2 13/16	5/8	2	5 3/4
	2	.40	9	2	1/4	2 1/4	4 1/2	2 1/2	1/2	2	5
	3	.45	13 1/2	2	1/4	2 1/4	4 1/2	2 1/2	1/2	2	5
	4	.50	18	2	1/4	2 1/4	4 1/2	2 1/2	1/2	2	5
	5	.55	22 1/2	2	1/4	2 1/4	4 1/2	2 1/2	1/2	2	5
	6	.60	27	2	1/4	2 1/4	4 1/2	2 1/2	1/2	2	5
2	7	.75	31 1/2	2 1/2	1/4	2 1/4	4 1/2	3	1/2	1 1/2	5
	8	.85	36	2 1/2	1/4	2 1/4	4 1/2	3	1/2	1 1/2	5
	9	1.00	40 1/2	2 1/2	1/4	2 1/4	4 1/2	3	5/8	2	5 3/4
	10	1.20	45	3	1/4	2 1/4	4 1/2	3 1/2	5/8	1 1/2	5 3/4
	12	1.50	54	3	1/4	2 1/4	4 1/2	3 1/2	5/8	1 1/2	5 3/4

List prices do not include hanger rods and nuts.
Order by Figure number.

LIST PRICES AND DIMENSIONS—FIG. NO. 170

Pipe size	Number of branches	Price ea.	A	B	C	D	E	F	G
	2	$0.15	7 1/2	1 1/4	3/16	1 7/8	1/2	2 3/4	5
	3	.20	10	1 1/4	3/16	1 7/8	1/2	2 3/4	5
	4	.25	12 1/2	1 1/4	3/16	1 7/8	1/2	2 3/4	5
	5	.30	15	1 1/4	3/16	1 7/8	1/2	2 3/4	5
	6	.35	17 1/2	1 1/4	3/16	1 7/8	1/2	2 3/4	5
1	7	.40	20	1 1/2	1/4	2 1/8	1/2	2 1/2	5
	8	.50	22 1/2	1 1/2	1/4	2 1/8	1/2	2 1/2	5
	9	.55	25	1 1/2	1/4	2 1/8	5/8	3	5 3/4
	10	.60	27 1/2	1 1/2	1/4	2 1/8	5/8	3	5 3/4
	12	.75	32 1/2	1 1/2	1/4	2 1/8	5/8	3	5 3/4
	2	.20	8 1/4	1 1/2	3/16	2 5/16	1/2	2 1/2	5
	3	.25	11 1/4	1 1/2	3/16	2 5/16	1/2	2 1/2	5
	4	.30	14 1/4	1 1/2	3/16	2 5/16	1/2	2 1/2	5
	5	.35	17 1/4	1 1/2	3/16	2 5/16	1/2	2 1/2	5
	6	.40	20 1/4	1 1/2	3/16	2 5/16	1/2	2 1/2	5
1 1/4	7	.45	23 1/4	1 3/4	1/4	2 9/16	1/2	2 1/4	5
	8	.55	26 1/4	1 3/4	1/4	2 9/16	1/2	2 1/4	5
	9	.70	29 1/4	1 3/4	1/4	2 9/16	5/8	2 3/4	5 3/4
	10	.85	32 1/4	1 3/4	1/4	2 9/16	5/8	2 3/4	5 3/4
	12	1.10	38 1/4	1 3/4	1/4	2 9/16	5/8	2 3/4	5 3/4

List prices do not include hanger rods and nuts.
Order by Figure number.

LIST PRICES AND DIMENSIONS—FIG. NO. 170

Pipe size	Number of branches	Price ea.	A	B	C	D	E	F	G
	2	$0.30	9	1 1/2	3/16	2 7/16	1/2	2 1/2	5
	3	.35	12 1/2	1 1/2	3/16	2 7/16	1/2	2 1/2	5
	4	.40	16	1 1/2	3/16	2 7/16	1/2	2 1/2	5
	5	.45	19 1/2	1 1/2	3/16	2 7/16	1/2	2 1/2	5
	6	.50	23	1 1/2	3/16	2 7/16	1/2	2 1/2	5
1 1/2	7	.55	26 1/2	1 3/4	1/4	2 11/16	1/2	2 1/4	5
	8	.65	30	1 3/4	1/4	2 11/16	1/2	2 1/4	5
	9	.75	33 1/2	1 3/4	1/4	2 11/16	5/8	2 3/4	5 3/4
	10	.90	37	1 3/4	1/4	2 11/16	5/8	2 3/4	5 3/4
	12	1.20	44	1 3/4	1/4	2 11/16	5/8	2 3/4	5 3/4
	2	.35	10 1/2	1 3/4	1/4	2 15/16	1/2	2 1/4	5
	3	.40	15	1 3/4	1/4	2 15/16	1/2	2 1/4	5
	4	.45	19 1/2	1 3/4	1/4	2 15/16	1/2	2 1/4	5
	5	.50	24	1 3/4	1/4	2 15/16	1/2	2 1/4	5
	6	.55	28 1/2	1 3/4	1/4	2 15/16	1/2	2 1/4	5
2	7	.65	33	2 1/2	1/4	3 11/16	1/2	1 1/2	5
	8	.75	37 1/2	2 1/2	1/4	3 11/16	1/2	1 1/2	5
	9	.90	42	2 1/2	1/4	3 11/16	5/8	2	5 3/4
	10	1.10	46 1/2	2 1/2	1/4	3 11/16	5/8	2	5 3/4
	12	1.40	55 1/2	2 1/2	1/4	3 11/16	5/8	2	5 3/4

List prices do not include hanger rods and nuts.
Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Single Pipe Rolls—Branch Pipe Rolls

Grinnell Single and Branch Pipe Rolls are especially designed to take care of expansion and contraction. Rolls are made hollow, which means small surface in contact with rod. See line sketch.

The adjustable sockets permit vertical adjustment at the roll. The nut at the bottom of the hanger rod fits into a recess in the socket, thus preventing loosening or turning from vibration.

On branch pipe rolls for seven to twelve branches inclusive, an adjustable hook is provided for a third or center hanger rod. See diagram.

Single Pipe Rolls
Fig. No. 171

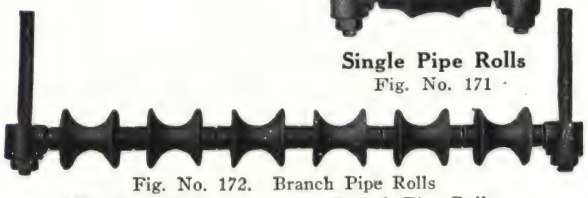


Fig. No. 172. Branch Pipe Rolls
Fig. No. 172-E. Expansion Branch Pipe Rolls

Notes

See page 27 for single pipe rolls with special sockets for use with pipe covering protection saddles.

For 2-in. overhead coils use saddle hangers. See preceding pages.

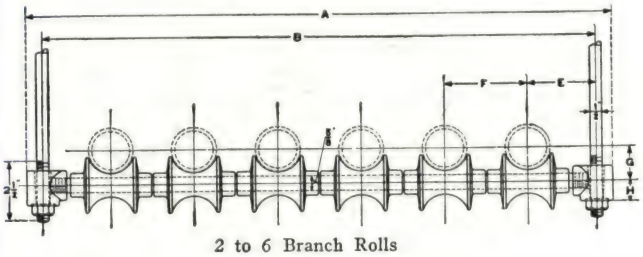
Instructions for Ordering—Single Pipe Rolls

To order single pipe rolls with roll rods and adjustable sockets, specify:
..... (*Quantity*) ..... (*Size*) pipe rolls, rods and adjustable sockets, Fig. No. 171.

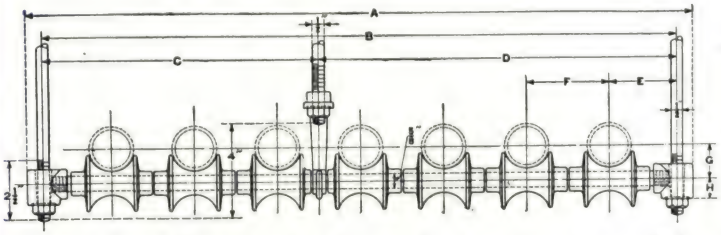
To order single pipe rolls without roll rods or adjustable sockets, specify:
..... (*Quantity*) ..... (*Size*) pipe rolls, Fig. No. 173.

To order adjustable sockets only, specify:
..... (*Quantity*) ..... No. ( ) adjustable sockets, Fig. No. 171-A.

Note: Hanger rods and nuts are to be ordered separately.



2 to 6 Branch Rolls



7 to 12 Branch Rolls Showing Adjustable Hook for Center Hanger Rod

Instructions for Ordering—Branch Pipe Rolls

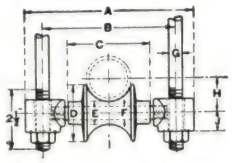
To order branch pipe rolls with roll rods and adjustable sockets, specify:
..... (*Quantity*) ..... (*Size*) ..... (*No.*) branch pipe rolls, rods and adjustable sockets, Fig. No. 172.

To order expansion branch pipe rolls with roll rods and adjustable sockets, specify:
..... (*Quantity*) ..... (*Size*) ..... (*No.*) branch expansion pipe rolls, rods and adjustable sockets, Fig. No. 172-E.

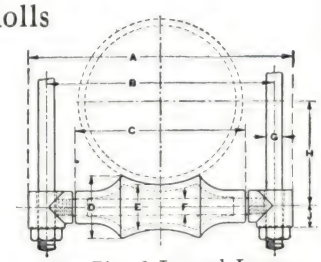
To order adjustable sockets only, specify:
..... (*Quantity*) ..... No. 2 adjustable sockets, Fig. No. 171-A.

To order adjustable hooks only, specify:
..... (*Quantity*) ..... adjustable hooks, Fig. No. 172-A.

Note: Hanger rods and nuts are to be ordered separately.



For Pipe 1 to 1½ In.



For Pipe 2 In. and Larger

Fig. No. 171

LIST PRICES AND DIMENSIONS—FIG. NO. 171

Pipe size, in.	Price, ea. Pipe rolls with roll rods and adj. sock.	Pipe rolls only Fig. No. 173	Adj.sock. only, ea. Fig. No. 171-A	No of adj. sock.	Dimensions A	B	C	D	E	F	G	H	J
1	$0.35	$0.08	$0.11	1	5 5/8	4 1/2	2 7/16	1 15/16	1			1 3/16	
1¼	.35	.09	.11		6 1/8	5	2 15/16	2 1/8	1	5/8	3/8	1 5/16	13/16
1½	.35	.10	.11		6 5/8	5 1/2	3 7/16	2 3/8	1			1 7/16	
2	.40	.13	.11		6	4 7/8	2 7/8	1 3/8	1 3/16			1 3/4	
2½	.40	.15	.12	2	7 1/2	6 1/8	4	1 9/16	1 5/16	5/8	1/2	2 1/16	7/8
3	.45	.18	.12		7 1/2	6 1/8	4	1 5/8	1 5/16			2 3/8	
3½	.45	.21	.12		7 7/8	6 1/2	4 1/4	1 7/8	1 1/2			2 3/4	
4	.45	.21	.12	3	8 3/4	7 1/8	4 3/4	1 15/16	1 1/2	5/8	5/8	3	7/8
5	.65	.24	.12		9 13/16	8 1/16	5 13/16	2 5/16	1 3/4			3 5/8	
6	.75	.27	.22	4	11 5/8	9 3/4	6 7/8	2 9/16	1 7/8	3/4	3/4	4 1/4	1
7	.85	.36	.22		12 5/8	10 3/4	7 7/8	2 7/8	2 1/8			4 7/8	
8	1.25	.60	.25	5	14 1/4	12 1/8	8 7/8	3 3/8	2 7/16	7/8	7/8	5 1/2	1 1/8
9	1.80	1.00	.25		15 1/4	13 1/8	9 7/8	3 3/4	2 11/16			6 1/8	
10	2.20	1.40	.25		16 3/8	14 1/4	11	4 1/8	3			6 7/8	
12	3.50	2.00	.25		18 3/8	16 1/4	13	4 5/8	3 1/4			8	
14	4.00	2.75	.40	6	20 1/4	17 1/8	14 1/4	4 7/8	3 3/8	1	1	8 11/16	1 1/4
15	5.00	3.50	.40		21 1/4	18 7/8	15 1/4	5	3 3/8			9 3/16	
16	6.00	4.50	.40		22 1/4	19 7/8	16 1/4	5 3/8	3 5/8			9 13/16	
18	8.00	6.00	.60	7	24 7/8	22 1/4	18 1/4	5 11/16	3 3/4	1 1/8	1 1/8	10 7/8	1 3/8
20	12.00	8.00	1.00	8	27	24	20 1/4	6	3 7/8	1 1/4	1 1/4	11 15/16	1 1/2
24	15.00	10.50	1.25	9	31 3/4	28 1/4	24 1/4	7 3/8	4 3/4	1 1/2	1 1/2	14 3/8	1 3/4
30	24.00	16.00	2.00	10	39 7/8	35 1/2	30 1/4	9	5 7/8	1 7/8	1 7/8	17 15/16	2 1/8

LIST PRICES AND DIMENSIONS—FIG. NO. 172

Pipe size, in.	No. of branches	Price, ea. Fig. Nos. 172—172-E	Adj. socket Fig. No. 171-A	Adj. hook Fig. No. 172-A	Dimensions A	B	C	D	E	F	G	H
1	2	$ .55	$ .12	.....	8 5/8	7 1/4	.....	.....	2 3/8	2 1/2	1 3/8	7/8
	3	.75	.12	.....	11 1/8	9 3/4	.....	.....	2 3/8	2 1/2	1 3/8	7/8
	4	.85	.12	.....	13 5/8	12 1/4	.....	.....	2 3/8	2 1/2	1 3/8	7/8
	5	.95	.12	.....	16 1/8	14 3/4	.....	.....	2 3/8	2 1/2	1 3/8	7/8
	6	1.05	.12	.....	18 5/8	17 1/4	.....	.....	2 3/8	2 1/2	1 3/8	7/8
	7	1.30	.12	$ .15	21 1/8	19 3/4	8 5/8	11 1/8	2 3/8	2 1/2	1 3/8	7/8
	8	1.45	.12	.15	23 5/8	22 1/4	11 1/8	11 1/8	2 3/8	2 1/2	1 3/8	7/8
	9	1.50	.12	.15	26 1/8	24 3/4	11 1/8	13 5/8	2 3/8	2 1/2	1 3/8	7/8
	10	1.60	.12	.15	28 5/8	27 1/4	13 5/8	13 5/8	2 3/8	2 1/2	1 3/8	7/8
	11	1.70	.12	.15	31 1/8	29 3/4	13 5/8	16 1/8	2 3/8	2 1/2	1 3/8	7/8
	12	1.80	.12	.15	33 5/8	32 1/4	16 1/8	16 1/8	2 3/8	2 1/2	1 3/8	7/8
1¼	2	.60	.12	.....	9 5/8	8 1/4	.....	.....	2 5/8	3	1 5/16	7/8
	3	.80	.12	.....	12 5/8	11 1/4	.....	.....	2 5/8	3	1 5/16	7/8
	4	.90	.12	.....	15 5/8	14 1/4	.....	.....	2 5/8	3	1 5/16	7/8
	5	1.00	.12	.....	18 5/8	17 1/4	.....	.....	2 5/8	3	1 5/16	7/8
	6	1.10	.12	.....	21 5/8	20 1/4	.....	.....	2 5/8	3	1 5/16	7/8
	7	1.35	.12	.15	24 5/8	23 1/4	10 1/8	13 1/8	2 5/8	3	1 5/16	7/8
	8	1.60	.12	.15	27 5/8	26 1/4	13 1/8	13 1/8	2 5/8	3	1 5/16	7/8
	9	1.70	.12	.15	30 5/8	29 1/4	13 1/8	16 1/8	2 5/8	3	1 5/16	7/8
	10	1.80	.12	.15	33 5/8	32 1/4	16 1/8	16 1/8	2 5/8	3	1 5/16	7/8
	11	1.90	.12	.15	36 5/8	35 1/4	16 1/8	19 1/8	2 5/8	3	1 5/16	7/8
	12	2.00	.12	.15	39 5/8	38 1/4	19 1/8	19 1/8	2 5/8	3	1 5/16	7/8
1½	2	.65	.12	.....	10 5/8	9 1/4	.....	.....	2 7/8	3 1/2	1 7/16	7/8
	3	.85	.12	.....	14 1/8	12 3/4	.....	.....	2 7/8	3 1/2	1 7/16	7/8
	4	1.00	.12	.....	17 5/8	16 1/4	.....	.....	2 7/8	3 1/2	1 7/16	7/8
	5	1.10	.12	.....	21 1/8	19 3/4	.....	.....	2 7/8	3 1/2	1 7/16	7/8
	6	1.25	.12	.....	24 5/8	23 1/4	.....	.....	2 7/8	3 1/2	1 7/16	7/8
	7	1.50	.12	.15	28 1/4	26 3/4	11 5/8	15 1/8	2 7/8	3 1/2	1 7/16	7/8
	8	1.75	.12	.15	31 5/8	30 1/4	15 1/8	15 1/8	2 7/8	3 1/2	1 7/16	7/8
	9	1.85	.12	.15	35 1/8	33 3/4	15 1/8	18 5/8	2 7/8	3 1/2	1 7/16	7/8
	10	2.00	.12	.15	38 5/8	37 1/4	18 5/8	18 5/8	2 7/8	3 1/2	1 7/16	7/8
	11	2.10	.12	.15	42 1/8	40 3/4	18 5/8	22 1/8	2 7/8	3 1/2	1 7/16	7/8
	12	2.25	.12	.15	45 5/8	44 1/4	22 1/8	22 1/8	2 7/8	3 1/2	1 7/16	7/8

Notes: For expansion branch rolls, add 1½ in. to dimensions A and B.

For 2-in. overhead coils, use saddle hangers—see pages 23 and 24.

Number of adjustable sockets, 2.

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

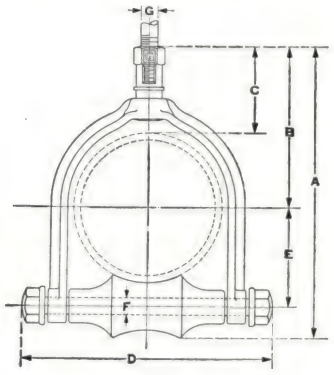
Grinnell Adjustable Swivel Pipe Rolls

The Adjustable Swivel Pipe Roll supplies the need for an adjustable type of pipe roll hanger with single hanger rod. It is unique inasmuch as vertical adjustment can be made by use of the swivel shank at the top of the hanger.

As in the swivel pipe ring, Fig. No. 101 shown on page 10, the swivel shank automatically locks, preventing loosening due to vibration in the pipe line.

When Fig. No. 174 adjustable swivel pipe rolls are to be used on line on which pipe covering is to be installed, order hangers two full sizes larger than pipe. This allows for the installation of 1-in. standard thick covering. When pipe covering protection saddles are to be used, order pipe rolls in accordance with sizes indicated in tables.

Adjustable Swivel Pipe Roll
Fig. No. 174



LIST PRICES AND DIMENSIONS—FIG. NO. 174

Pipe size	Price ea.	Dimensions						
		A	B	C	D	E	F	G
2½	$1.00	7 7/16	4 9/16	3 1/8	7 1/8	2 1/16	5/8	1/2
3	1.25	7 7/16	4 1/4	2 1/2	7 1/8	2 3/8	5/8	1/2
3½	1.50	8 1/8	4 7/16	2 7/16	7 5/8	2 3/4	5/8	1/2
4	1.75	9 3/8	5 3/8	3 1/8	8 3/16	3	5/8	5/8
5	2.50	10 5/8	5 13/16	3	9 1/4	3 5/8	5/8	5/8
6	2.75	12 5/8	7 1/16	3 3/4	11 1/4	4 1/4	3/4	3/4
7	3.50	13 7/8	7 9/16	3 3/4	12 1/4	4 7/8	3/4	3/4
8	4.25	16	8 3/4	4 7/16	13 3/4	5 9/16	7/8	7/8

Order by Figure number.

Grinnell Pipe Covering Protection Saddles—*Steel*

The illustrations show the improved pattern of Grinnell Pipe Covering Protection Saddles which are designed primarily for high temperature service or where heat losses are to be kept at a minimum.

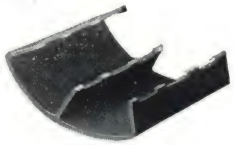
The construction of this saddle makes possible a weathertight and finished job of covering at the points of pipe support.

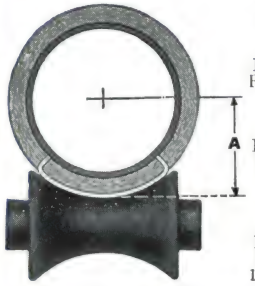
All saddles are 12-in. long and are made of curved steel plates with side edges turned up, and for 8-in. pipe and larger have a center plate welded in.

Saddles are furnished unfilled and should be filled before being put in place either with plastic cement or with sectional covering cut to suit.

For prices and dimensions of saddles for standard, double standard, and double 1½-in. covering, see table.

An illustration of our type B pipe covering protection saddle showing small points of contact which cut heat losses to a minimum.





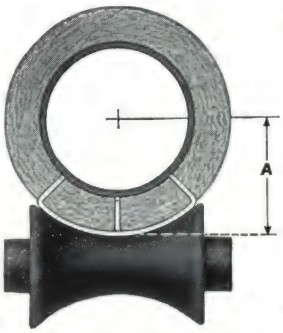
Type A. For 6-in. Pipe and Smaller

Pipe covering protection saddles

Fig. No. 186 For standard thick covering

Fig. No. 187 For double standard thick covering

Fig. No. 188 For double 1½-in. thick covering



Type B. For 8-in. Pipe and Larger

LIST PRICES AND DIMENSIONS

Nominal pipe size	Price ea. Protection saddle only	Type of saddle	Size of pipe roll to fit saddle	Center line of pipe to outside of saddle A
Saddles for Standard Thick Covering—Fig. No. 186				
3	$4.25	A	5	3
3½	4.25	A	6	3 5/16
4	4.75	A	6	3 5/8
5	4.75	A	7	4 3/16
6	5.25	A	8	4 11/16
8	5.25	B	10	5 13/16
10	5.75	B	12	7
12	5.75	B	16	8 1/4
14–o.d.	6.50	B	18	8 7/8
16–o.d.	6.50	B	20	9 7/8
18–o.d.	7.25	B	20	11
20–o.d.	7.50	B	24	12
24–o.d.	8.75	B	30	14
Saddles for Double Standard Thick Covering—Fig. No. 187				
3	$4.50	A	7	4 1/16
3½	4.50	A	8	4 5/16
4	5.00	A	8	4 3/4
5	5.00	A	9	5 5/16
6	5.50	A	10	5 13/16
8	5.50	B	14	7 1/16
10	6.25	B	16	8 1/4
12	6.25	B	20	9 3/4
14–o.d.	6.75	B	20	10 3/8
16–o.d.	6.75	B	24	11 3/8
18–o.d.	7.50	B	24	12 1/2
20–o.d.	7.75	B	30	13 1/2
24–o.d.	9.00	B	30	15 1/2
Saddles for Double 1½-in. Thick Covering—Fig. No. 188				
3	$5.00	A	9	5
3½	5.00	A	9	5 1/4
4	5.50	A	10	5 1/2
5	5.50	A	12	6
6	6.00	A	12	6 9/16
8	6.00	B	14	7 9/16
10	6.25	B	18	8 3/4
12	6.25	B	20	9 3/4
14–o.d.	6.75	B	20	10 3/8
16–o.d.	6.75	B	24	11 3/8
18–o.d.	7.50	B	24	12 1/2
20–o.d.	7.75	B	30	13 1/2
24–o.d.	9.00	B	30	15 1/2

Prices do not include rolls or covering.
Saddles for larger sizes of pipe and for other thicknesses of covering made on order. Prices on application.
Order by Figure number.

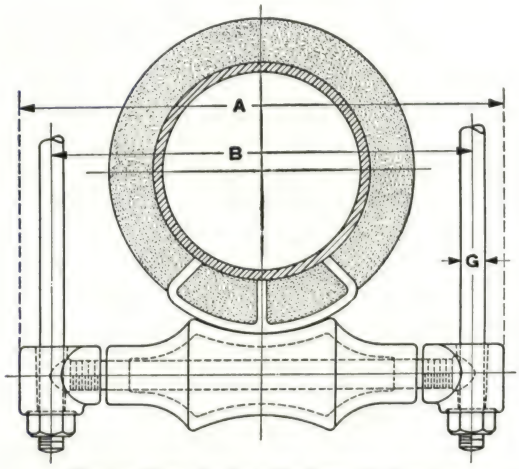
Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Single Pipe Rolls with Special Sockets for Use with Pipe Covering Protection Saddles

Grinnell Single Pipe Rolls with special sockets, Fig. No. 171-S, are an adaptation of our Fig. No. 171 single pipe rolls. The special sockets are provided to permit the use of hanger rods of the same standard size as regularly used with each size pipe, yet to allow the use of larger size rolls as required with Grinnell Pipe Covering Protection Saddles for various thicknesses of covering.

See page 26 for illustrations, description and dimensions of the Grinnell Pipe Covering Protection Saddles; also for list of sizes of pipe rolls for use with these saddles for the various thicknesses of covering.



Single Pipe Roll with Special Socket
Fig. No. 171-S

LIST PRICES AND DIMENSIONS—FIG. NO. 171-S

Nominal pipe size of roll	Price, each. Pipe rolls with roll rods and adjustable sockets	Size pipe used with pipe covering protection saddles	Size No. of adjustable sockets	Size hanger rod G	Center to center of rods B	Overall dimension A
5	$ 0.65	3	3– ½	½	8 3/16	9 3/16
6	.75	3½ 4	4– ½ 4– ⅝	½ ⅝	9¾	11⅛ 11⅜
7	.85	3 5	4– ½ 4– ⅝	½ ⅝	10¾	12⅛ 12⅜
8	1.25	3½ 4, 5 6	5– ½ 5– ⅝ 5– ¾	½ ⅝ ¾	12⅛	13½ 13¾ 14
9	1.80	3, 3½ 4, 5 6	5– ½ 5– ⅝ 5– ¾	½ ⅝ ¾	13⅛	14½ 14¾ 15
10	2.20	4, 5 6 8	5– ⅝ 5– ¾ 5	⅝ ¾ ⅞	14¼	15⅞ 16⅛ 16⅜
12	3.50	5 6 8, 10	5– ⅝ 5– ¾ 5	⅝ ¾ ⅞	16¼	17⅞ 18⅛ 18⅜
14	4.00	8, 10	6– ⅞	⅞	17⅞	20
16	6.00	10, 12	6– ⅞	⅞	19⅞	22
18	8.00	10, 12 14	7– ⅞ 7–1	⅞ 1	22¼	24⅜ 24⅝
20	12.00	12 14, 16 18	8– ⅞ 8–1 8–1⅛	⅞ 1 1⅛	24	26⅛ 26⅜ 26⅝
24	15.00	16 18 20	9–1 9–1⅛ 9–1¼	1 1⅛ 1¼	28¼	30⅝ 30⅞ 31¼
30	24.00	20 24	10–1¼ 10–1½	1¼ 1½	35½	38½ 39

See page 25 for other dimensions of single pipe rolls.

Instructions for Ordering

To order single pipe rolls with special sockets, specify: ..... *(Quantity)* ..... *(Size)* Pipe rolls, Fig. No. 171-S, with sockets No. ..... (*Size*—as 3–½).

Note: Hanger rods and nuts are to be ordered separately.

Grinnell Two-pipe Adjustable Brackets—Cast Iron

This hanger is a combination of two standard pipe rolls and a bracket. It is designed principally for supporting pipe mains in tunnels or against walls and columns, where for convenience or economy it is necessary to carry one pipe directly over the other. Designed to support pipe up to 6-in. The economy of this two-pipe adjustable hanger lies in allowing the installation of one bracket to take care of two lines. Also this hanger, by means of the pipe roll, will take care of any amount of expansion without buckling or throwing pipe out of alignment.

Note that bracket is constructed so that small pipe can be installed at top and large pipe below or vice versa. This is accomplished by slots in the bracket.

The adjustable two-pipe hanger like most Grinnell hangers, is adjustable, easily installed, compact in construction and economical to use because of its double service.

When ordering always give size of top and bottom pipe.

Order by Figure number.

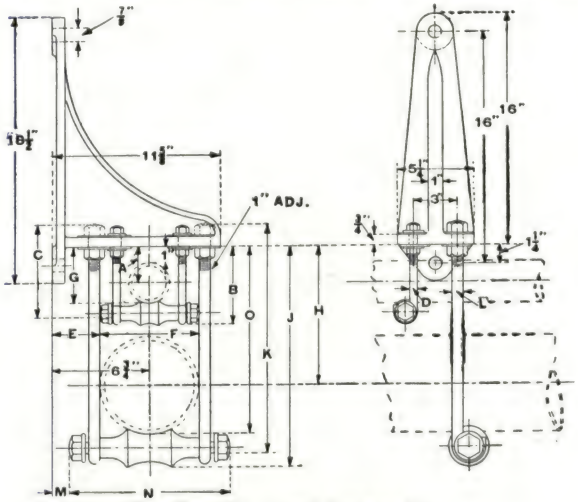


Fig. No. 175. Small Pipe on Top

Patented May 20, 1913. No. 1,062,373

Fig. No. 175. Small Pipe at Top

Fig. No. 176. Large Pipe at Top

Note: Dimensions C and K are minimum lengths for hanger rods. List prices include machine threaded hook rods in lengths C and K. For list prices on hook rods of additional lengths, see page 43.

LIST PRICES AND DIMENSIONS—FIG. NO. 175

Top pipe size	2½	2½	2½	2½	2½	2½	2½	3	3	3
Bottom pipe size	2½	3	3½	4	4½	5	6	3	3½	4
Price, ea.	$5.75	5.75	5.75	6.00	6.00	6.00	6.50	6.00	6.00	6.00
A	2 7/16	2 7/16	2 7/16	2 7/16	2 7/16	2 7/16	2 7/16	2¾	2¾	2¾
B	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	6	6	6
C	6¼	6¼	6¼	6¼	6¼	6¼	6¼	6¾	6¾	6¾
D	½	½	½	½	½	½	½	½	½	½
E	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛	3⅛
F	7¼	7¼	7¼	7¼	7¼	7¼	7¼	7¼	7¼	7¼
G	3⅞	3⅞	3⅞	3⅞	3⅞	3⅞	3⅞	4½	4½	4½
H	7 5/8	7 15/16	8 5/16	8 7/16	8 11/16	8 15/16	9½	8 9/16	8 13/16	9 1/16
J	10½	11 3/16	11 7/8	12 7/16	13 1/16	13 13/16	15 1/16	11 13/16	12½	13 1/16
K	11¾	12	12¾	13¼	13¾	14½	15½	12¾	13¼	13¾
L	½	½	½	⅝	⅝	⅝	⅝	½	½	⅝
M	3⅛	3⅛	3	2 9/16	2 5/16	2	1¼	3⅛	3	2 9/16
N	7¼	7¼	7½	8 3/8	8 7/8	9 7/16	11	7¼	7½	8 3/8
O	9 1/16	9 11/16	10 5/16	10 11/16	11 5/16	11¾	12 13/16	10 5/16	10 13/16	11 5/16

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Two-Pipe Adjustable Brackets *(Continued)*

SMALL PIPE ON TOP—FIG. NO. 175 (Continued)

Top pipe size	3	3	3	3½	3½	3½	3½	3½	4
Bottom pipe size	4½	5	6	3½	4	4½	5	6	4
Price ea.	$6.00	6.00	6.50	5.75	6.00	6.00	6.00	6.00	6.50
A	2¾	2¾	2¾	3	3	3	3	3	3¼
B	6	6	6	6 11/16	6 11/16	6 11/16	6 11/16	6 11/16	7¼
C	6¾	6¾	6¾	7½	7½	7½	7½	7½	8⅛
D	½	½	½	½	½	½	½	½	⅝
E	3⅛	3⅛	3⅛	3	3	3	3	3	2 9/16
F	7¼	7¼	7¼	7½	7½	7½	7½	7½	8⅜
G	4½	4½	4½	5	5	5	5	5	5½
H	9 5/16	9 9/16	10⅛	9½	9¾	10	10¼	10 13/16	10¼
J	13 11/16	14 7/16	15 11/16	13 3/16	13¾	14⅜	15⅛	16⅜	14¼
K	14⅜	15	16¼	13⅞	14½	15	15¾	16⅞	15
L	⅝	⅝	¾	½	⅝	⅝	⅝	¾	⅝
M	2 5/16	2	1¼	3	2 9/16	2 5/16	2	1¼	2 9/16
N	8⅞	9 7/16	11	7½	8⅜	8⅞	9 7/16	11	8⅜
O	11 13/16	12⅜	13 7/16	11½	12	12½	13 1/16	14⅛	12½

Order by Figure number.

SMALL PIPE ON TOP—FIG. NO. 175 (Continued)

Top pipe size	4	4	4	4½	4½	4½	5	5	6
Bottom pipe size	4½	5	6	4½	5	6	5	6	6
Price ea.	$6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	7.00
A	3¼	3¼	3¼	3½	3½	3½	3¾	3¾	4 5/16
B	7¼	7¼	7¼	7⅞	7⅞	7⅞	8 9/16	8 9/16	9⅞
C	8⅛	8⅛	8⅛	8¾	8¾	8¾	9¼	9¼	10½
D	⅝	⅝	⅝	⅝	⅝	⅝	⅝	⅝	¾
E	2 9/16	2 9/16	2 9/16	2 5/16	2 5/16	2 5/16	2	2	1¼
F	8⅜	8⅜	8⅜	8⅞	8⅞	8⅞	9 7/16	9 7/16	11
G	5½	5½	5½	6	6	6	6 9/16	6 9/16	7⅝
H	10½	10¾	11 5/16	11⅛	11⅜	11 5/16	12 1/16	12⅝	13 13/16
J	14⅞	15⅝	16⅞	15½	16¼	17	17½	16 15/16	18 3/16	19⅜
K	15¾	16¼	17½	16¼	17	18⅛	17⅝	18¾	20
L	⅝	⅝	¾	⅝	⅝	¾	⅝	¾	¾
M	2 5/16	2	1¼	2 5/16	2	1¼	2	1¼	1¼
N	8⅞	9 7/16	11	8⅞	9 7/16	11	9 7/16	11	11
O	13	13 9/16	14⅝	13⅝	14 3/16	15¼	14⅞	15 15/16	17⅛

Note: Dimensions C and K are minimum lengths for hanger rods. List prices include machine threaded hook rods in lengths C and K. For list prices on hook rods of additional lengths, see page 43.

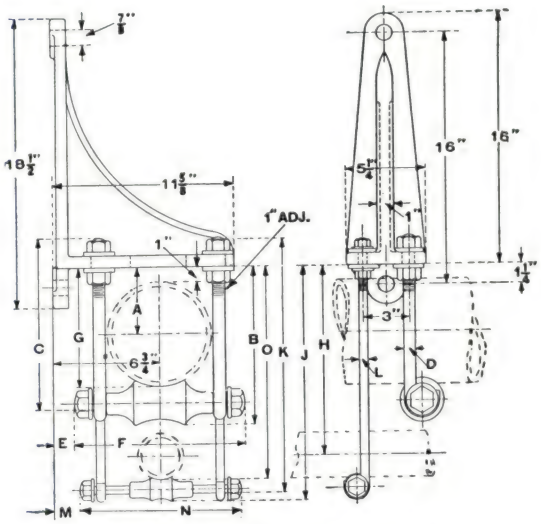


Fig. No. 176. Large Pipe on Top

LIST PRICES AND DIMENSIONS—FIG. NO. 176

Top pipe size	2½	3	3	3½	3½	3½	4	4	4	4
Bottom pipe size	2½	2½	3	2½	3	3½	2½	3	3½	4
Price ea.	$5.75	5.75	5.75	5.75	5.75	5.75	5.75	6.00	6.00	6.50
A	2 7/16	2¾	2¾	3	3	3	3¼	3¼	3¼	3¼
B	5 5/16	6	6	6 11/16	6 11/16	6 11/16	7¼	7¼	7¼	7¼
C	6¼	6¾	6¾	7½	7½	7½	8⅛	8⅛	8⅛	8⅛
D	½	½	½	½	½	½	⅝	⅝	⅝	⅝
E	3⅛	3⅛	3⅛	3	3	3	2 9/16	2 9/16	2 9/16	2 9/16
F	7¼	7¼	7¼	7½	7½	7½	8⅜	8⅜	8⅜	8⅜
G	3⅞	4½	4½	5	5	5	5½	5½	5½	5½
H	7⅝	8¼	8 15/16	8 15/16	9¼	9½	9 7/16	9¾	10	10¼
J	10½	11⅛	11 13/16	11 13/16	12 7/16	13 3/16	12 5/16	13	13 11/16	14¼
K	11⅜	12	12¾	12¾	13¼	13⅞	13⅛	13⅞	14⅜	15
L	½	½	½	½	½	½	½	½	½	⅝
M	3⅛	3⅛	3⅛	3	3	3	2⅜	2⅝	2 9/16	2 9/16
N	7¼	7¼	7¼	7½	7½	7½	8	8¼	8⅜	8⅜
O	9 1/16	9 11/16	10⅝	10⅜	11	11½	10 7/8	11½	12	12½

Order by Figure number.

LARGE PIPE ON TOP—FIG. NO. 176

Top pipe size	4½	4½	4½	4½	4½	5	5	5	5
Bottom pipe size	2½	3	3½	4	4½	2½	3	3½	4
Price ea.	$6.50	6.50	6.50	6.50	6.50	6.00	6.00	6.00	6.00
A	3½	3½	3½	3½	3½	3¾	3¾	3¾	3¾
B	7⅞	7⅞	7⅞	7⅞	7⅞	8⅝	8⅝	8⅝	8⅝
C	8¾	8¾	8¾	8¾	8¾	9¼	9¼	9¼	9¼
D	⅝	⅝	⅝	⅝	⅝	⅝	⅝	⅝	⅝
E	2 5/16	2 5/16	2 5/16	2 5/16	2 5/16	2	2	2	2
F	8⅞	8⅞	8⅞	8⅞	8⅞	9 7/16	9 7/16	9 7/16	9 7/16
G	6	6	6	6	6	6 9/16	6 9/16	6 9/16	6 9/16
H	10 1/16	10⅜	10⅝	10⅞	11⅛	10¾	11 1/16	11 5/16	11 9/16
J	12 15/16	13⅝	14⅝	14⅞	15½	13⅝	14⅝	15	15 9/16
K	13⅞	14⅜	15⅛	15¾	16¼	14½	15⅛	15¾	16½
L	½	½	½	⅝	⅝	½	½	½	⅝
M	2⅜	2⅜	2 5/16	2 5/16	2 5/16	2⅛	2⅛	2	2
N	8¾	8¾	8⅞	8⅞	8⅞	9 5/16	9 5/16	9 7/16	9 7/16
O	11½	12⅛	12⅝	13⅛	13⅝	12 3/16	12 13/16	13 5/16	13 13/16

LARGE PIPE ON TOP—FIG. NO. 176 (Continued)

Top pipe size	5	5	6	6	6	6	6	6	6
Bottom pipe size	4½	5	2½	3	3½	4	4½	5	6
Price ea.	$6.50	6.50	6.25	6.25	6.25	6.50	6.50	6.50	6.75
A	3¾	3¾	4 5/16	4 5/16	4 5/16	4 5/16	4 5/16	4 5/16	4 5/16
B	8⅝	8⅝	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞
C	9¼	9¼	10½	10½	10½	10½	10½	10½	10½
D	⅝	⅝	¾	¾	¾	¾	¾	¾	¾
E	2	2	1¼	1¼	1¼	1¼	1¼	1¼	1¼
F	9⅞	9⅞	11	11	11	11	11	11	11
G	6 9/16	6 9/16	7⅝	7⅝	7⅝	7⅝	7⅝	7⅝	7⅝
H	11 13/16	12 1/8	11 15/16	12 1/4	12½	12¾	13	13 5/16	13 13/16
J	16 3/16	16 15/16	14 13/16	15½	16 3/16	16¾	17⅜	18⅛	19⅜
K	17	17⅝	15½	16¼	16⅞	17⅝	18⅛	18¾	20
L	⅝	⅝	½	½	½	⅝	⅝	⅝	¾
M	2	2	1 7/16	1 7/16	1⅜	1⅜	1⅜	1⅜	1¼
N	9 7/16	9 7/16	10 5/8	10 5/8	10¾	10¾	10¾	10¾	11
O	14 5/16	14⅞	13⅜	14	14½	15	15½	16 1/16	17⅛

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Light Welded Steel Brackets—Steel Bracket Clips

Grinnell Light Welded Steel Brackets, Fig. No. 194, are designed to support pipe lines up to and including 6-in. size.

These brackets may be installed either in position illustrated or reversed as a suspension bracket.

Ends of brackets are drilled to take hanger rods up to and including ¾ in. in diameter, and pipe is ordinarily suspended from this point.

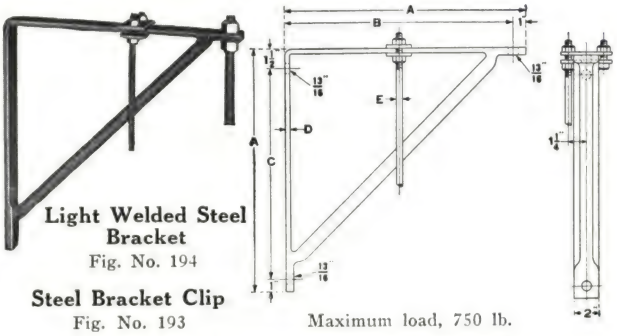
It is possible, however, to hang pipes 3½ in. and smaller from any other point on the horizontal member by using the Grinnell Steel Bracket Clips, Fig. No. 193, as illustrated. These clips are made in two sizes as listed in table. Each clip consists of two steel plates and one bolt and nut.

All sizes of the bracket are designed for maximum load of 750 lb.

Any changes in drillings or dimensions will be charged extra.

Brackets and clips are coated with a protective paint to prevent rust during shipment.

Hanger rods and hex nuts to be ordered separately. Order by figure number and specify size number.



Light Welded Steel Bracket
Fig. No. 194

Steel Bracket Clip
Fig. No. 193

Maximum load, 750 lb.

LIST PRICES AND DIMENSIONS—FIG. NOS. 194 AND 193

Bracket No.	Price ea. Bracket only	A	B	C	D	Clip No.	Price ea.	Pipe size	Rod size E
1	$5.00	9	8	6½	5/16	1	$0.25	¾–2	⅜
2	5.50	13	12	10½	5/16	2	.30	2½–3½	½
3	6.00	19	18	16¼	⅜				

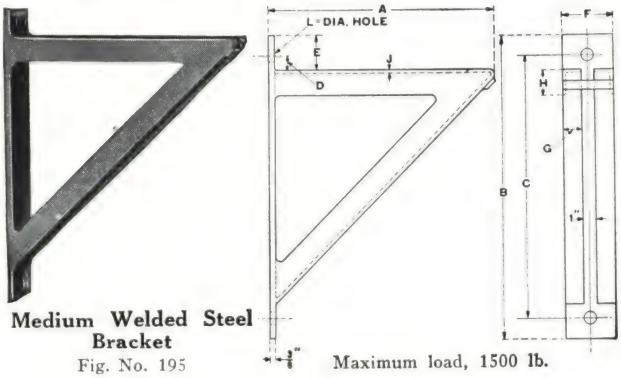
Grinnell Medium Welded Steel Brackets

Grinnell Medium Welded Steel Brackets, Fig. No. 195, are designed to support a maximum load of 1500 lb.

These brackets are of the same type and construction as our Heavy Welded Steel Brackets, Fig. No. 199, shown on this and following pages. They may be used with the adjustable pipe stands, anchor chairs, pipe seats, etc., in the same manner as the heavy bracket.

When brackets are to be bolted to walls, back plates must be ordered of such size and thickness as to properly distribute the weight over the wall. Size and thickness of back plates will, of course, be governed by the load to be carried and the nature and condition of the wall.

Unless otherwise specified, holes will be drilled in brackets in accordance with drawing and dimension table above. Brackets are coated with a protective paint to prevent rust during shipment.



Medium Welded Steel Bracket
Fig. No. 195

Maximum load, 1500 lb.

Instructions for Ordering

To order specify:

.....(Quantity) No. ( ) medium welded steel brackets, Fig. No. 195.

Note: Order separately, the bolts and nuts and back plates for fastening the brackets to wall, specifying the size and length of bolts and the size, thickness and drilling of the plates.

LIST PRICES AND DIMENSIONS—FIG. NO. 195

Bracket No.	Price ea. Bracket only	A	B	C	D	E	F	G	H	J	L
0	$11.00	12	18	15½	1¼	2½	4	1½	1½	3/16	13/16
1	14.00	18	24	21½	1¼	2½	4½	1¾	1¾	3/16	13/16
2	17.00	24	30	27½	1¼	2½	5	2	2	¼	13/16

Grinnell Heavy Welded Steel Brackets and Attachments

Grinnell Heavy Welded Steel Brackets are light in weight as compared with the usual cast iron brackets. Top of bracket and supporting brace are constructed of two angle irons with 1-in. space between.

All sizes of the bracket are designed to support a load of 3000 lb.

When brackets are to be bolted to walls, back plates must be ordered of such size and thickness as to properly distribute the weight over the wall. Size and thickness of back plates will, of course, be governed by the load to be carried and the nature and condition of the wall.

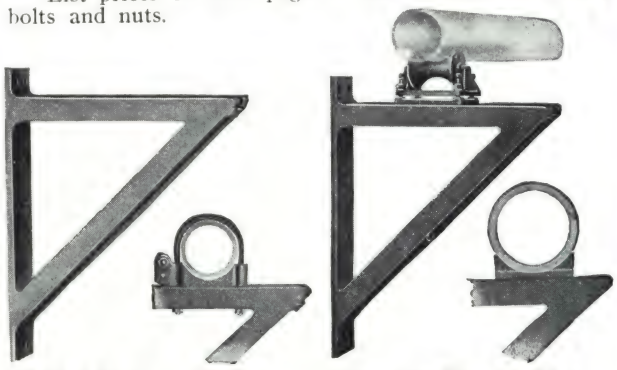
In addition to back plates, it may be necessary in some cases to insert a steel plate or angle iron in the wall on which the upper bolts can rest, in order to spread the load over a greater wall area.

Unless otherwise specified, holes will be drilled in brackets in accordance with drawing and dimension table on opposite page.

We are in a position to furnish on order practically any size or type of welded steel brackets. Prices will be furnished on application. Applications must be accompanied by sketch or print showing all essential dimensions and necessary details.

Brackets are coated with a protective paint to prevent rust during shipment.

List prices on next page do not include back plates, bolts and nuts.



Welded Steel Bracket
Fig. No. 199

Anchor Chair
Fig. No. 197

Adjustable Pipe Stand
Fig. No. 196

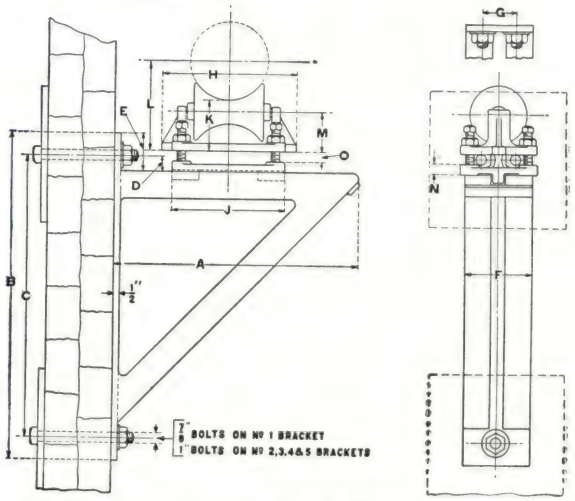
Pipe Seat
Fig. No. 198

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Welded Steel Brackets and Attachments

Adjustable Pipe Stands with Welded Steel Brackets



Application of Adjustable Pipe Stand with Welded Steel Bracket

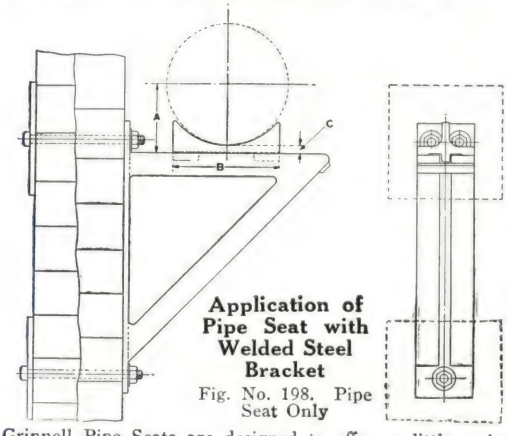
Fig. No. 196. Adjustable Pipe Stand Only

LIST PRICES AND DIMENSIONS—FIG. NO. 196

Pi p size	Price, ea.	H	J	K	L	M	N	Max. O
3	$ 5.00	8 5/16	7 3/16	3 1/4	5	2 1/2	13/16	1 3/16
3 1/2	5.00	8 5/16	7 3/16	3 1/4	5 1/4	2 1/2	13/16	1 3/16
4	6.00	8 5/16	7 3/16	3 1/4	5 1/2	2 1/2	13/16	1 3/16
5	8.00	9 15/16	8 5/16	3 13/16	6 5/8	2 15/16	13/16	1 3/16
6	9.00	11 5/8	9 1/2	4 1/4	7 9/16	3 5/16	7/8	1 3/8
7	10.00	12 5/8	10 1/8	4 13/16	8 5/8	3 3/4	7/8	1 3/8
8	14.00	14 3/8	11 3/4	5 1/2	9 13/16	4 1/4	1	1 5/8
9	16.00	15 3/4	12 1/2	6 1/16	10 7/8	4 11/16	1	1 5/8
10	20.00	17 1/2	13 5/8	6 9/16	11 15/16	5 1/16	1	1 5/8
12	25.00	19 7/8	15 3/4	7 7/16	13 13/16	5 13/16	1	2
14	27.00	19 7/8	15 3/4	7 7/16	14 7/16	5 13/16	1	2
15	30.00	21	17 1/8	7 1/2	15	5 3/4	1 1/8	1 3/4
16	33.00	21	17 1/8	7 5/8	15 5/8	5 3/4	1 1/8	1 3/4
18	42.00	21	17 1/8	7 5/8	16 5/8	5 3/4	1 1/8	1 3/4
20	50.00	21	17 1/8	7 5/8	17 5/8	5 3/4	1 1/8	1 3/4
24	55.00	25 1/4	20 1/2	8 1/4	20 1/4	6 1/8	1 1/4	1 3/4

For larger sizes, prices and dimensions on application.
Order by Figure number.

Pipe Seats with Welded Steel Brackets



Application of Pipe Seat with Welded Steel Bracket

Fig. No. 198. Pipe Seat Only

Grinnell Pipe Seats are designed to offer as little resistance to expansion and contraction as possible and yet are strong enough to carry a heavy weight and resist vibration. They are larger and conform to a greater portion of the circumference of the pipe than those of most manufacturers.

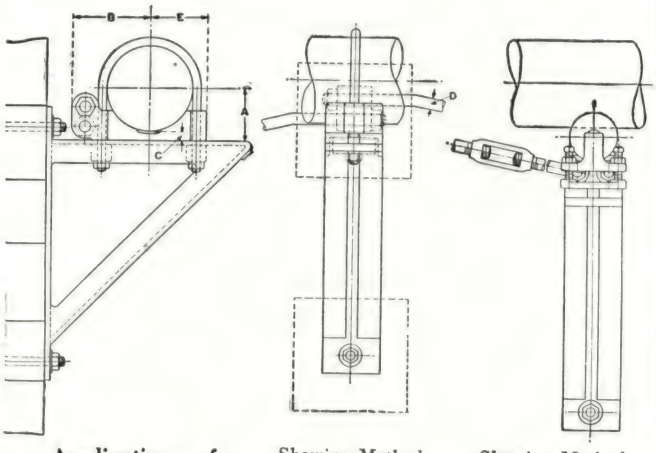
This feature minimizes the danger of pipe "jumping out" of the seat.

Order by Figure number.

LIST PRICES AND DIMENSIONS—FIG. NO. 198

Pipe size	4	4 1/2	5	6	7	8	9	10	12
Price ea.	$1.50	1.50	1.75	2.00	2.50	2.50	3.00	3.50	4.50
A	2 13/16	3 1/16	3 3/8	3 15/16	4 7/16	5 1/16	5 9/16	6 1/8	7 1/8
B	4 1/2	5	5 1/4	6 1/4	7 1/8	8	8 3/4	9 3/8	11
C	9/16	9/16	9/16	5/8	5/8	3/4	3/4	3/4	3/4

Anchor Chairs



Application of Anchor Chair with Welded Steel Bracket

Fig. No. 197. Anchor Chair Only

Showing Method of Attaching Anchor Rods to Anchor Chair

Showing Method of Attaching Anchor Rod to Wall Bolt of Adjoining Bracket

LIST PRICES AND DIMENSIONS—FIG. NO. 197

Pipe size	Price, ea.	A	B	C	D	E
4	$ 4.50	3	4 1/8	3/4	5/8	3 3/16
5	5.50	3 5/8	5	13/16	3/4	3 7/8
6	7.50	4 1/16	5 3/4	3/4	7/8	4 9/16
8	11.00	5 5/16	7 1/8	1	1	5 3/4
10	14.00	6 1/2	8 3/8	1 1/8	1 1/8	7
12	20.00	7 5/8	9 1/2	1 1/4	1 1/4	8
14	22.00	8 1/2	10 1/8	1 1/2	1 1/4	8 5/8
16	28.00	9 5/8	11 1/2	1 5/8	1 1/2	9 13/16
18	32.00	10 7/8	12 1/2	1 7/8	1 1/2	10 13/16
20	36.00	12	13 1/8	2	1 1/2	11 13/16

Order by Figure number.

Heavy Welded Steel Brackets

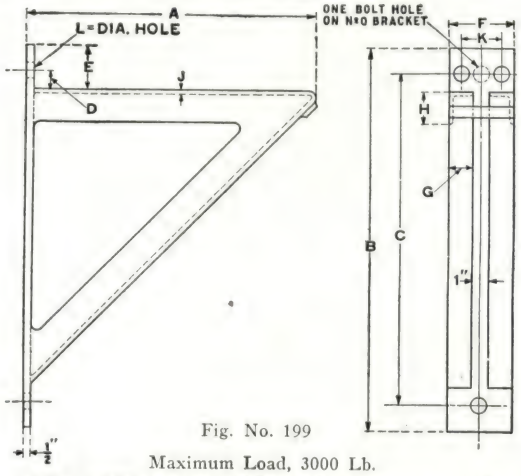


Fig. No. 199

Maximum Load, 3000 Lb.

LIST PRICES AND DIMENSIONS—FIG. NO. 199

Bracket No.	Price ea. Bracket only	Dimensions A	B	C	D	E	F	G	H	J	K	L
0	$15.00	12	18	15 1/4	1 1/4	2 3/4	4	1 1/2	2	1/4	...	13/16
1	17.00	18	24	21 3/8	1 3/8	2 3/4	5	2	2	3/8	2 3/4	15/16
2	20.00	24	30	27 1/2	1 1/2	2 3/4	5	2	2 1/2	5/16	2 1/2	1 1/16
3	22.00	30	36	33 1/4	1 1/2	3	5	2	2 1/2	5/16	2 1/2	1 1/16
4	30.00	36	42	39	1 1/2	3	6	2 1/2	3 1/2	3/8	3 1/2	1 1/16
5	36.00	42	50	46	1 1/2	3 1/2	6	2 1/2	3 1/2	3/8	3 1/2	1 1/16

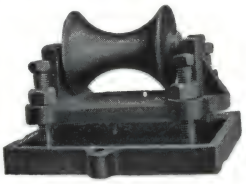
Instructions for Ordering—To order specify:
....(Quantity) No. ( ) welded steel brackets, Fig. No. 199.
Note: Order separately, the bolts and nuts and back plates for fastening the brackets to wall, specifying the size and length of bolts and the size, thickness and drilling of the plates.
Note: Order all Hangers by Figure numbers.

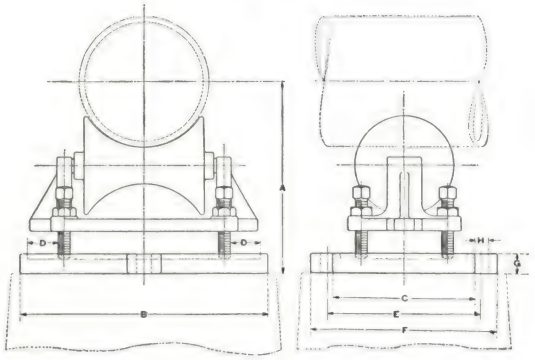
Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Adjustable Pipe Rolls with Base Plates—*Cast Iron*

For supporting heavy piping where expansion and contraction conditions must be met the adjustable pipe rolls and chairs shown herewith are often used. They are located on floors, piers, tunnel floors or brackets as shown previously. Both vertical and horizontal adjustment is obtained—the vertical by four adjusting screws as shown and the horizontal by sliding on ends of bolts in base plate.





Adjustable Pipe Roll with Base Plate
Fig. No. 185

LIST PRICES AND DIMENSIONS—FIG. NO. 185

Pipe size	Price ea.	A Min.	A Max.	B	C	D	E	F	G	H
3	$5.50	6	7¼	9 3/16	6 3/8	1	6 7/8	8 5/8	1	¾
3½	5.50	6¼	7½	9 3/16	6 3/8	1	6 7/8	8 5/8	1	¾
4	6.50	6½	7¾	9 3/16	6 3/8	1	6 7/8	8 5/8	1	¾
5	7.75	7 5/8	8 7/8	10 5/16	6 5/8	1	7 1/8	8 7/8	1	¾
6	9.50	8 1/8	10	12 5/8	7¼	1¼	7 3/4	9½	1	¾
7	11.00	9 5/8	11 1/8	12 5/8	7¼	1¼	7 3/4	9½	1	¾
8	17.00	11	12 5/8	15	8	1¼	8½	10¼	1 3/16	¾
9	18.50	12¼	13 7/8	15	8	1¼	8½	10¼	1 3/16	¾
10	22.00	13 1/8	14 3/4	16 5/8	8 5/8	1½	9¼	10 7/8	1 3/16	¾
12	27.00	15 3/16	17 3/16	18 3/4	9 3/8	1½	9 7/8	11 5/8	1 3/8	¾
14	29.00	15 13/16	17 15/16	18 3/4	9 3/8	1½	9 7/8	11 5/8	1 3/8	¾
15	35.00	16½	18¼	20½	10¼	1¾	10 3/4	12½	1½	¾
16	37.00	17 1/8	18 7/8	20½	10¼	1¾	10 3/4	12½	1½	¾
18	45.00	18½	19 7/8	20½	10¼	1¾	10 3/4	12½	1½	¾
20	52.00	19 1/8	20 7/8	20½	10¼	1¾	10 3/4	12½	1½	¾
24	60.00	21 3/4	23½	24½	11	2 1/16	11½	13¼	1½	¾

Larger sizes on application. Order by Figure number.

Grinnell Pipe Rolls and Plates—Pipe Roll Chairs—*Cast Iron*

Grinnell Pipe Roll Chairs, and Pipe Rolls and Plates, are for use in supporting piping when adjustment is not necessary but where provision must be made for expansion and contraction.

They are similar to pipe chairs but can be put to more varied use. For instance, they may be used for high pressure steam, blow-off lines and other pipe lines where a pipe support is required.

Actual adjustment of the chair itself is not possible but in case of necessity they can be raised or lowered by blocking or shimming up the support or base.

For larger sizes, prices on application.

Order by figure number.

Pipe Roll Chair
Fig. No. 177

Pipe Roll and Plate
Fig. No. 180

LIST PRICES

Pipe size, in.	4–6	7–10	12–15	16–20	22–24
Roll and plate complete, Fig. No. 180, ea.	$2.25	4.25	6.00	7.75	8.50
Roll only, Fig. No. 182, ea.	.90	2.00	3.10	5.10	6.00

LIST PRICES

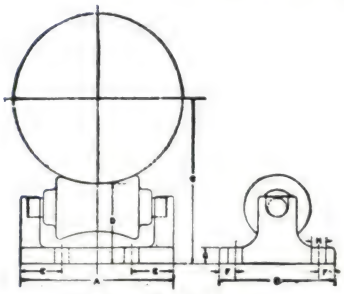
Pipe size, in.	2	2½	3	3½	4	4½	5	6	7
Roll and chair complete, Fig. No. 177, ea	$0.35	.40	.50	.60	.80	.95	1.00	1.40	1.60
Roll chair only, Fig. No. 178, ea.	.20	.25	.35	.40	.60	.70	.75	1.10	1.25
Roll only, Fig. No. 179, ea.	.15	.15	.15	.20	.20	.25	.25	.30	.35

Pipe size, in.	8	9	10	12	14	15	16	18
Roll and chair complete, Fig. No. 177, ea.	$2.00	2.75	4.00	5.50	7.25	10.50	14.00	18.00
Roll chair only, Fig. No. 178, ea.	1.50	1.75	2.50	3.50	4.50	6.00	8.50	12.00
Roll only, Fig. No. 179, ea.	.50	1.00	1.50	2.00	2.75	4.50	5.50	6.00

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Pipe Rolls and Plates—Pipe Chairs *(Continued)*

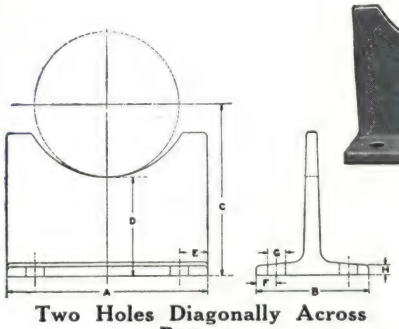


Pipe Roll Chair
Fig. No. 177

DIMENSIONS—FIG. NO. 177

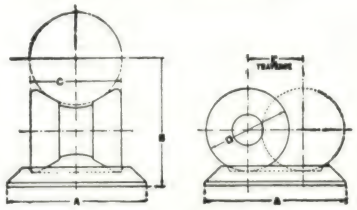
Pipe size, in.	A	B	C	D	E	F	G	Diam. of hole H
2	2 7/8	2 7/8	3	1 13/16	1 1/8	1/2	3/8	7/16
2 1/2	3 5/16	3 1/8	3 9/16	2 1/8	1 1/4	1/2	7/16	7/16
3	3 5/8	3 1/4	3 7/8	2 1/8	1 1/4	1/2	7/16	7/16
3 1/2	3 15/16	3 1/4	4 7/16	2 7/16	1 1/4	1/2	1/2	7/16
4	4 1/2	3 1/2	4 13/16	2 9/16	1 1/2	5/8	9/16	9/16
4 1/2	4 3/4	3 3/4	5 1/8	2 5/8	1 1/2	5/8	9/16	9/16
5	4 15/16	4	5 5/8	2 13/16	1 1/2	5/8	9/16	9/16
6	6	4 1/2	6 7/16	3 1/8	1 5/8	5/8	5/8	9/16
7	6 3/8	5	7 3/16	3 3/8	1 5/8	5/8	5/8	9/16
8	7 1/4	5 1/2	8 1/4	3 15/16	2	3/4	3/4	11/16
9	7 5/8	6	9 1/16	4 1/4	2	3/4	3/4	11/16
10	8 1/16	6 1/2	9 15/16	4 9/16	2	3/4	3/4	11/16
12	9	7 1/2	11 15/16	4 15/16	1 1/2	1	3/4	11/16
14	9 3/4	8	12 1/16	5 1/16	1 1/2	1	3/4	11/16
15	10 1/4	8 1/2	12 5/8	5 1/8	1 1/2	1	3/4	11/16
16	10 7/8	9	13 5/8	5 5/8	1 1/2	1	7/8	3/4
18	12 1/8	9 1/2	15	6	1 1/2	1	1	3/4

For larger sizes, dimensions on application.



Two Holes Diagonally Across Bottom

Pipe Chair
Fig. No. 183



Pipe Roll and Plate
Fig. No. 180

DIMENSIONS—FIG. NO. 180

Size	Pipe size	A	B	C	D	E
4–6	4	6 3/4	6 1/4	4 3/8	4	2 3/4
	5		6 7/8			
	6		7 1/2			
7–10	7	9 3/4	8 1/8	6 5/8	5 7/16	4 1/2
	8		9 5/8			
	9		10 1/4			
	10		10 7/8			
12–15	12	12 1/2	12 3/8	8 5/8	6 3/16	6
	14		13 1/8			
	15		13 5/8			
16–20	16	15	14 1/8	10 7/8	7 1/2	8
	18		16			
	20		17 1/8			
22–24	22	18	19 1/8	13 1/2	8 7/8	10
	24		20 1/4			

LIST PRICES AND DIMENSIONS—FIG. NO. 183

Pipe size, in.	Price ea.	A	B	C	D	E	F	Hole G	H
2	$ 0.30	3 1/2	2 7/8	3 3/4	2 9/16	5/8	1/2	7/16	3/8
2 1/2	.40	4 1/4	3 1/8	4 3/16	2 3/4	3/4	1/2	7/16	3/8
3	.67	5	3 1/4	4 11/16	2 15/16	3/4	1/2	7/16	3/8
3 1/2	.70	5 1/2	3 1/4	4 7/8	2 7/8	3/4	1/2	7/16	3/8
4	.85	6 1/4	3 1/2	5 3/16	3 1/16	7/8	5/8	9/16	7/16
5	1.55	7 1/2	4	6	3 3/16	1	5/8	9/16	1/2
6	2.25	8 3/4	4 1/2	6 7/16	3 1/8	1	5/8	9/16	1/2
8	3.10	10 3/4	5 1/2	7 3/4	3 7/16	1 1/4	3/4	11/16	9/16
10	4.70	13	6 1/2	9	3 5/8	1 1/4	3/4	11/16	5/8
12	7.00	15	7 1/2	10 1/2	4 1/8	1 1/2	1	11/16	5/8
14	9.70	17	8 1/2	11 3/4	4 3/4	1 1/2	1	11/16	11/16
16	14.00	19	9 1/2	13	5	1 3/4	1 1/4	11/16	3/4
18	16.00	21	10 1/4	13 3/4	4 3/4	2	1 3/8	11/16	3/4
20	20.00	23 1/4	11 1/2	15	5	2 1/4	1 5/8	11/16	3/4

Order by Figure number.

Grinnell Adjustable Pipe Chairs with Base Plates—*Cast Iron*

This pipe chair with base plate was designed with complete understanding of the need of a suitable pipe support for blow-off lines which would be adjustable as well as practical.

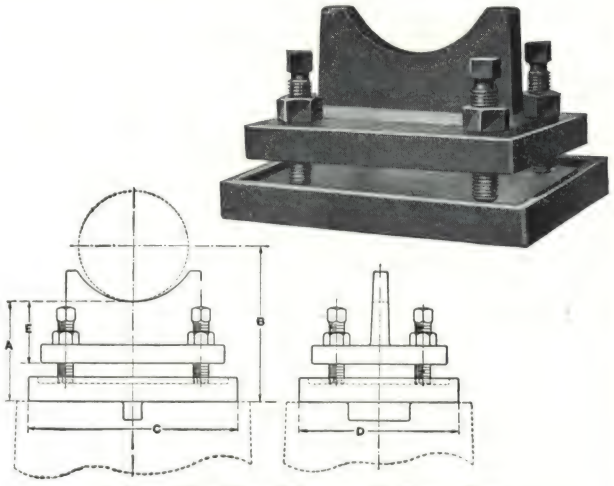
The main advantage of this pipe chair is, of course, the fact that by adjustment the chair can be brought securely up against pipe or back of fitting after pipe is erected. When thus adjusted it holds pipe line firmly against thrust due to opening of blow-off connection.

Prices include chair and base plate complete.

LIST PRICES AND DIMENSIONS—FIG. NO. 184

Pipe size, in.	Price ea.	A		B		C	D	E
		Min.	Max.	Min.	Max.			
3	$3.80	3 1/4	4 3/16	5	5 15/16	7 1/4	6	2 1/8
4	5.30	3 5/8	4 7/16	5 7/8	6 11/16	8 1/2	6 1/2	2 1/2
5	7.00	4	4 11/16	6 13/16	7 1/2	10	7	2 7/8

Order by Figure number.

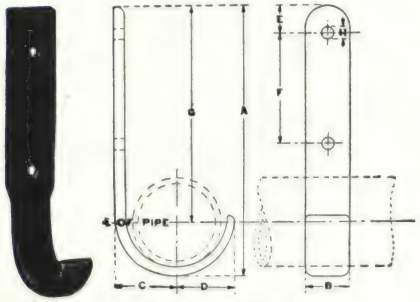


Adjustable Pipe Chair with Base Plate
Fig. No. 184

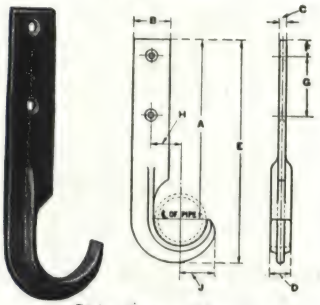
Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Back Beam Hooks—Side Beam Hooks—*Malleable Iron*



Back Beam Hook
Fig. No. 200



Side Beam Hook
Fig. No. 201

LIST PRICES AND DIMENSIONS—FIG. NO. 200

Pipe size	Price ea.	A	B	C	D	E	F	G	Size screw
½	$0.50	6¾	1¼	11/16	9/16	1	3	6	No. 18
¾	.55	7¼	1⅜	29/32	23/32	1⅛	3	6 7/16	No. 18
1	.65	7¾	1 9/16	1 1/16	⅞	1¼	3	6 27/32	No. 18
1¼	.70	8⅝	1¾	1 3/16	1	1¼	3	7 17/32	No. 18
1½	.95	9⅝	1⅞	1⅜	1⅛	1¼	4	8 5/16	No. 18
2	1.10	10½	2	1 21/32	1 13/32	1½	4	8 31/32	No. 18
2½	1.25	11½	2	1 15/16	1 11/16	2	5	9 11/16	No. 18
3	1.45	12¼	1⅞	2¼	2	1⅝	4	10⅛	No. 18

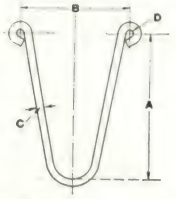
LIST PRICES AND DIMENSIONS—FIG. NO. 201

Pipe size	Price ea.	A	B	C	D	E	F	G	H	J	Size screw
½	$0.35	7 3/16	1 1/16	7/32	11/16	8 1/16	⅝	2⅛	9/16	⅝	No. 18
¾	.40	7 13/32	1⅛	¼	¾	8⅜	¾	2 3/16	⅝	⅞	No. 18
1	.45	7 17/32	1¼	¼	¾	8⅝	¾	2 5/16	13/16	15/16	No. 18
1¼	.50	7 23/32	1⅜	¼	13/16	9⅛	¾	2 5/16	1	1 1/16	No. 18
1½	.75	8⅜	1½	¼	⅞	9⅞	¾	2 9/16	1 1/16	1 5/16	No. 18
2	.90	8 5/16	1 11/16	5/16	1 5/16	10¼	¾	2¾	1⅜	1¾	No. 18
2½	1.05	9 1/16	1⅞	⅜	1	11 5/16	⅞	2¾	1¾	1 15/16	No. 18
3	1.25	10 1/16	2	7/16	1 1/16	12 5/8	⅞	2¾	2⅛	2⅜	No. 18

Back beam and side beam hooks are particularly adapted for hanging small pipe lines such as gas, air or water piping along walls or on side of beams, etc. They are also used for carrying electric conduits.
Order by Figure number.

Grinnell U Hooks

U Hook
Fig. No. 205



LIST PRICES—FIG. NO. 205

Nominal pipe size	Price, ea.—Length A, in. 6, 8	10, 12	14	16	18	20, 24	Size iron C	Size screws D
¾–2	$0.05	$0.06	$0.07	$0.08	$0.08	$0.09	5/16	No. 16
2½, 3	.....	.11	.12	.13	.14	.17	⅜	⅜
3½, 4	.....	.15	.18	.21	.24	.30	7/16	½
5	.....	.28	.30	.32	.34	.41	9/16	½
6	.....	.35	.38	.41	.44	.48	⅝	½
8	.....	.....	.55	.60	.65	.80	¾	⅝

STOCK SIZES AND DIMENSIONS—FIG. NO. 205

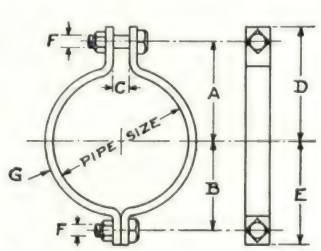
Nom. pipe size	Length A	Spread B	Nom. pipe size	Length A	Spread B	Nom. pipe size	Length A	Spread B	Nom. pipe size	Length A	Spread B
	6	4					10	6⅛		12	8⅛
¾	8	4½		6	4⅞	2½	12	6½	4	14	8⅝
	10	5⅛		8	5⅜		14	7		16	9
	12	5⅝	1½	10	6		16	7⅜			
				12	6½						
	6	4¼		14	7⅛					12	9⅜
	8	4¾		16	7⅝		10	6¾	5	14	9¾
1	10	5⅜				3	12	7⅛		16	10¼
	12	5⅞					14	7⅝			
	14	6½		8	5⅞		16	8			
				10	6½					12	10¾
	6	4½	2	12	7				6	14	11⅛
	8	5⅛		14	7⅝		10	7¼		16	11⅝
1¼	10	5⅝		16	8⅛	3½	12	7⅝			
	12	6¼		18	8¾		14	8⅛			
	14	6¾					16	8½	8	16	13¾

When ordering specify length.
Order by Figure number.

Grinnell Wrought Pipe Clamps

The Grinnell Wrought Pipe Clamp, Fig. No. 212, shown below, has been extensively used for hanging power piping, etc., and forms part of the special adjustable I-beam clamp hanger illustrated on next page. This wrought pipe clamp is also used for anchoring pipe on steam and hot water mains.
Order by Figure number.

Wrought Pipe Clamp
Fig. No. 212



The adjustable wrought pipe clamp, Fig. No. 251, shown on pages 36 and 37, is preferable to the wrought pipe clamp, Fig. No. 212, for most purposes.

LIST PRICES AND DIMENSIONS—FIG. NO. 212

Pipe size	Price ea.	A	B	C	D	E	F	G
2	$0.30	2⅛	1 15/16	½	2⅝	2 7/16	⅜	¼x1
2½	.35	2⅝	2¼	⅝	3 3/16	2 13/16	7/16	¼x1
3	.40	2 15/16	2 9/16	⅝	3½	3⅛	7/16	¼x1
3½	.45	3 3/16	2 15/16	⅝	3 11/16	3½	7/16	⅜x1¼
4	.50	3⅝	3¼	¾	4¼	3⅞	½	⅜x1¼
5	.75	4 3/16	3 13/16	¾	4 13/16	4 7/16	½	⅜x1½
6	.75	5	4 7/16	⅞	5¾	5 3/16	⅝	⅜x1½
8	1.25	6⅜	5 11/16	1	7¼	6 9/16	¾	½x1½
10	1.60	7 7/16	6¾	1	8 5/16	7⅝	¾	½x2
12	2.00	8 7/16	7¾	1	9 5/16	8⅝	¾	½x2
14-o.d.	3.25	9½	8⅞	1⅛	10½	9⅞	⅞	½x2¼
16-o.d.	4.00	10½	9⅞	1⅛	11½	10⅞	⅞	½x2¼
18-o.d.	6.00	11⅞	11	1¼	13 1/16	12 3/16	1	½x2½
20-o.d.	7.00	13¼	12⅜	1⅜	14½	13⅝	1⅛	⅝x3
24-o.d.	8.50	15¾	14½	1⅝	17⅛	15⅞	1¼	⅝x3

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Special Adjustable I-Beam Clamp Hangers

Special Adjustable I-Beam Clamp Hanger
Fig. No. 214

The Grinnell Special Adjustable I-Beam Clamp Hanger, Fig. No. 214, was originally designed to provide a substantial and adjustable means of supporting industrial and power plant piping. This type of hanger has been extensively used, especially in power plant work. Adjustment is provided through the use of the turn-buckles which permit a total adjustment of six inches.

Prices on this special hanger furnished on application. A request for prices, or an order, should state:

Size of pipe to be supported.
Size, weight and kind of I-beam to which it is to be attached.
Size of iron for I-beam clamp.
Size of rod.
Distance from bottom of I-beam to center of pipe.
Order by Figure number.

U. F. S. I-Beam Clamp Hangers

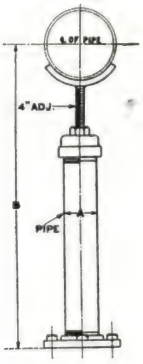
Grinnell U. F. S. I-Beam Clamps and Adjustable Wrought Pipe Clamps, as described on pages 36 and 37, are a later development and have many superior features to the special adjustable I-beam clamp hanger shown at left.

Grinnell Adjustable Saddle Stands

The adjustable saddle stand is used when it is necessary to support piping at a height of from 18 in. to 7 ft. above floors. An adjustment of approximately 4 in. can be obtained with this pipe support by turning nut at top of stand cap. Threaded rod is prevented from swaying by collar attached to lower end of rod, extending inside of pipe stand.

The adjustable saddle stand is made up only upon order, and in the sizes given in table at right.

Adjustable Saddle Stand
Fig. No. 210



Long runs of pipe should be anchored at intervals to prevent side sway. In all cases the pipe flange at base of stand should be securely fastened to a solid floor or foundation.

For intermediate lengths use next higher price.

If there is any appreciable amount of expansion and contraction in the pipe line, we can furnish this pipe stand with single roll in place of saddle. Prices on application.

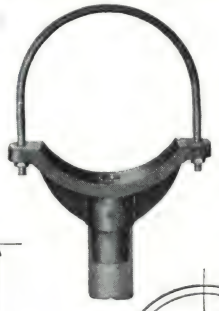
LIST PRICES AND DIMENSIONS—FIG. NO. 210

Pipe size	A	Height B	Price ea.	Pipe size	A	Height B	Price ea.
2½–3–3½	2½	2 ft. 0 in.	$11.25	8	3	2 ft. 0 in.	$14.50
		4 ft. 0 in.	12.50			4 ft. 0 in.	15.50
	3	5 ft. 6 in.	15.00		3½	5 ft. 6 in.	18.75
		7 ft. 0 in.	16.50			7 ft. 0 in.	20.00
4–5	2½	2 ft. 0 in.	11.25	10	3	2 ft. 0 in.	16.50
		4 ft. 0 in.	12.50			4 ft. 0 in.	17.50
	3	5 ft. 6 in.	15.00		3½	5 ft. 6 in.	20.50
		7 ft. 0 in.	16.50			7 ft. 0 in.	22.00
6	2½	2 ft. 0 in.	13.75	12	3	2 ft. 0 in.	18.25
		4 ft. 0 in.	14.50			4 ft. 0 in.	19.50
	3	5 ft. 6 in.	16.75		3½	5 ft. 6 in.	22.50
		7 ft. 0 in.	17.50			7 ft. 0 in.	23.75

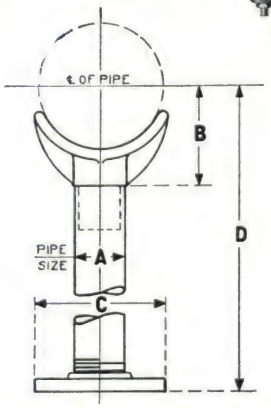
Order by Figure number.

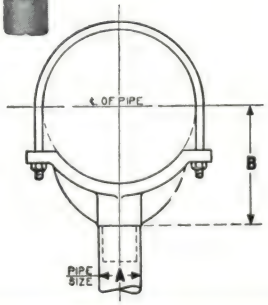
Grinnell Pipe Saddle Supports—Pipe Stanchion Saddles

Pipe Saddle Support
Fig. No. 258



Pipe Stanchion Saddle
Fig. No. 259





List prices cover only the cast iron pipe saddle support, and the cast iron pipe stanchion saddle with yoke and nuts, as illustrated to the left.

Prices on the riser pipe and reducing flange on application.

LIST PRICES AND DIMENSIONS—FIG. NO. 258, 259

Pipe size	4	5	6	8	10	12
Fig. No. 258. .ea.	$0.95	1.20	1.40	2.10	2.60	2.75
Fig. No. 259. .ea.	$3.50	3.75	4.00	4.50	6.00	6.50
Dimension A. . in.	3	3	3	3	3	3
Dimension B. . in.	4¼	4⅞	5½	7	8½	10
Dimension C. . in.	9	9	9	9	9	9

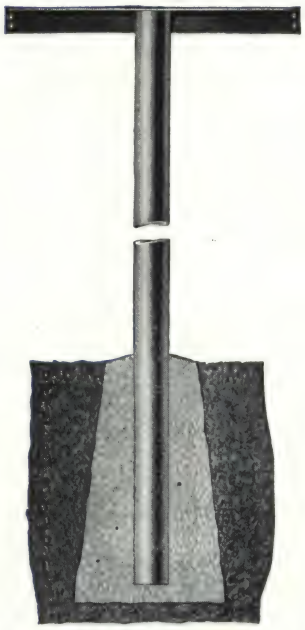
Pipe size	14-o.d.	16-o.d.	18-o.d.	20-o.d.	24-o.d.	30-o.d.
Fig. No. 258. .ea.	$3.10	4.10	5.10	6.40	8.65	12.00
Fig. No. 259. .ea.	$8.00	9.00	11.00	15.00	19.00	24.00
Dimension A. . in.	4	4	4	6	6	6
Dimension B. . in.	11	12½	14	15½	18	21½
Dimension C. . in.	11	11	11	13½	13½	13½

Order by Figure number.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Pipe Pole Supports for Outside Lines



Pipe Pole Support for Outside Lines
Fig. No. 257

Grinnell Pipe Pole Supports for outside lines provide a permanent, substantial method of supporting piping between buildings. Each support consists of a length of standard steel pipe with two steel angles securely welded to top of pipe. A steel plate welded in makes a weathertight cap.

These pipe pole supports are designed for use with several different types of Grinnell Pipe Hangers and Supports, three of which are illustrated in sketch, as follows:

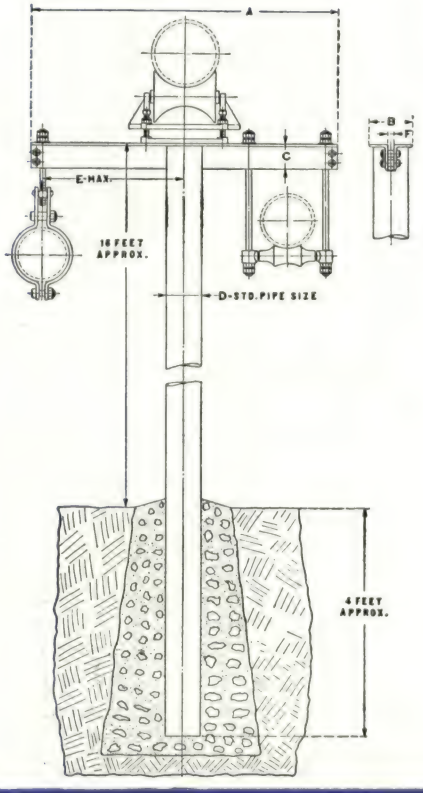
Left—Adjustable wrought pipe clamp, Fig. No. 252.

Top—Adjustable pipe stand, Fig. No. 196.

Right—Single pipe roll with adjustable sockets, Fig. No. 171.

The space between the angles allows for insertion of the hanger rods, or the lugs cast on bottom of base plate of adjustable pipe stand.

These supports can be used for high and low pressure steam lines, as well as for all kinds of process piping, either with or without pipe covering. When pipe covering is to be applied on pipe lines supported by either of the roll type hangers, Grinnell Pipe Covering Protection Saddles, Fig. Nos. 186, 187 or 188, may be used, which saddles make possible a weathertight and finished job of covering at points of pipe support.



List prices given herewith are based on pipe poles 20 ft. long.

For pipe pole supports less than 20 ft. long make the following deductions per ft. from list prices given below:

Support No. 1, $1.00 per ft.
Support No. 2, 1.35 per ft.
Support No. 3, 1.75 per ft.

Pipe pole supports having pipe poles longer than 20 ft., prices on application.

Adjustable stands, clamps, rolls, rods, nuts, etc., to be ordered separately.

Order by Figure number. Specify size number and length of pipe pole.

LIST PRICES AND DIMENSIONS—FIG. NO. 257

Support size No.	Nom. pipe size	Price ea.	A	B	C	D	E max.	F
1	4– 6	$45.00	32	5	2½	4	14¼	1
2	8–12	60.00	46	7	4	5	21	1
3	14–18	80.00	59	8¼	5	6	27	1¼

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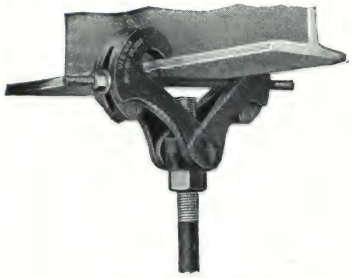
GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell U. S. F. I-Beam Clamps—*Universal Forged Steel*



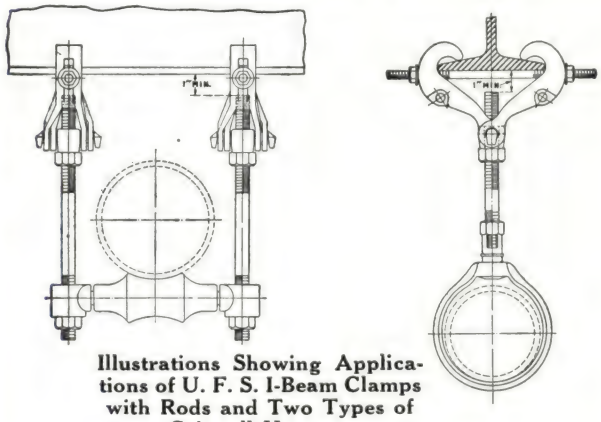
U. F. S. I-Beam Clamp
Fig. No. 228
Patented October 26, 1926.
No. 1,604,590

The Grinnell U. F. S. (Universal Forged Steel) I-Beam Clamps are made of forged steel throughout. They have a factor of safety of twelve, as called for by the specifications of the Power Piping Society, based on supporting 12 ft. of extra-heavy pipe of maximum size filled with water.

These beam clamps are made in but three sizes for supporting pipes up to and including 24 in. in size. (See table below.) They will fit all I-beams, girders and trusses whose flange widths and thicknesses at edge do not exceed dimensions specified in table. Sizes Nos. 1 and 2 will fit Carnegie structural I-beams 24 in. x 100 lb. and smaller, and Bethlehem I-beams 15 in. x 54.5 lb. and smaller. Size No. 3 will fit all Carnegie structural I-beams, Bethlehem I-beams 30 in. x 121 lb. and smaller, and the 30-in. x 135-lb. beam (CB 301) of the Carnegie beam section series. (Some of the new CB series less than 30 in. in depth have flanges greater than specified in table.)

The U. F. S. I-beam clamps, when used with hanger rods having lengths of thread as specified in table, permit a minimum vertical adjustment at the clamps of 1-in. on any width beam; more adjustment on most beams. Length of thread specified provides for the use of a hex nut below the U. F. S. nut for locking the hanger rod in position.

These beam clamps may be used in combination with the Adjustable Wrought Pipe Clamps, Fig. No. 251—see page 37, also with Single Pipe Rolls, Fig. No. 171, Adjustable Swivel Pipe Rolls, Fig. No. 174, Adjustable Swivel Rings, Fig. Nos. 101 and 104, Spring Pipe Hangers, etc. When used in combination with rolls, rings, etc., the length of hanger rods and minimum distance from bottom of beam to center line of pipe may be figured from dimensional data on these items. Top of hanger rods to be figured at 1-in. below bottom of beam.



Illustrations Showing Applications of U. F. S. I-Beam Clamps with Rods and Two Types of Grinnell Hangers

Fig. No. 171. Left, Single Pipe Roll
Fig. No. 101. Right, Adjustable Swivel Ring

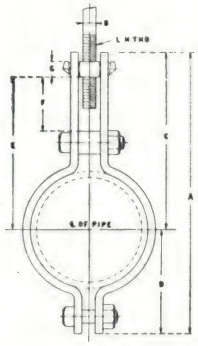
LIST PRICES AND DIMENSIONS—FIG. NO. 228

Clamp size No.	Price ea.	Hanger rod size	Min. length thread on hanger rod	Nom. pipe size	‡— Maximum beam flange Width	Thickness
1	$2.00	3/8 1/2 5/8	4 1/4 4 1/4 4 1/2	3/4 - 2 2 1/2 - 3 1/2 4 - 5	7.25	0.60
2	2.75	3/4 7/8	5 5	6 8 -12	7.25	0.60
3	5.00	*1/2-7/8 1 1 1/8 1 1/4 1 1/2	7 7/8 7 7/8 7 7/8 8 1/8 8 3/8	2 1/2-12 14 -16 18 20 24	10.59	1.031

All dimensions given in inches.
*Size No. 3 U. F. S. I-beam clamps can be furnished to order tapped for rods smaller than 1 in., when necessary to support pipes 12 in. or smaller from I-beams having flange widths greater than 7 1/4 in.
‡See second paragraph above for listing of maximum size beams of different types which each size of clamp will fit.
Hanger rods and hex nuts to be ordered separately.
Order by Figure number and specify size number and rod size.

Grinnell Adjustable Wrought Pipe Clamps

Adjustable Wrought Pipe Clamp
Fig. No. 251 (Complete)
Fig. No. 250. U. F. S. Nut—L. H. thread



The adjustable wrought pipe clamp, Fig. No. 251, consists of two half-bands bolted together and a U. F. S. (lower) forged steel nut, Fig. No. 250, threaded left hand. This pipe clamp is for use with hanger rods threaded right and left. Adjustment is obtained by turning hanger rod. Left-hand nut will, when specified, be furnished with setscrew to prevent hanger rod from turning.

The pipe clamp in each size is designed to support 12 ft. of extra heavy pipe filled with water and to have a factor of safety of not less than twelve, as called for by the specifications of the Power Piping Society.

LIST PRICES AND DIMENSIONS FIG. NOS. 251, 250

Nom. pipe size	Price, ea. Complete fig. No. 251	Price, ea. U. F. S. nuts L.H. thread fig. No. 250	U.F.S. nut size No.	Rod size B	A	C	D	E	F	G
1 1/2	$ 0.65	$0.25	1	3/8	8 1/16	5 15/16	2 1/8	4 3/4	2 13/16	3/4
2	.70	.25	1	3/8	8 11/16	6 1/4	2 7/16	5 1/16	2 13/16	3/4
2 1/2	.75	.25	1	1/2	9 11/16	6 11/16	3	5 1/2	2 11/16	3/4
3	.90	.25	1	1/2	10 11/16	7 3/16	3 1/2	6	2 11/16	3/4
3 1/2	1.00	.25	1	1/2	11 3/16	7 7/16	3 3/4	6 1/4	2 11/16	3/4
4	1.15	.25	1	5/8	12 1/4	7 7/8	4 3/8	6 11/16	2 5/8	3/4
5	1.35	.25	1	5/8	13 3/8	8 7/16	4 15/16	7 1/4	2 5/8	3/4
6	1.60	.40	2	3/4	14 7/8	9 5/16	5 9/16	7 11/16	2 7/16	1 1/8
8	2.25	.40	2	7/8	17 3/4	10 11/16	7 1/16	9 1/16	2 1/4	1 1/8
10	3.00	.40	2	7/8	20	11 13/16	8 5/16	10 3/16	2 1/4	1 1/8
12	4.00	.40	2	7/8	22	12 13/16	9 3/16	11 3/16	2 1/4	1 1/8
14-o.d.	6.00	.80	3	1	26 13/16	16 5/8	10 5/16	14 1/16	4 5/16	2
16-o.d.	8.00	.80	3	1	28 13/16	17 5/8	11 5/16	15 1/16	4 5/16	2
18-o.d.	10.00	.80	3	1 1/8	31 3/8	18 13/16	12 5/16	16 1/4	4 5/16	2
20-o.d.	12.00	.80	3	1 1/4	33 3/4	20	13 3/4	17 7/16	4 5/16	2
24-o.d.	14.00	.80	3	1 1/2	38 5/8	22 5/16	16 5/16	19 3/4	4 1/16	2

All dimensions given in inches. Order by Figure number.

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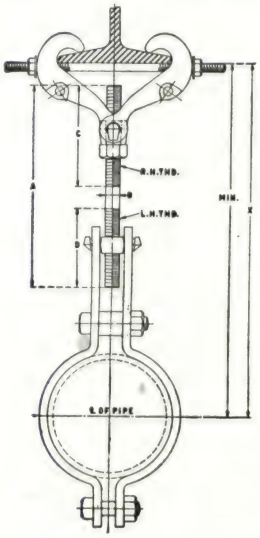
GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell U. S. F. I-Beam Clamps and Adjustable Wrought Pipe Clamps *(Continued)*



The adjustable wrought pipe clamp when used with the U.F.S. I-beam clamp and threaded hanger rod provides an extremely strong adjustable combination hanger.

Table opposite gives data for figuring length of hanger rods, also average minimum distance from bottom of beam to center of pipe.

Minimum vertical adjustment of 2 in. is provided for: 1 in. up and 1 in. down from distance given.

TABLE FOR DETERMINING LENGTHS OF HANGER RODS

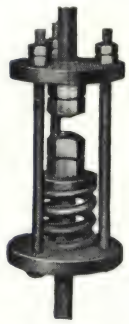
Nom. pipe size	Rod length A	Rod size B	R.h. thread length C	L.h. thread length D	Min. dist. beam to cen. pipe
1½	x- 3½	⅜	4¼	3½	12¼
2	x- 4	⅜	4¼	3½	12¾
2½	x- 4½	½	4¼	3½	13¼
3	x- 5	½	4¼	3½	13¾
3½	x- 5	½	4¼	3½	13¾
4	x- 5½	⅝	4½	3½	14½
5	x- 6½	⅝	4½	3½	15½
6	x- 6¾	¾	5	3¾	16¾
8	x- 8¼	⅞	5	3¾	18¼
10	x- 9¼	⅞	5	3¾	19¼
12	x-10¼	⅞	5	3¾	20¼
14-o.d.	x-11½	1	7⅞	6⅜	27
16-o.d.	x-12½	1	7⅞	6⅜	28
18-o.d.	x-13½	1⅛	7⅞	6⅜	29
20-o.d.	x-15	1¼	8⅛	6⅜	30¾
24-o.d.	x-17	1½	8⅜	6⅜	33

All dimensions given in inches.

Grinnell Spring Pipe Hangers—Spring Pipe Roll Hangers

The use of springs in pipe hanger assemblies is recognized by many engineers as an efficient means for absorbing vibration which is often conveyed to piping lines from various causes.

Grinnell Spring Pipe Hangers and Grinnell Spring Pipe Roll Hangers as illustrated represent a convenient means of applying this principle to most types of pipe hangers.



Spring Pipe Hanger
Fig. No. 255

Spring Pipe Roll Hanger
Fig. No. 256

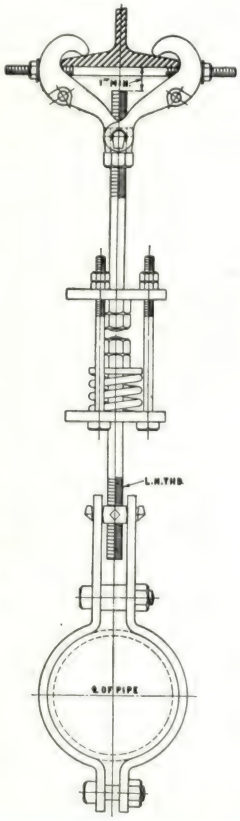


Illustration showing application of spring pipe hanger with U. F. S. I-beam clamp, Fig. No. 228, hanger rods and adjustable wrought pipe clamps, Fig. No. 251

These are furnished standard for all sizes of hanger rods from ⅜ in. to 1½ in. in diameter and are suitable for normal loads of piping in the pipe sizes shown in list price and dimension tables on page 38.

Grinnell Spring Pipe Hanger, Fig. No. 255, includes the steel flanges, spring and outside bolts with nuts. The center or hanger rods and hex nuts are not included, but can be furnished in all sizes and lengths listed for Fig. Nos. 140 and 253 on page 42.

Grinnell Spring Pipe Roll Hanger, Fig. No. 256, includes the roll, roll rod, adjustable sockets, springs and cups. Hanger rods and hex nuts are not included, but can be furnished as mentioned in preceding paragraph.

The spring pipe hangers with threaded hanger rods may be used in any hanger combinations which have Grinnell U.F.S. I-Beam Clamps, Grinnell Welded Steel Brackets, adjustable wrought U-pipe hangers, or some other type of overhead support at the upper end, and Grinnell Adjustable Wrought Pipe Clamps, adjustable swivel rings or adjustable swivel pipe rolls at the lower end.

The spring pipe roll hangers may be suspended with threaded hanger rods from any of the clamps, brackets, etc., listed above. When the pipe line is to be insulated, Grinnell Pipe Covering Protection Saddles, Fig. Nos. 186, 187, 188, should be used. These are shown on page 26.

Both types of springs can be made to fit many other applications and can be furnished separately at special prices.

Sketch at left shows application of spring pipe hanger as used with U.S.F. I-beam clamp and adjustable wrought pipe clamp. Left hand nut in pipe clamp will, when specified, be furnished with set screw to prevent hanger rod from turning.

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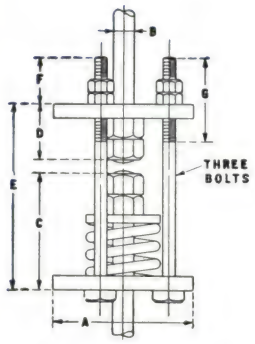
GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Spring Pipe Hangers—Spring Roll Hangers *(Continued)*



Spring Pipe Hanger
Fig. No. 255

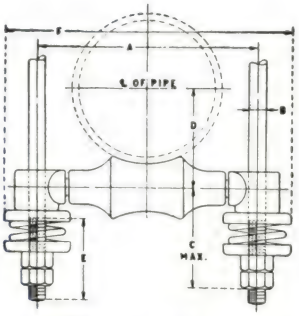
All dimensions given in inches.

Center or hanger rods with hex nuts are not included in price of spring pipe hangers, and are to be ordered separately.

Order by Figure number and size number.

LIST PRICES AND DIMENSIONS—FIG. NO. 255

Nom. pipe size, in	Spring hanger size No.	Price ea.	Rod size B	A	C	D	E	F	G
1–2	1	$1 50	3/8	3	2 5/8	1 1/8	4	1	2
2 1/2–3 1/2	2	2.00	1/2	3 1/2	3	1 1/2	4 3/4	1 1/4	2 1/2
4–5	3	2.50	5/8	4 1/4	3 1/2	1 3/4	5 5/8	1 3/8	2 1/2
6	4	3 00	3/4	4 1/4	4	2	6 1/2	1 1/2	3
8–12	5	3.75	7/8	4 5/8	5 1/4	2 1/4	8	1 1/2	3
14–16–o.d.	6	4 25	1	4 5/8	6 5/8	2 1/2	9 5/8	1 7/8	3
18–o.d.	7	5.00	1 1/8	5	6 1/8	2 7/8	9 1/2	2	3 1/2
20–o.d.	8	7.00	1 1/4	6	7 5/8	3 1/8	11 3/8	2 1/8	4
24–o d	9	8.00	1 1/2	6	8 1/8	3 5/8	12 3/8	2 5/8	4 1/2



Spring Pipe Roll Hanger
Fig. No. 256

LIST PRICES AND DIMENSIONS—FIG. NO. 256

Nom. pipe size, in	Price, ea. pipe rolls with roll rods, adj. sockets, springs and cups	Rod size B	A	C max.	D	Rod thread length E	F
1	$ 1.00	3/8	4 1/2	3 1/8	1 3/16	2 1/2	5 11/16
1 1/4	1.00	3/8	5	3 1/8	1 5/16	2 1/2	6 3/16
1 1/2	1.00	3/8	5 1/2	3 1/8	1 7/16	2 1/2	6 11/16
2	1.05	3/8	4 7/8	3 1/8	1 3/4	2 1/2	6 1/16
2 1/2	1.40	1/2	6 1/8	3 1/2	2 1/16	3	7 15/16
3	1.45	1/2	6 1/8	3 1/2	2 3/8	3	7 15/16
3 1/2	1.45	1/2	6 1/2	3 1/2	2 3/4	3	8 5/16
4	2.20	5/8	7 1/8	3 3/4	3	3	9 5/8
5	2.40	5/8	8 3/16	3 3/4	3 5/8	3	10 11/16
6	2.85	3/4	9 3/4	4 1/2	4 1/4	3 1/2	12 7/16
7	2.95	3/4	10 3/4	4 1/2	4 7/8	3 1/2	13 7/16
8	3.90	7/8	12 1/8	5 3/16	5 1/2	3 1/2	14 15/16
9	4.45	7/8	13 1/8	5 3/16	6 1/8	3 1/2	15 15/16
10	4.85	7/8	14 1/4	5 3/16	6 7/8	3 1/2	17 1/16
12	6 15	7/8	16 1/4	5 3/16	8	3 1/2	19 1/16
14–o.d.	7.75	1	17 7/8	6 1/2	8 11/16	4	21 1/8
16–o.d.	9.75	1	19 7/8	6 1/2	9 13/16	4	23 1/8
18–o.d.	12.15	1 1/8	22 1/4	7	10 7/8	4 1/2	25 5/8
20–o.d.	16 55	1 1/4	24	8 1/2	11 15/16	4 1/2	27 1/8
24–o.d.	20.80	1 1/2	28 1/4	8 1/4	14 3/8	5	32 3/8

All dimensions given in inches.
Hanger rods and hex nuts are not included in price of spring pipe roll hanger and are to be ordered separately.
Order by Figure number and specify pipe size.

Grinnell One Hole Clamps—*Malleable Iron*

This clamp is designed for supporting all standard conduit cable or wrought iron or steel pipe in sizes 3/8 in. to 4 in. It is neat in appearance and requires only one screw or bolt.

Regularly furnished in plain black malleable iron finish. Can be furnished galvanized or other coatings on order, and at an extra cost.

One Hole Clamp
Fig. No. 126

When ordering specify inside diameter of conduit or pipe, or outside diameter of lead cable with which the clamp is to be used.

Order by Figure number.

LIST PRICES—FIG. NO. 126

Conduit or pipe size nom. inside diameter, in.	Cable size or outside diameter of conduit in.	Price per 100	Diameter of screw hole	Size expansion case or screw anchor
3/8	.67	$ 4.80	3/16	3/16x1
1/2	.84	6.00	1/4	3/16x1
3/4	1.05	7.20	5/16	1/4x1 1/2
1	1.31	9.60	5/16	1/4x1 1/2
1 1/4	1.66	16.80	3/8	1/4x1 1/2
1 1/2	1.90	24.00	7/16	3/8x2
2	2 37	48.00	9/16	1/2x2
2 1/2	2.87	72.00	5/8	1/2x2
3	3.50	96.00	5/8	1/2x3 1/2
3 1/2	4 00	144.00	11/16	5/8x3 1/2
4	4.50	156.00	11/16	5/8x3 1/2

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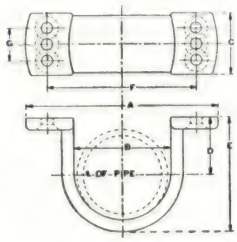
GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Short and Long Clips—*Cast Iron*

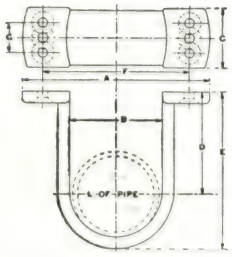
Short Clip
Fig. No. 206



LIST PRICES—FIG. NO. 206

Pipe size, in.	Price ea.	A	B	C	D	E	F	G	Size screws
¾	$0.15	3 5/16	1 1/4	1 1/8	25/32	1 9/16	2 7/16	....	No. 14x1 1/2
1	.16	3 9/16	1 15/32	1 1/4	27/32	1 3/4	2 3/4	....	No. 14x1 1/2
1 1/4	.18	4 3/32	1 13/16	1 5/16	1 3/32	2 3/16	3 1/4	....	No. 14x1 1/2
1 1/2	.20	4 3/8	2 1/16	1 3/8	1 5/16	2 1/2	3 7/16	....	No. 18x1 1/2
2	.25	5	2 17/32	1 5/8	1 7/16	2 15/16	4	....	No. 18x1 1/2
2 1/2	.30	6 1/8	3 1/8	2 1/16	1 7/8	3 5/8	4 13/16	1	No. 18x1 1/2
3	.40	6 11/16	3 5/8	2 1/8	2	4 1/8	5 1/4	1	No. 18x1 1/2
3 1/2	.50	7 1/4	4 1/8	2 5/16	2 3/16	4 9/16	6	1 1/8	No. 18x1 1/2
4	.65	8 3/16	4 23/32	2 1/4	2 9/16	5 1/4	6 3/4	1 1/8	No. 18x1 1/2

Long Clip
Fig. No. 207



LIST PRICES—FIG. NO. 207

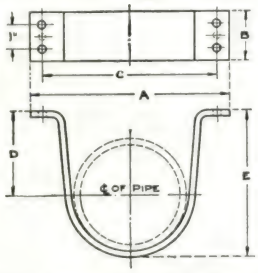
Pipe size, in.	Price ea.	A	B	C	D	E	F	G	Size screws
¾	$0.17	3 1/4	1 3/16	1 1/8	2 1/32	2 13/16	2 3/8	....	No. 14x1 1/2
1	.18	3 9/16	1 3/8	1 1/4	2 3/32	3 1/16	2 3/4	....	No. 14x1 1/2
1 1/4	.20	4 1/16	1 13/16	1 5/16	2 9/32	3 3/8	3 1/4	....	No. 14x1 1/2
1 1/2	.22	4 1/2	2 1/16	1 3/8	2 1/2	3 11/16	3 9/16	....	No. 18x1 1/2
2	.27	5 1/8	2 17/32	1 5/8	2 13/16	4 5/16	4 1/8	....	No. 18x1 1/2
2 1/2	.35	5 15/16	3 3/32	2	2 3/4	4 1/2	4 5/8	1	No. 18x1 1/2
3	.45	6 5/8	3 11/16	2 1/8	2 7/8	5	5 1/4	1	No. 18x1 1/2
3 1/2	.60	7 13/32	4 1/8	2 3/8	3 1/8	5 1/2	6 1/8	1 3/16	No. 18x1 1/2
4	.75	7 15/16	4 19/32	2 7/16	3 3/8	6 1/16	6 1/2	1 1/4	No. 18x1 1/2

Note: Clips for pipe larger than 2 in., use 4 screws.
Order by Figure number.

Grinnell Wrought Short Clips and Long Clips

Wrought Short Clip
Fig. No. 262

Wrought Long Clip
Fig. No. 263



Clips for ¾ to 2-in. pipe take 2 screws; for 2½ to 4-in. pipe take 4 screws. Holes drilled for No. 14 or No. 18 round or flat head screws as shown. ⅜-in. bolts can be used on ¾ to 1¼-in. clips; ¼-in. bolts on 1½ to 4-in. clips.

LIST PRICES AND DIMENSIONS—FIG. NOS. 262, 263

Pipe size, in.	Price ea. Short clip No.262	Price ea. Long clip No.263	A	B	C	Size screws	Short clip D	Short clip E	Long clip D	Long clip E
¾	$0.07	$0.09	3 7/8	7/8	3	No. 14	¾	1 1/2	2	2 3/4
1	.08	.10	4 1/8	7/8	3 1/4	No. 14	7/8	1 11/16	2 1/8	2 15/16
1 1/4	.10	.12	4 9/16	7/8	3 11/16	No. 14	1 1/8	2 3/16	2 5/16	3 3/8
1 1/2	.12	.15	5 3/16	1	4 3/16	No. 18	1 5/16	2 9/16	2 1/2	3 3/4
2	.13	.18	5 3/4	1	4 3/4	No. 18	1 7/16	2 15/16	2 13/16	4 5/16
2 1/2	.18	.25	6 1/4	2	5 1/4	No. 18	1 7/8	3 9/16	2 3/4	4 7/16
3	.25	.30	6 7/8	2	5 7/8	No. 18	2	4	2 7/8	4 7/8
3 1/2	.28	.35	7 3/8	2	6 3/8	No. 18	2 5/16	4 9/16	3 1/8	5 3/8
4	.30	.40	8	2	7	No. 18	2 9/16	5 1/16	3 3/8	5 7/8

Order by Figure number.

Grinnell Extension Pipe Clamps or Riser Clamps—for Steel or Wrought Soil Pipe

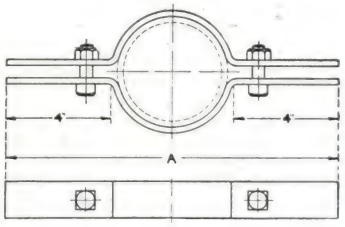
Grinnell Extension Pipe Clamps are generally used as riser clamps for supporting or steadying steel pipe risers or soil pipe. Also used to support asbestos or other types of pipe covering.

These clamps are rugged in construction, will hold tight to pipe, and can be placed anywhere on the length of pipe. It is not necessary for the clamps to be placed below a coupling on steel pipe or below the hub on cast iron soil pipe, although we recommend that they be so placed when possible.

Grinnell Extension Pipe Clamps can be used interchangeably on either steel pipe or cast iron soil pipe, making it necessary to carry but one type of clamp for both purposes.

Order by Figure number.

Extension Pipe Clamp or Riser Clamp
Fig. No. 261



LIST PRICES AND DIMENSIONS—FIG. NO. 261

Pipe size, in.	Price ea.	Length A	Size bolts	Pipe size, in.	Price ea.	Length A	Size bolts
¾	$0.50	9 3/8	3/8x1 1/4	5	$0.90	14 1/2	1/2x1 1/2
1	.50	9 5/8	3/8x1 1/4	6	1.15	15 1/2	1/2x1 1/2
1 1/4	.55	10	3/8x1 1/4	8	1.45	18 1/2	5/8x2
1 1/2	.55	10 3/8	3/8x1 1/4	10	1.90	20 3/4	5/8x2
2	.60	10 3/4	7/16x1 1/2	12	2.20	22 3/4	5/8x2 1/2
2 1/2	.65	11 1/4	7/16x1 1/2	14-o.d.	2.50	24	5/8x2 1/2
3	.70	12	7/16x1 1/2	16-o.d.	5.60	26	3/4x3
3 1/2	.75	13	1/2x1 1/2	18-o.d.	6.20	28	3/4x3
4	.80	13 1/2	1/2x1 1/2	20-o.d.	6.80	30	3/4x3

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Tin Clips

Tin Clips
Fig. No. 231

LIST PRICES—FIG. NO. 231

Size, in.	¼	⅜	½	¾
Price, ea.	.02	.02	.02	.03
Size, in.	1	1¼	1½	2
Price, ea.	.04	.05	.06	.08

Order by Figure number.

Grinnell Pear Shape Rings

Pear Shape Rings—Malleable
Fig. No. 232

LIST PRICES—FIG. NO. 232

Size, in.	¾	1	1¼	1½	2	2½
Price, ea.	.10	.13	.15	.18	.20	.23
Size, in.		3	3½	4	5	6
Price, ea.		.25	.40	.50	.60	.75

Order by Figure number.

Grinnell Cast Iron Building Washers

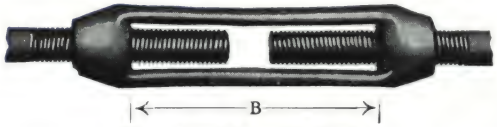
Cast Iron Building Washers
Fig. No. 233

LIST PRICES—FIG. NO. 233

Size, in.	½	⅝	¾	⅞	1	1⅛	1¼	1½
Price, ea.	.15	.15	.20	.35	.45	.65	.80	1.25
Thickness, in.	⅜	½	⅝	¾	⅞	1⅛	1¼	1⅜
Outside dia., in.	2½	2¾	3	3½	4	4½	5	6

Drop Forged Turn-Buckles

With Right and Left Hand U. S. Standard Threads



Turn-buckle with Stubs
Fig. No. 230

Turn-buckles complete with stub ends will be furnished unless definitely specified "without stub ends."

For galvanized turn-buckles, add 25 per cent to above list prices.

Order by Figure number.

LIST PRICES WITH OR WITHOUT STUBS
(Simplified List effective Jan. 1, 1928)

Diam. of screw, in.	Dimension "B," in.				
	†6	9	12	18	24
⅜	$0.45	.....	.....	.....	.....
½	.50	$0.75	$0.88	.....	.....
⅝	.60	.90	1.05	$1.50	.....
¾	.75	1.13	1.31	1.88	$2.63
⅞	.90	.....	1.58	2.25	3.15
1	1.10	.....	1.93	2.75	3.85
1⅛	1.40	.....	2.45	3.50	4.90
1¼	1.70	.....	2.98	4.25	5.95
1⅜	2.10	.....	.....	.....	.....
1½	2.50	.....	4.38	6.25	8.75
1⅝	3.25	.....	.....	.....	.....
1¾	4.00	.....	.....	10.00	14.00
2	6.25	.....	.....	.....	21.88
2¼	9.25	.....	.....	.....	32.38
2½	13.00	.....	.....	.....	45.50

†Standard length turn-buckles have 6-in. opening B. This length will be shipped unless otherwise specified.

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Spring Ceiling Plates—*Steel*

The spring ceiling plate is unique inasmuch as plate is so held to the rod by five steel points that it can easily be pushed up against the ceiling, but cannot be pulled downward. Illustration B shows a cross sectional view of the spring ceiling plate and shows how points hold against rod.

Once plate is installed in place against ceiling, it will never work loose. Eliminates entirely the need of set screws for fastening ceiling plate to hanger rod.

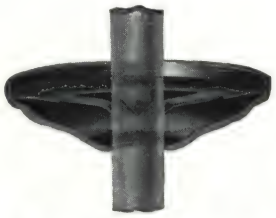
Spring Ceiling Plate
Fig. No. 133
Patented July 17, 1923—No. 1,462,187

Spring and plate are stamped from sheet steel and are strongly made.

Where ceiling plates are required for 7/8-in. and 1-in. rods, use cast iron ceiling plates (Figures No. 215) shown below.

Order by Figure number.

Spring Ceiling Plate on Rod
Illustration A



Spring Ceiling Plate in Cross Section
Illustration B

Spring Ceiling Plate on Rod with Expansion Case
Illustration C

LIST PRICES—FIG. NO. 133

Size, dia. rod	Price ea.	Outside dia.	Depth
3/8	$0.09	1 13/16	9/16
1/2	.145	2 3/16	5/8
5/8	.20	2 1/2	11/16
3/4	.27	2 1/2	11/16

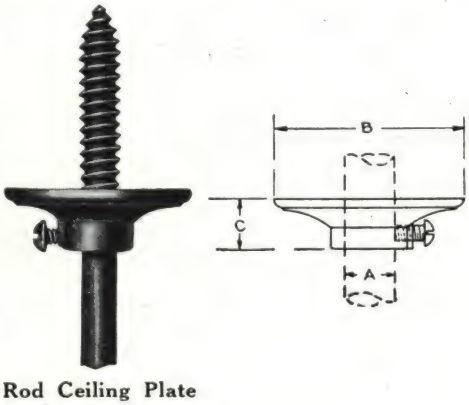
Grinnell Rod Ceiling Plates—*Cast Iron*

Grinnell Cast Iron Ceiling Plates can be used on coach screw rods installed in plastered, wood, plaster board or metal sheathed ceilings.

This ceiling plate can also be used on hanger rods in connection with expansion cases and with inserts.

This ceiling plate is made of cast iron in a neat design and, in addition to covering up the roughness of the hole made in the ceiling, gives a finished appearance to the work. The tightening of the set screw will hold the plate in proper position against the ceiling. Although we carry in stock the cast iron ceiling plate we believe that the Grinnell Spring Ceiling Plate (Fig. No. 133) shown above is preferable and more adaptable for general use.

Order by Figure number.



Rod Ceiling Plate
Fig. No. 215

LIST PRICES—FIG. NO. 215

Size A		Price each	B	C
Rod	Pipe			
3/8	....	$0.06	1 7/8	5/8
1/2	....	.08	2 1/8	5/8
5/8	....	.09	2 3/8	5/8
3/4	....	.10	2 1/2	5/8
7/8	1/2	.11	2 7/8	3/4
1	3/4	.13	3 3/8	1

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Hanger Rods, Machine Threaded—Right Hand—Right and Left Hand

Should hanger rods be required in lengths other than shown in table at right, they will be furnished at prices for next longer length listed.

List prices as given cover hanger rods having threads not over 2½-in. long as illustrated at right —Fig. Nos. 140, 141, 253, 254.

For use with U. F. S. I-beam clamps, adjustable wrought pipe clamps and some other types of hangers, rods will be required with threads longer than 2½-in. In the following notes, reference to "long threads" covers any thread length required longer than 2½-in. up to maximum lengths required for these clamps.

Add 15% to list prices at right for hanger rods as follows:

Fig. No. 140 having one long right hand thread.

Fig. No. 141 having long right hand thread.

Fig. No. 254 having long left hand thread.

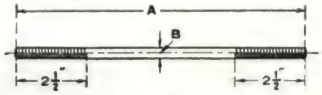
Add 30% to list prices for hanger rods as follows:

Fig. No. 253 having long left hand thread.

Add 40% to list prices for hanger rods as follows:

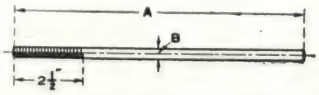
Fig. No. 253 having long right hand and long left hand threads.

Order by Figure number and specify length of threads if other than 2½ in. long.



Machine Threaded Both Ends

Fig. No. 140. Right Hand Threads
Fig. No. 253. Right and Left Threads



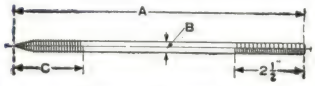
Machine Threaded One End

Fig. No. 141. Right Hand Thread
Fig. No. 254. Left Hand Thread

LIST PRICES—FIG. NO. 140, 141, 253, 254

Length A	Rod size B								
	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1½
8 in.	$0.08	$0.10	$0.18	$0.25	$0.30	$0.35	$0.45	$0.60	$0.80
10 in.	.08	.10	.18	.25	.30	.35	.45	.60	.80
12 in.	.08	.10	.18	.25	.30	.35	.45	.60	.80
14 in.	.10	.14	.24	.30	.40	.50	.65	.85	1.10
18 in.	.10	.14	.24	.30	.40	.50	.65	.85	1.10
24 in.	.12	.17	.30	.38	.50	.60	.75	1.00	1.35
30 in.	.14	.20	.36	.45	.60	.75	.95	1.25	1.60
36 in.	.16	.23	.42	.50	.70	.90	1.10	1.45	1.90
42 in.	.18	.26	.48	.60	.80	1.00	1.30	1.70	2.20
48 in.	.20	.29	.54	.65	.90	1.15	1.50	1.90	2.45
54 in.	.22	.32	.60	.75	1.00	1.25	1.60	2.10	2.70
60 in.	.24	.35	.66	.80	1.10	1.35	1.75	2.30	3.00
66 in.	.26	.38	.72	.90	1.20	1.50	1.90	2.50	3.30
72 in.	.28	.41	.78	.95	1.30	1.60	2.10	2.75	3.60

Grinnell Coach Screw Rods



Coach Screw Rod

Fig. No. 142. Machine Threaded on Opposite End

Coach Screw Rod

Fig. No. 143. Opposite End Not Threaded

Coach Screw rods with or without machine thread 2½ in. long on opposite end are stocked in sizes and lengths listed in table. In addition, ⅜ in. rods Fig. No. 142 are stocked in lengths 11, 11¼, 11½, 11¾ and 13 in. which are used in the adjustable coach screw clip, Fig. No. 100, shown on page 10. Should lengths not listed be desired, they will be furnished at price for next longer length listed.

When coach screw rods are ordered with machine thread longer than 2½ in., an additional charge will be made.

Order by Figure number.

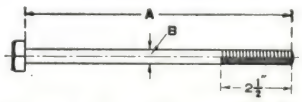
LIST PRICES—FIG. NO. 142, 143

Length A	Size B				
	⅜	½	⅝	¾	⅞
8 in.	$0.06	$0.09	$0.13	$0.14	$0.20
10 in.	.06	.09	.13	.14	.20
12 in.	.06	.09	.13	.14	.20
14 in.	.08	.12	.17	.19	.27
18 in.	.08	.12	.17	.19	.27
24 in.	.10	.15	.21	.24	.34
30 in.	.12	.18	.25	.29	.41
36 in.	.14	.21	.29	.34	.48
42 in.	.16	.24	.33	.39	.55
48 in.	.18	.27	.37	.44	.62
54 in.	.20	.30	.41	.49	.69
60 in.	.22	.33	.45	.54	.76
66 in.	.24	.36	.49	.59	.83
72 in.	.26	.39	.53	.64	.90
Dimension C	2 in.	2 7/16 in.	2 9/16 in.	2 9/16 in.	. . .

Grinnell Square Head Hanger Rods

Square head hanger rods may be used in connection with the Grinnell Cast Iron Bracket, Fig. No. 223, shown on page 16, and with other types of Hangers. In the ⅜-in. size these rods are used in connection with adjustable clip base shown on page 11 and with center I-beam clamp shown on page 17.

Square head hanger rods with or without machine thread 2½ in. long are stocked in sizes and lengths listed in table. In addition, ⅜-in. rods, Fig. No. 144, are stocked in lengths, by inches, from 6 in. to 24 in., also in lengths 6¼, 6¾, 7, 7¼ and 8½ in. used in the adjustable clip, Fig. No. 106, shown on page 11. Should lengths not listed be desired they will be furnished at price for next longer length listed.



Square Head Hanger Rod

Fig. No. 144. Threaded
Fig. No. 145. Not Threaded

An additional charge will be made for threads longer than 2½ in. Order by Figure number.

LIST PRICES—FIG. NO. 144, 145

Length A	Size B				
	⅜	½	⅝	¾	⅞
8 in.	$0.05	$0.07	$0.10	$0.15	$0.26
10 in.	.05	.08	.12	.17	.32
12 in.	.06	.10	.14	.19	.36
14 in.	.06	.11	.15	.22	.40
18 in.	.07	.13	.19	.27	.50
24 in.	.09	.17	.24	.34	.66
30 in.	.10	.21	.29	.42	.80
36 in.	.12	.25	.35	.49	.95
42 in.	.13	.28	.40	.57	1.10
48 in.	.15	.32	.45	.63	1.25
54 in.	.16	.35	.50	.70	1.40
60 in.	.18	.40	.55	.78	1.55
66 in.	.19	.43	.60	.85	1.70
72 in.	.22	.47	.66	.93	1.85

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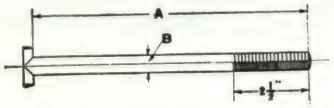
GRINNELL ADJUSTABLE PIPE HANGERS

Grinnell Swinging Hanger Flange Rods



Swinging Hanger Flange Rod
Fig. No. 146. Threaded
Fig. No. 147. Not Threaded

Special T headed rods to be used with the swinging hanger flange, Fig. No. 158, shown on page 13, are stocked in sizes and lengths listed in table both with and without machine thread, 2½ in. long. Should special lengths be desired, they will be furnished at price for next longer length listed.

When swinging hanger flange rods are ordered with threads longer than 2½ in. an additional charge will be made.

Order by Figure number.

LIST PRICES—FIG. NO. 146, 147

Length A	Size B				
	⅜	½	⅝	¾	⅞
8 in.	$0.15	$0.26	$0.35	$0.44	$0.50
10 in.	.15	.26	.35	.44	.50
12 in.	.15	.26	.35	.47	.52
14 in.	.17	.28	.35	.54	.60
18 in.	.17	.33	.47	.62	.68
24 in.	.30	.38	.54	.70	.75
30 in.	.30	.43	.67	.84	.90
36 in.	.35	.48	.80	.97	1.05
42 in.	.35	.53	.90	1.05	1.20
48 in.	.40	.58	1.00	1.20	1.35
54 in.	.40	.63	1.10	1.30	1.50
60 in.	.45	.68	1.20	1.40	1.65
66 in.	.45	.73	1.30	1.50	1.80
72 in.	.50	.78	1.40	1.60	1.95

Grinnell Hook Rods

Fig. No. 148. Hook Rod Threaded
Fig. No. 149. Not Threaded

Hook rods are used as part of the two-pipe adjustable bracket, shown on page 27, and in connection with the adjustable hanger plate, shown in Fig. X on page 20.

Hook rods with or without machine thread 2½ in. long can be furnished in sizes and lengths listed in table. Should special lengths be desired, they will be furnished at price for next longer length listed.

When ordering ½, ⅝ or ¾-in. hook rods separately for use with the adjustable two-pipe bracket, the length of thread on rod should be specified as 4 in.

An additional charge will be made for threads longer than 4 in.

Order by Figure number.

LIST PRICES—FIG. NO. 148, 149

Length A	Size B				
	⅜	½	⅝	¾	⅞
8 in.	$0.08	$0.10	$0.18	$0.25	$0.30
10 in.	.08	.10	.18	.25	.30
12 in.	.08	.10	.18	.25	.30
14 in.	.10	.14	.24	.30	.40
18 in.	.10	.14	.24	.30	.40
24 in.	.12	.17	.30	.38	.50
30 in.	.14	.20	.36	.45	.60
36 in.	.16	.23	.42	.50	.70
42 in.	.18	.26	.48	.60	.80
48 in.	.20	.29	.54	.65	.90
54 in.	.22	.32	.60	.75	1.00
60 in.	.24	.35	.66	.80	1.10
66 in.	.26	.38	.72	.90	1.20
72 in.	.28	.41	.78	.95	1.30

Grinnell Special Hanger Rods

In addition to the several types of hanger rods as listed above and on preceding page, we will furnish upon order any special types of hanger rods desired.

These special types will include rods with welded eye or eyes, with turnbuckle, etc. Sketch giving information regarding size and length of rod and other details should accompany the order.

Prices on application.

Grinnell Pipe Threaded Coach Screws

The pipe threaded coach screw shown below is manufactured especially for use with hangers shown in this catalogue. The coach screw end has gimlet point while opposite end has standard pipe thread.

It is designed for use with split pipe ring and socket (Fig. No. 107), page 11, and with extension split ring (Fig. No. 138), page 12.

This coach screw is made in four sizes carrying pipe threads ⅛ to ½ in. and coach screw threads ⅜ to ¾ in.

Pipe Threaded Coach Screw
Fig. No. 111

Note that coach screws for ⅛ and ¼ in. pipe thread are 3½ in. long and that ⅜ and ½ in. pipe thread are 5 in. long.

Order by Figure number.

LIST PRICES—FIG. NO. 111

No.	Price each	Pipe thread	Coach screw thread	Length
1	$0.10	⅛	⅜	3½
2	.12	¼	½	3½
3	.14	⅜	⅝	5
4	.20	½	¾	5

Iron Wood Screws and Drive Screws

Drive screws are regularly made in iron only, and with but one style of head. In use they are driven with a hammer like nails, but have greater holding power and can be withdrawn with an ordinary screwdriver. Prices for Wood, Drive and Coach Screws on application.

Wood Screw

Drive Screw

Grinnell Square Head Coach Screws

Coach Screw

Drive Coach Screw

Continued on next page

GRINNELL ADJUSTABLE PIPE HANGERS

Standard Specifications for Pipe Hangers and Supports

Piping to be supported by means of hangers or supports which are capable of screw adjustment *after* erection of the pipe.

Hangers

Pipe rings to be made of malleable iron fitted with an adjusting nut of the locking type threaded to take a rod.

Pipe rolls to be provided with threaded nut or with sockets to take threaded rods.

Pipe clamps to be made of heavy steel equipped with a hooked nut threaded to take a rod.

Hangers located overhead to be supported by means of threaded rods fastened to:

(No. 1) Wooden Construction—

(a) By the use of proper hanger flanges or brackets attached directly to ceiling or beams with wood or coach screws.

(b) By the use of coach screw threads provided on one end of rods.

(No. 2) Steel Construction—

(a) By means of U.F.S. (Universal Forged Steel), or Side I-Beam Clamps or Channel Iron Clamps fastened directly to steel beams or channels.

(b) By means of welded steel brackets fastened to steel columns.

(No. 3) Concrete Construction—

By means of malleable iron or steel concrete inserts or of expansion cases placed in the concrete.

Hanger Rod Sizes

No matter what the type of construction the size of rod is to be determined by the size of pipe to be supported as per the following schedule:

¾-in. to 2-in. pipe inclusive	⅜-in. rod
2½-in. to 3½-in. pipe inclusive	½-in. rod
4-in. and 5-in. pipe	⅝-in. rod
6-in. pipe	¾-in. rod
8-in. to 12-in. pipe inclusive	⅞-in. rod
14-in. O.D. and 16-in. O.D. pipe	1-in. rod
18-in. O.D. pipe	1⅛-in. rod
20-in. O.D. pipe	1¼-in. rod
24-in. O.D. pipe	1½-in. rod
30-in. O.D. pipe	1⅞-in. rod

Supports

Piping to be supported from:

(No. 1) Walls or Columns—

By means of welded steel brackets and adjustable pipe (roll) stands.

(No. 2) Floors or Piers—

(a) By means of adjustable pipe rolls or chairs with bases.

(b) By means of saddle stands or stanchions.

(No. 3) Ground (between buildings)—

By means of pipe pole supports and adjustable attachments.

Standard Specifications for Radiation Hangers

Wall coils to be supported by means of all-metal hangers capable of screw adjustment *after* erection of coils to secure perfect alignment. Hanger plates to be of steel, shaped to insure rigidity and strength and to offer only slight resistance to expansion, and to be attached to brackets fastened directly to walls or pilasters.

Over-head coils to be supported by means of steel saddle hangers (or branch pipe roll hangers) capable of screw adjustment *after* erection of coils to secure perfect alignment. Hangers to be supported by means of ½ or ⅝-in. threaded rods fastened to:

(No. 1) Wooden Construction—

(a) By the use of proper hanger flanges or brackets attached directly to ceiling or beams with wood or coach screws.

(b) By the use of coach screw threads provided on one end of rods.

(No. 2) Steel Construction—

By means of side I-beam clamps or channel iron clamps fastened directly to steel beams or channels.

(No. 3) Concrete Construction—

By means of malleable iron or steel concrete inserts or of expansion cases placed in the concrete.

Wall and Column Radiator Brackets

Wall radiation to be supported by means of all-metal hangers capable of screw adjustment *after* radiators are in place to secure perfect alignment and attached to bracket fastened directly to wall by one ⅝-in. bolt.

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Direct Control System

AUTOMATIC TEMPERATURE REGULATION

DIRECT CONTROL VALVE COMPANY
CHICAGO, ILLINOIS

CONCENTRATED EVIDENCE

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2. Chrysler Building, New York, N. Y.
3. Lefcourt Colonial Building, New York, N. Y.
4. Daily News Building, New York, N. Y.
5. 10 East 40th Street Building, New York, N. Y.
6. Bank of Manhattan Building, New York, N. Y.
7. Rand Building, Minneapolis, Minn.
8. New York Life Building, New York, N. Y.
9. Central Union Trust Building, New York, N. Y.
10. Pittsfield Building, Chicago, Ill.
11. New Insurance Exchange Building, Chicago, Ill.
12. Willoughby Tower, Chicago, Ill.

DIRECT CONTROL VALVE COMPANY

Manufacturers of Thermostatic Control Devices

GENERAL OFFICES

8 South Michigan Boulevard
CHICAGO, ILL.

DISTRICT SALES OFFICES

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Products

THERMOSTATIC RADIATOR CONTROL VALVES, automatically controlling room temperature.

The Company

The DIRECT CONTROL VALVE COMPANY was founded in 1927 and is incorporated under the laws of Delaware. It has established a financial standing and reputation sufficient to guarantee its integrity and responsibility, and to assure efficient and dependable service.

Manufacturing

The company's product is manufactured at Milwaukee, Wisconsin, the plant having ample brass foundry, machine shop and assembly facilities for the company's requirements. The modern research laboratory, in a separate building, is equipped to carry on the experimental and research work on the company's products and their uses.

Sales and Service

The sales organization consists of experienced sales engineers, familiar with the heating industry and thoroughly equipped by experience to intelligently handle any sales problems pertaining to the application of the company's products.

An important part of the organization is the Service Department with an unusually high-calibered personnel to render efficient service.

Continued on next page

STEAM ECONOMY AND SATISFIED OCCUPANTS BY TEMPERATURE REGULATION

During recent years the term "Steam Economy" has been constantly misunderstood and misused by the heating industry. Steam saving is not always an economy and should be studied from the viewpoint of its economic effect on the other phases of building operation.

Fundamentally, steam economy in any building is secondary to the fact that you must heat the building to the complete satisfaction of the building occupants. This occupancy requirement for heat, which influences the degree of heat furnished and the heating hours, will vary with the nature of the occupancy and the result in heat demand will vary from day to day independent of climatic conditions—resulting in a building requirement that is not consistent throughout the heating season.

Demands for heat of the individual building occupants must be satisfied before any attempt is made to save steam, for it would offer little profit to the building owner to decrease the steam consumption to the extent of creating dissatisfied occupants or tenants.

For
THE OWNER

Automatic temperature control makes space, whether office or apartment, more rentable. It also saves fuel to an extent little understood by either building owners or operators

We consider that the heating requirement in any building is made up of a number of separate and variable human requirements and, of course, is further influenced by the natural variation in climatic and atmospheric conditions. The human requirements together with the climatic conditions determine the heat demand of any building and, because of the variation that exists in the above factors influencing accordingly the heat demand, it is not feasible to operate a building on the basis of a predetermined or fixed building temperature.

The Direct Control Valve offers to the operator the opportunity of heating the building to the minimum temperatures tolerated by the building occupants and at the same time, while satisfying the occupancy demand, the Direct Control Valve automatically compensates for variations in climatic conditions. The Direct Control Valve offers the maximum in steam economy consistent with the theory that the building must be heated satisfactorily.

When we study the factors that make up the heat demand in your building, it is agreed that the human element,

Continued on next page

or the occupancy factor, is an item over which we have little control. We know that the demand for heat originating from any one occupant will vary from day to day and that the daily variations in heat demand by individual building occupants will not coincide with each other. We know in addition to this that we have no control over the climatic or atmospheric conditions which affect the heat demand in a building. It appears then that the logical method to use in effecting maximum economy in steam consumption is to install such equipment as will enable the building to maintain each heated space in the building at the minimum temperature that will be demanded by the space occupant on that particular day. Any steam savings beyond this point represents under-heating and any steam consumed in excess of this point represents waste. The only known method to promote this condition is to control the heat in-put to each individual space in the building consistent with the minimum temperature required by the occupant of that space. This can only be accomplished by the use of a device which will be flexible enough to guarantee to the individual space occupant the degree of control over the radiation in that space necessary to satisfy his variable demand for heat.

To effect the maximum in steam economy you must then accurately control the room temperatures throughout the building. In order to maintain all spaces in the building at minimum allowable temperature it is necessary to install such equipment as will actually maintain each individual space in the building within one degree of a predetermined temperature. The most economical and most efficient method of securing the above result is by the use of the Direct Control Valve.

For THE TENANT

Automatic temperature control makes rooms far more comfortable and healthier. It also makes workers more efficient by eliminating high enervating temperature

Direct Control Valves

1. Control room temperature within one degree Fahrenheit of any predetermined temperature between 60 degrees and 80 degrees Fahrenheit.
2. Offer the tenant the option of closing the radiator valve by hand.
3. Make it impossible to over-heat the room.
4. Require no air lines, piping, electrical connections, or other outside or auxiliary equipment.
5. Allow changing of radiator locations without tearing out plaster, tile, trim, etc.
6. Conserve all of the steam possible after satisfying the heat demands of the building occupants.
7. Guarantee minimum maintenance cost.
8. Increase the rental value of your building by offering temperature control with resultant room comfort, better working conditions, with increased efficiency and added health.

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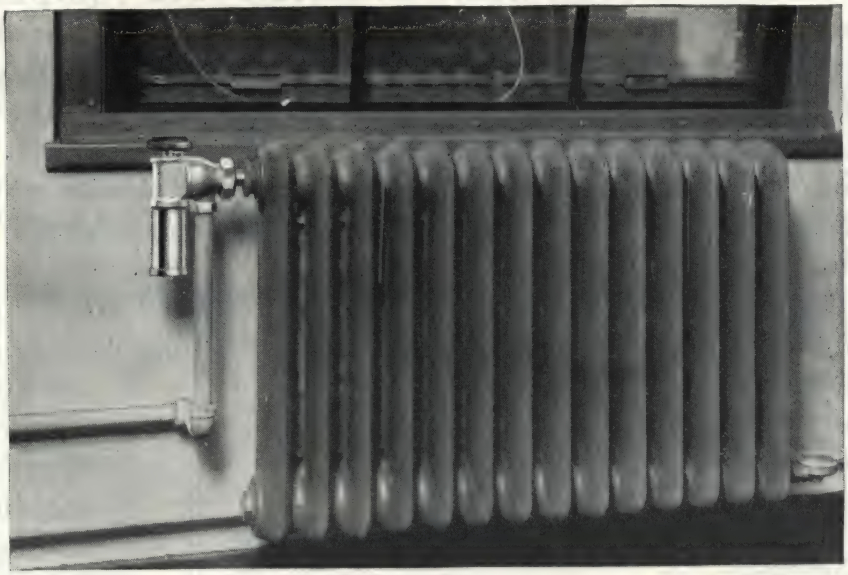


The value on the radiator is the entire temperature control. It is easily installed, and requires no outside attachments of any kind.

THE DIRECT CONTROL SYSTEM OF AUTOMATIC TEMPERATURE REGULATION AND STEAM ECONOMY

Other Methods of Heat Control

Other methods of heat or temperature control necessitate the use of costly pneumatic systems which involve high maintenance costs or the use of some of the newer partial control devices now offered on the market. All of these devices operate on the principle of restricting heat furnished rather than regulating it, and accordingly violate the principle that your first requirement is to heat the building.

The Direct Control System

The Direct Control System merely involves the attachment to each radiator of a direct control unit. Each direct control unit is a self-contained automatic regulating device which *satisfies the demand of each room occupant for heat but prevents the waste of steam beyond that point.*

Installation

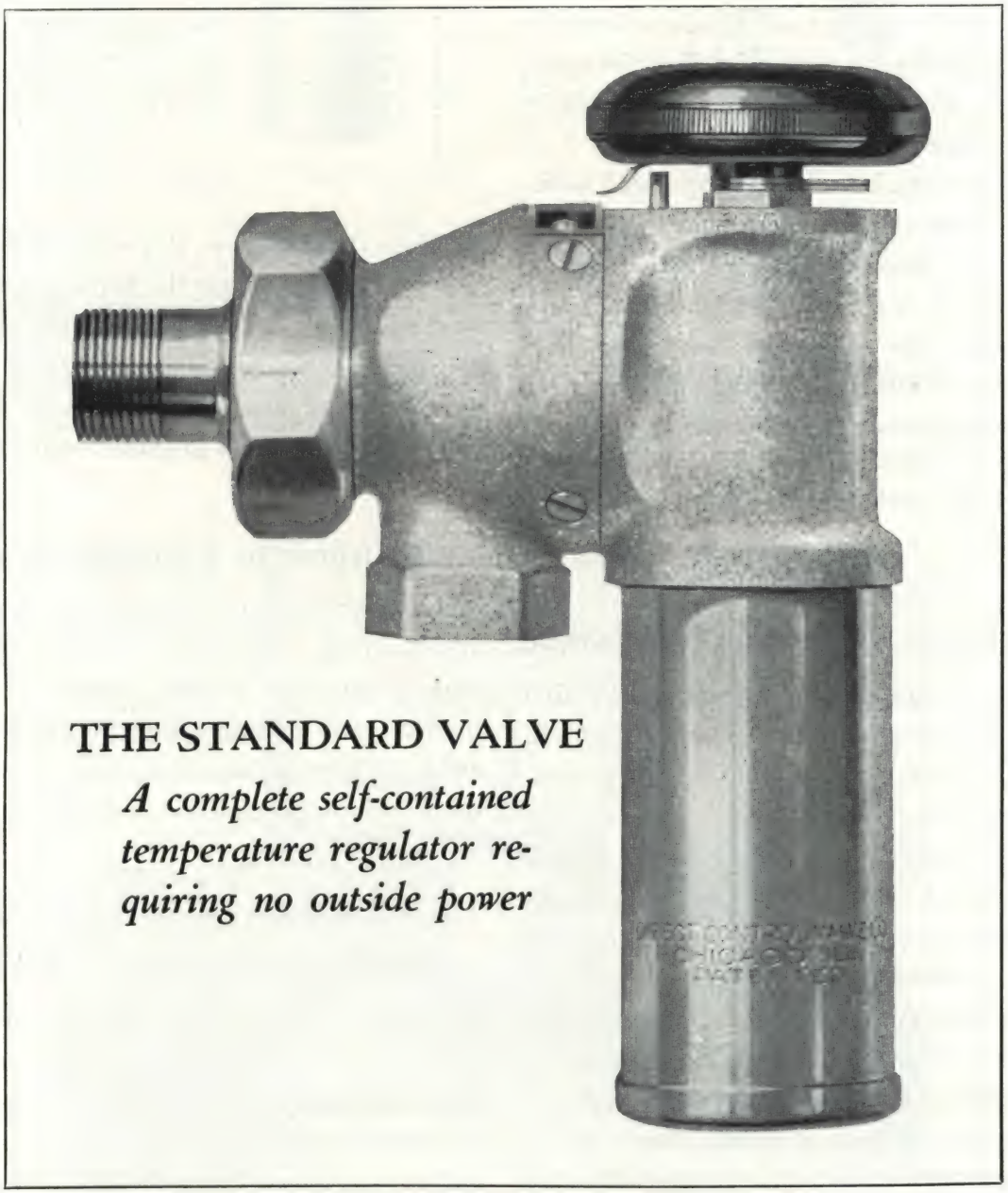
The direct control valve is installed in the same manner as any ordinary radiator valves and adds nothing to the installation cost over the usual hand valve.

The direct control valve does not involve the use of air lines, electrical connections, etc., and being self-contained, is always available for inspection and adjustment.

Continued on next page

The Most Economical of all Control Systems

The greatest advantage of the direct control valve is its economy. It reduces installation cost enormously, costing no more to install than a simple hand valve. It does away with maintenance cost entirely. It involves but a fraction of the cost of pneumatic systems. This, coupled with its remarkable savings in fuel cost, enables the Direct Control System to repay the investment involved, in a very brief period of time—usually about three years. After this the fuel economies effected are pure saving.



THE STANDARD VALVE

A complete self-contained temperature regulator requiring no outside power

Continued on next page

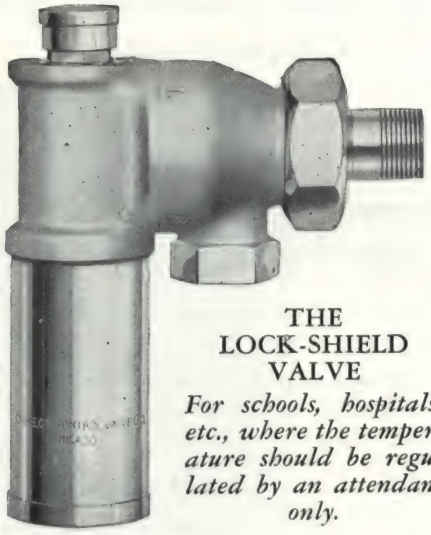
Maintains Even Temperature

Direct Control Valves are installed with the guarantee to maintain the temperature of the room to within one degree of the required point. The degree of temperature at which the room is to be maintained may be changed, by a minor adjustment, by turning the valve wheel, to eight degrees above or below the point at which the valve is originally set. Upon request it is made with a key or lock shield so it can be adjusted only by the person holding the operating key. This type of valve is particularly suited to schools and institutions.

The valve can be manually operated without the thermostat. In new buildings it can therefore be installed without the thermostat, and operated as a hand valve until the building is ready for occupancy, when the thermostat can be attached. Should occasion arise the thermostat can be removed without removing the valve or shutting off steam from the radiator, and the valve can be manually operated.

Modulating in Action ~ Hydraulic

The valve is operated by a thermostat which is strictly hydraulic *(*not gas and liquid*)* in principle and very powerful, tested to a minimum pressure of 2500 lbs. to the square inch. Hydraulic pressure—the tremendous expansion force of a liquid when heated—makes the thermostat positive in action and gives the valve a constant power always adequate to seat the valve and assure its successful operation. The thermostat once filled and sealed is never affected by evaporation or leakage, or by structural fatigue of metal. The valve is protected against excessive temperatures by a relief spring.



THE LOCK-SHIELD VALVE

For schools, hospitals, etc., where the temperature should be regulated by an attendant only.

While the action of the valve is therefore absolutely positive, yet the valve is graduated or modulating in action, not of the all on or all off type. This avoids extreme radiator temperatures and assures the greatest possible heat utilization for a given amount of steam.

Applicable to Two-Pipe Systems

The Direct Control Valve may be applied to any building, new or old, which is equipped with a two-pipe vacuum, vapor, or atmospheric, steam heating system. Any good standard make of vacuum radiator trap may be used on a radiator in combination with the valve.

Constructed for Years of Trouble-free Service ~ Packless

The valve is constructed for long life. It is packless. It will stand use and abuse, and deliver a practically indefinite period of service. The assembly drawings show its substantial construction. Parts are few, strong and durable.

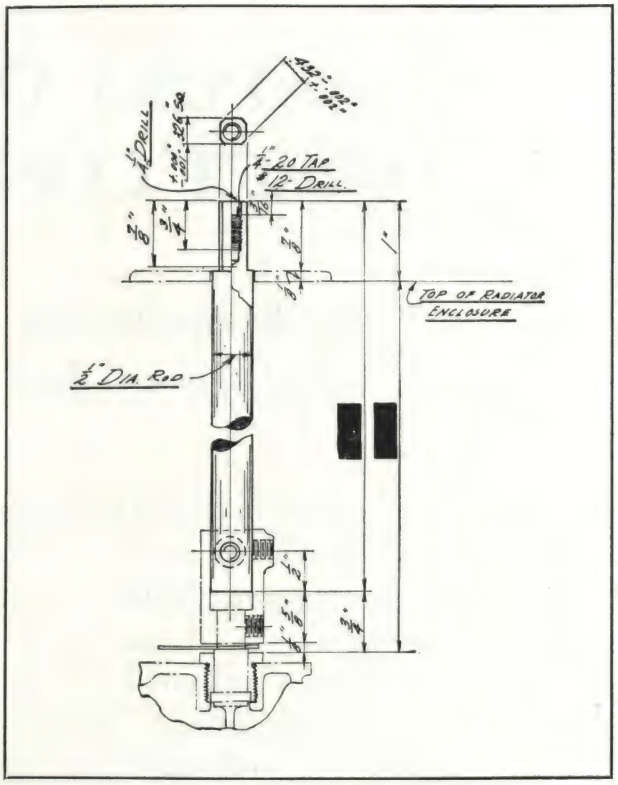
Continued on next page

Tried and Proved

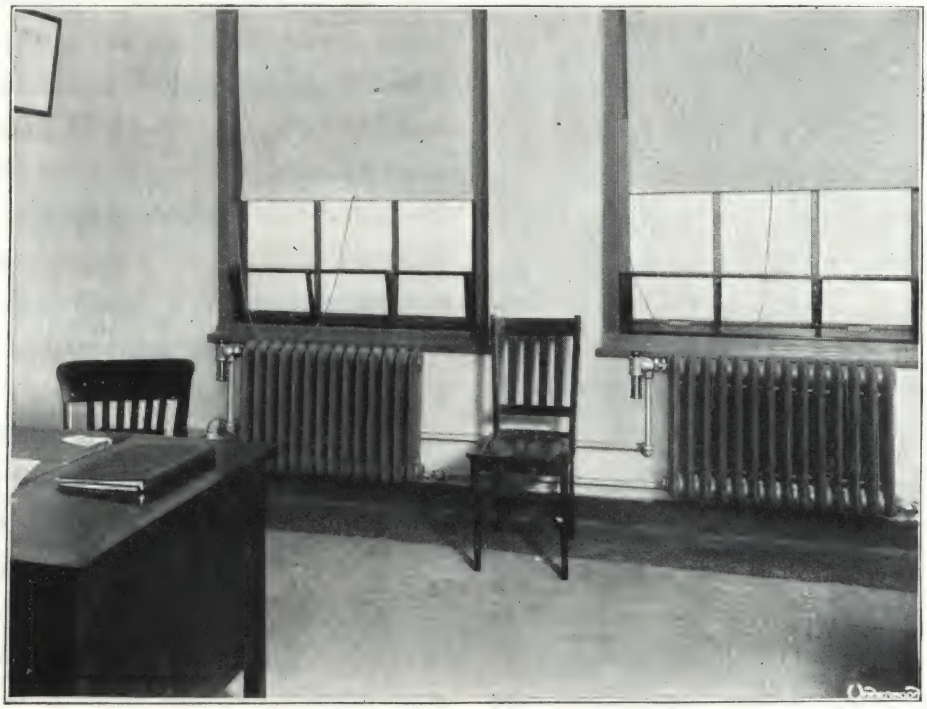
The Direct Control System of Automatic Temperature Regulation is not an experiment. It has been severely tested for a period of over six years. Direct Control Valves are used and specified by all of the outstanding architects and engineers in the United States and Canada. Its use is not limited to large office buildings, but to schools, hospitals and all buildings of all types and sizes.

Where the heating system is satisfactory it can be as easily installed in an old building as in a new one.

Thorough investigation by any architect, contracting engineer or owner will show not only that it is the most economical and reliable form of room temperature control, but that it may profitably be installed in many buildings where any other form of temperature control is out of the question.



Standard Extension Handle for Use on Enclosed Radiators



Direct Control Valves on radiators in an office building. The temperature of the entire room is automatically regulated by the valves.

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REPORT ON TEST OF DIRECT CONTROL VALVES

By the Investigating Committee of Architects and Engineers, May 1, 1928, to June 1, 1930

As the result of a request of several members of the American Institute of Architects, in 1927, to the Investigating Committees of Architects and Engineers, for a report on the Direct Control Valve, a committee was appointed to investigate this valve, and to determine its reliability as a means of regulating room temperatures under varying outdoor temperatures and operating conditions. This committee, known as the Investigating Committee of Architects and Engineers, visited the plant of the Direct Control Valve Company and made other investigations as to the general construction of the valve and its mechanical fitness for the work and also conducted tests during the heating season of 1927-1928 at the Pittsfield Building, Central Life Building, Stevens Hotel, and at the Pure Oil Building, Chicago.

Tests Show Commercial Operation

These tests indicated to the satisfaction of this committee that the Direct Control Valve gave temperature regulation well within commercial requirements when installed on two-pipe vacuum systems and in accordance with the recommendations of the manufacturer. The findings of the Committee were published in a report of the Investigating Committee of Architects and Engineers.

Condensation Tests

Near the end of the heating season of 1928, a test was made to determine the difference in condensation between radiators equipped with hand control valves and those equipped with Direct Control Valves. Two adjacent sets of risers, each set consisting of a supply and return, were selected in the Pure Oil Building. The amount of radiation on each supply riser was the same. The radiators on one set of risers were equipped with hand control valves and on the other set of risers with Direct Control Valves. The amounts of condensation for each set of risers was measured by condensation meters. While this test indicated considerable saving in favor of the Direct Control Valve, the Committee felt it was conducted for too short a period of time to supply reliable information. It was the opinion of the Committee that valuable information could be obtained if tests were conducted for at least another heating season and accordingly arranged to make tests on eight office buildings in Chicago for the purpose of measuring the condensation from the direct radiation. The condensation from fan heaters and domestic water heaters was measured independently.

It was the purpose of this test to obtain as

Continued on next page

accurately as possible, the amount of steam required per square foot of radiation in buildings of this class. In the past, condensation records from various types of heating systems have been taken and have been tabulated for various purposes—in general, these have shown the total amount of condensation for all services, or, they have been made in single buildings under varying conditions to determine the economies which might be effected by changes in methods of operation. Very little data has been obtained which would show a comparison between the amounts of steam required for direct radiation in buildings similar in character and where they were operated under normal conditions, using the equipment and operating forces as found. The Committee felt that accurate measurements of the amounts of steam required under these conditions would be valuable to the architectural and engineering professions, as well as to the building owners and managers.

Metering Facilities

In general, very few buildings are equipped with condensation meters unless such buildings purchase steam from an outside source, usually a central plant and even in such cases the usual method is to determine only the total condensation, including steam required for direct radiation, fan heaters, domestic hot water, restaurants, and laundries, etc. The Committee found it necessary in nearly every building selected to install separate meters on the fan heater returns and on the domestic hot water returns in order to obtain the amount of condensation required for the direct radiation only.

Buildings Tested

The Investigating Committee selected eight buildings of similar type and construction in Chicago to make comparative steam consumption tests. Three of these buildings had heating systems equipped with hand control valves on radiators, three were equipped with pneumatic control radiator valves, and two with Direct Control Valves. The buildings selected by the Committee for the test were not picked at random, each of them being representative buildings of their respective kind and well operated, and as far as could be observed they were not overheated. The hand-controlled installations particularly were above the average as far as efficient and careful operation was concerned.

Temperature Records

No record was kept of temperatures maintained in any of the buildings as it was assumed that each building was heated to a comfortable degree, neither was any attempt made to instruct the operators in the operation of the plants or determine in any way the efficiency of the plants. Wherever possible the Committee secured an accurate record of the number of heating hours each day in order to determine the condensation per square foot per heating hour. In some buildings where exhaust steam from generating plants passed into the low pressure header, the actual heating hours were difficult to determine and no record was kept.

Data Tabulated

In addition to the daily meter readings during the 1928-1929 heating season, the following data was tabulated. Average wind velocity and direction; the high, low and average temperature for the period between meter readings; the heating degree days; the total pounds of steam used for the direct radiation for the period; the pounds of steam per square foot per 24 hours; number of heating hours;

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pounds of steam per square foot of direct radiation per heating hour; and the pounds of steam per square foot of direct radiation per degree day. Summary sheets were made showing monthly totals and averages of the above items and from these monthly totals the estimated total steam consumption for the season was obtained. It was assumed by the Committee that the heating loads on the buildings would vary directly with the number of degree days and on this basis a tabulation was made of the number of degree days for each month and the percentage of the total load that each month should consume based on the number of degree days. From this record, the Committee estimated the monthly steam load for the months where records were missing. Due to delays in installing meters in some buildings, the records were not complete for all of the months of the heating season. During the 1929-1930 heating season monthly and semi-monthly readings only were taken and monthly and yearly consumptions calculated from them, as this season's record was used only as a check on the previous year's record.

Correction Factors

Where steam and flow meters were used to measure steam consumption, a pressure gauge was installed and the meter readings were corrected for the varying pressure where necessary. Temperature recorders were also installed in connection with each Cadillac condensation meter so that corrections could be made on these readings where the temperature of the condensate varied materially from 140° which is the temperature for which the meters are calibrated. In order to make direct comparisons between the buildings under test, the Committee felt it necessary to check the amount of direct radiation in each building according to a standard method adopted by them. Each building was checked and the radiation changed to conform to the standard.

Effect of Light Courts

An interesting fact was brought out in connection with the readings taken at one building during the first season, in regard to the condensation per square foot of radiation in rooms on a light court. In this particular building, the heating return lines were so installed that the court radiation could be separately metered from the radiation on outside exposures. Accurate records of the heating hours of the court and outside exposures were kept, and figures reduced to condensation per square foot per heating hour. Over a period of three months a very consistent record was obtained indicating that the condensation rate of court radiation is approximately 44% of the condensation rate of the radiation on the outside exposures. Although the Committee were not willing to present this information as an established fact, they were confident that the results obtained in this building could be duplicated in other buildings of the same type and that the information was of such importance that it could not be overlooked in comparing condensation rates of buildings with and without light courts.

During the 1929-1930 heating season a condensation meter was installed on the light court radiation in another building and temperatures taken comparing outside temperatures with that of the courts and a very definite relation was found between the court temperatures and the condensation rate. On the strength of the above information and after taking observations at each building, the radiation in each building having a light court was corrected so that the condensation rate

Continued on next page

for all of the radiation was brought up to the standard of the building having no court.

Weather Reports

As the meters on the various buildings were read at different hours of the day during the 1928-1929 season, the Committee did not use the published government daily weather records but calculated the temperatures between the meter readings. While in some cases this did not materially affect the temperature records, there were times when temperature changes were rapid and the results varied considerably. During the 1929-1930 season the published government records were used.

The results obtained from these tests are given in tabulated form below:

Building	Control	Condensation per square foot		Average condensation per degree day		Average of two years' records	
		1928-1929	1929-1930	1928-1929	1929-1930	Condensation per sq. ft. per season	Condensation per sq. ft. per degree day
A	Direct	476.0	479.7	.0755	.0761	477.8	.0758
B	Direct	348.6	368.8	.0553	.0569	358.7	.0570
C	Pneumatic	669.5	619.2	.0164	.0984	644.4	.1024
D	Pneumatic	498.3	632.2	.0792	.1004	632.2	.1004
E	Pneumatic	691.5	659.0	.1099	.1048	675.2	.1074
F	Hand	618.8	541.3	.0984	.0861	580.0	.0922
G	Hand	787.0	724.5	.1251	.1152	755.8	.1202
H	Hand	610.0	588.4	.0969	.0935	599.2	.0952

BUILDING A

Building A is a modern tower building, 40 stories high, with a light court from the 6th to 23rd floor. Heating system is a modern vacuum system with Direct Control Valves on all direct radiators. Steam is supplied from a boiler plant. This building operates at higher than average temperatures, due to the nature of occupancy, and for that reason has a slightly higher steam rate for heating.

BUILDING B

Building B is a modern 21 story building with a light court. Steam is supplied from a boiler plant to a modern vacuum system with all direct radiators equipped with Direct Control Valves.

BUILDING C

Building C is a modern 21 story office building with a light court. Steam is supplied to a vacuum system from a street main and all direct radiators are equipped with pneumatic control.

BUILDING D

Building D is a 20 story building with a light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with pneumatic control.

BUILDING E

Building E is a 21 story building with a light court.

Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with pneumatic control.

BUILDING F

Building F is a 23 story building without a light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with hand control valves.

BUILDING G

Building G is a 22 story building with a partially enclosed light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with hand control valves.

BUILDING H

Building H is a 22 story building with a light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with hand control valves.

{Signed} C. S. MILLARD,
Chairman, Committee.

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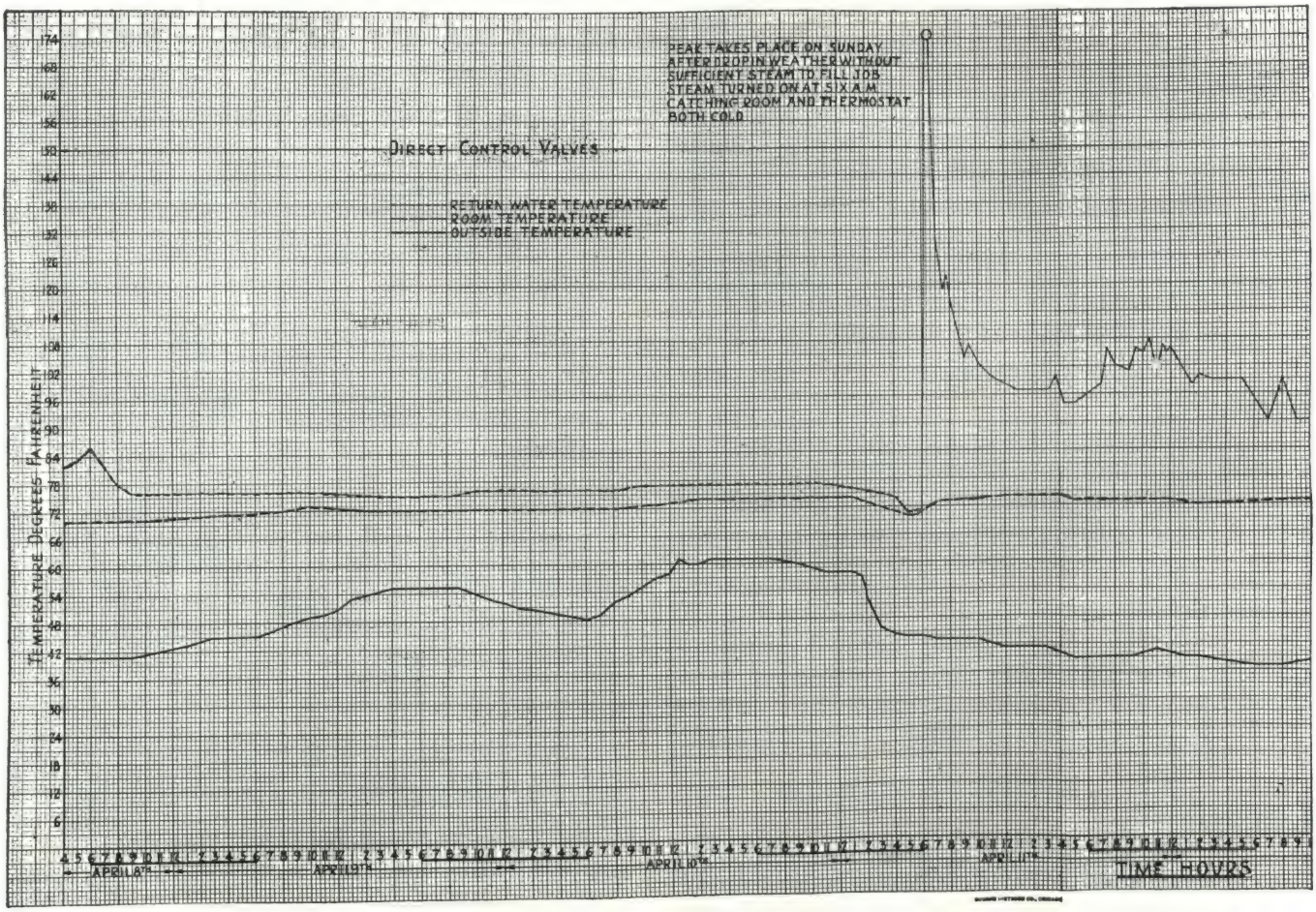
RESULTS THAT COUNT

The tabulated results of two years' investigation by the Architects and Engineers Investigating Committee should conclusively settle the moot question of steam consumption in office buildings and should further definitely prove that the superiority of Direct Control Valves is effecting substantial economies in heating costs.

The figures incorporated in the committee's tabulation were taken from actual installations in everyday operation over a period of two years and, considering the high standing in the profession of the members of the committee, should be authoritative.

It is of particular interest to note that the tabulation gives Direct Control Valves an average consumption of 418 pounds per square foot per heating season, or .0664 pounds per square foot per degree day as against 650 pounds per square foot per heating season, or .1034 pounds per square foot per degree day, for pneumatic control; and



Results from tests on Direct Control Valve made in room 535,

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645 pounds per square foot per heating season, or .1025 pounds per square foot per degree day, for hand control.

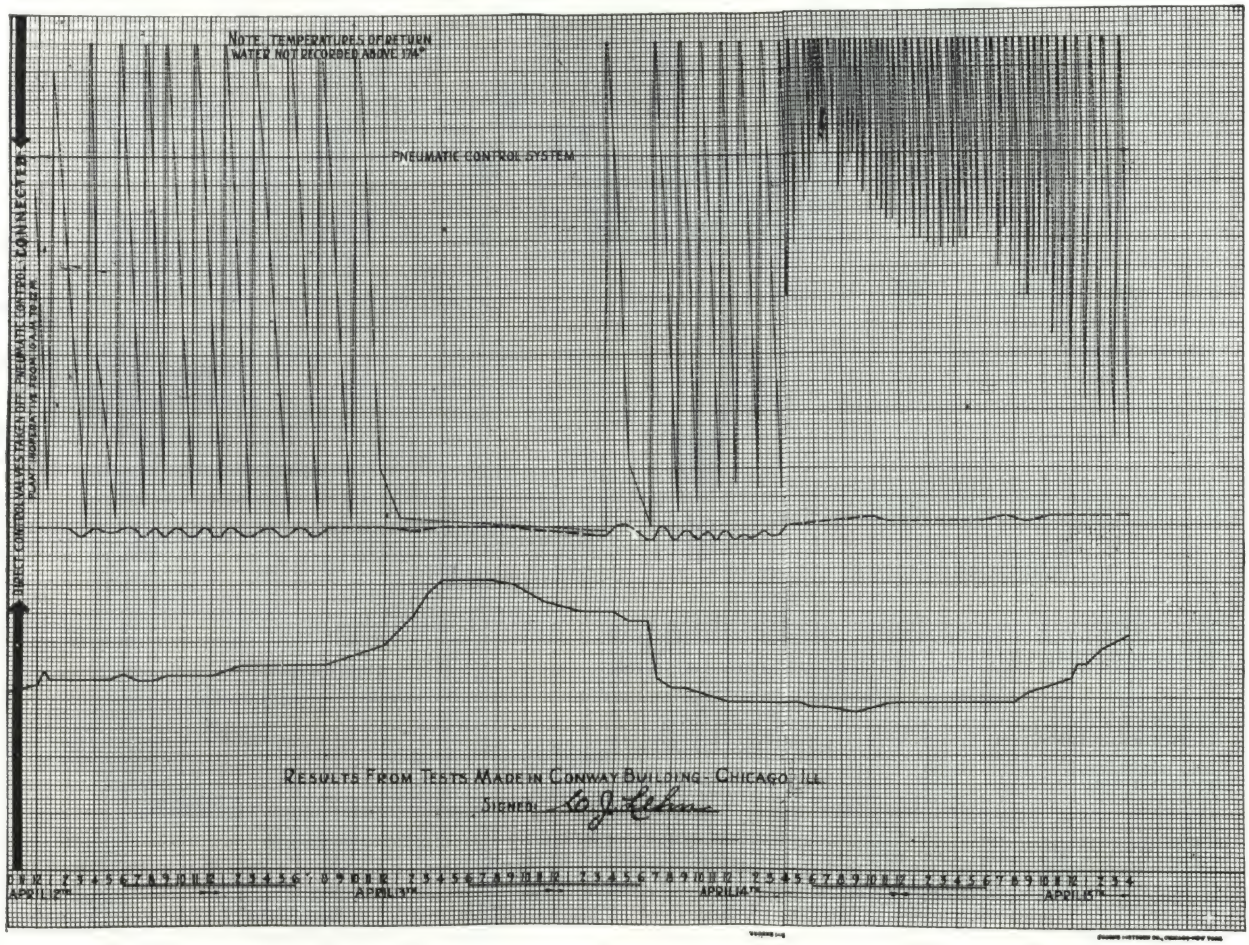
The figures indicate a savings for Direct Control Valves of 35½ per cent over pneumatic control and 35 per cent over hand control.

Such evidence is conclusive proof of the economic soundness of a Direct Control Valve installation.

In addition, it must be admitted that to effect such savings over other types of installations Direct Control Valves must of necessity have afforded to the building occupants a considerable degree of comfort and healthful working conditions by reason of accurately controlled room temperature.

In going over the committee's report, it is to be remembered that the buildings selected for hand operation were of the highest type and unusually well operated. With poorer buildings or poorer operation economies with Direct Control Valves will be substantially increased. A very small percentage of the buildings in the United States are of as high grade a type as were selected for the test.

With Direct Control Valves, the steam savings pays for the valves and the temperature control costs you nothing.



Conway Building, Chicago, Ill., April 8-15 inclusive, 1927

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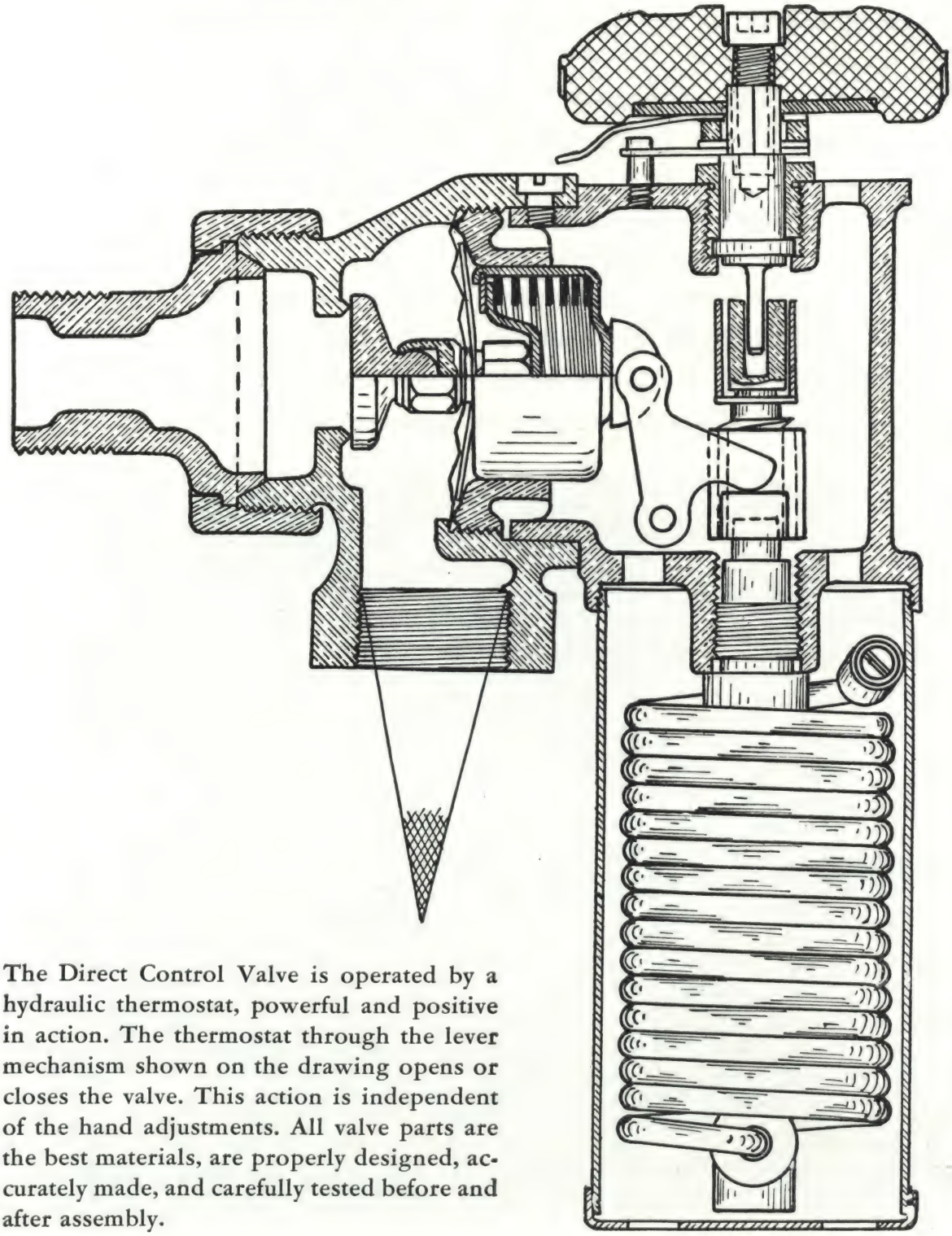
MECHANICAL DESCRIPTION OF THE DIRECT CONTROL VALVE



The Direct Control Valve is operated by a hydraulic thermostat, powerful and positive in action. The thermostat through the lever mechanism shown on the drawing opens or closes the valve. This action is independent of the hand adjustments. All valve parts are the best materials, are properly designed, accurately made, and carefully tested before and after assembly.

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DIRECT CONTROL VALVE

Guarantee and Specifications

Standard Guarantee

The Direct Control Valve Company guarantees that a Direct Control Valve or Valves when installed on sufficient radiation to properly heat the room will maintain a room temperature within the limits of 1 degree F. above and 1 degree F. below the point of adjustment subject to the following conditions:

(a) A sufficient and continuous supply of steam to be available for each radiator.

(b) A sufficient and continuous circulation maintained for properly draining each radiator.

(c) No other uncontrolled radiator or heating element shall be installed in the space to be regulated.

The determination of the room temperature shall be made by means of a test thermometer hung free at approximately the center of the room and 5 feet above the floor but not within 8 feet of the heating elements or outside walls.

The Company agrees to repair or replace without expense to the owner, any defective valves or valve parts which may, with normal use, develop defects within a period of three years from date of installation upon written notification by the owner. The Company is to be given the right of inspecting the valves on the premises.

This guarantee will become null and void if valve or valves, which to the Owner appear to be defective, have been removed from the radiator or have been taken apart or adjusted by others than the Company's representative.

Specifications

The Heating Contractor shall provide and install at the supply connection to each direct radiator (which connection shall be made to the top of the radiator) a temperature regulating valve, as made by the Direct Control Valve Company, Chicago, Ill., which valve shall so operate as to automatically maintain the room temperature at any required point between 00 degrees and 00 degrees.

These valves shall contain a thermostat operating upon a strictly hydraulic principle, shall be of nickel plated finish, and shall be of the following sizes:

For radiators up to 80 sq. ft.	3/4-in. valve
For radiators 80 to 140 sq. ft.	1 -in. valve
For radiators 140 to 250 sq. ft.	1 1/4-in. valve
For radiators 250 sq. ft. and above	1 1/2-in. valve

Make run-outs to the valves one size larger than valve size to a point directly under the valves.

These valves shall be guaranteed to maintain room temperatures within one degree above or below the point of adjustment so long as a supply of steam is available at the radiators. Should any defect appear in any of these valves within a period of three years from the date of delivery, other than that due to normal wear and usage, the same shall be made good without expense to the owner.

(NOTE TO ARCHITECTS AND ENGINEERS)
Use only one of the three paragraphs next below.

(a) Each valve shall be provided with an approved operating wheel and shall be capable of adjustment by the room occupant at any temperature between the points above specified, and it shall be also possible to shut the valve entirely off by hand, if desired.

(b) Each valve shall be provided with an approved operating wheel and with a locking device by means of which the range of adjustment of temperature control may be limited as required.

(c) Each valve shall be provided with a lock shield device and six operating keys shall be provided.

(NOTE TO ARCHITECTS AND ENGINEERS)
(Not to be included in specifications)

Direct Control Valves can be furnished to operate at any desired room temperature, and in other finishes than nickel plate.

Note especially that Direct Control Valves may be used only on two-pipe vacuum, vapor, or atmospheric steam heating systems.

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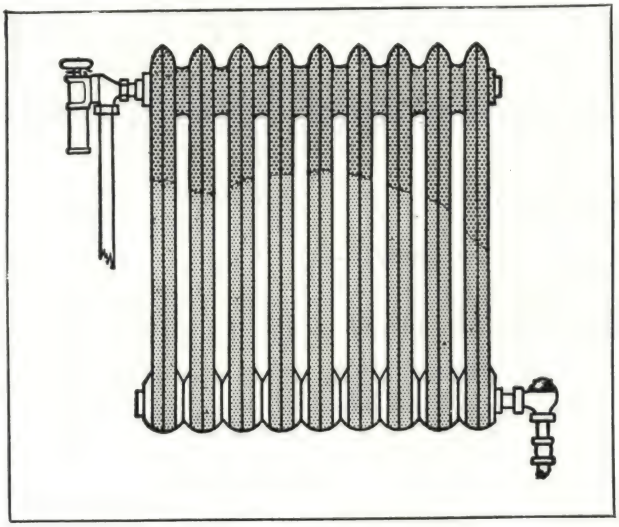
100% of this average radiator must be installed in your room.



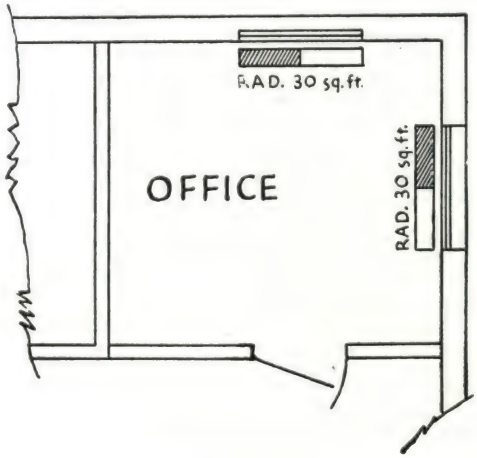
30% of this average radiator (indicated by shaded portion) is the actual average needed.

WHY YOUR RADIATOR OVERHEATS

Engineers and architects, in designing your steam heating system, must, in all cases, install in each room sufficient radiation to heat that room to approximately 70° F. when the outside temperature reaches the minimum for your locality, and additional radiation to shorten the time of "heating up."

Normally the only control you have over your radiator is to turn it on or shut it off. If you turn it on, you put an amount of heat into your room sufficient to heat the room to 70° F. when it is below zero outdoors. The sub-zero condition is present only a small percentage of the year so that at all other times your radiators may be twice too large.

For example, suppose that the office indicated, is located in Chicago and requires 60 sq. ft. of radiation to heat the room to 70° F. when the outside temperature is 10° below zero. Government reports indicate that the average temperature during the heating season in Chicago is 36° F. The amount of radiation required to heat this room to 70° F. when the outside temperature is 36° F. would be 26 sq. ft. Consequently, under average conditions, this room has over twice as much radiation as is required and will as a result, with hand valve control, greatly overheat, except when the outside temperatures reach 10° below zero.



With Direct Control Valves installed in this room, the flow of steam to each radiator would be restricted to the exact amount needed to keep the room at a predetermined temperature, irrespective to the outside temperature. *In addition to providing temperature control, the Direct Control Valves would actually perform the effect of changing the size of your radiators to suit the requirements of each day of the heating season.*

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STANDARD APPLICATIONS

Direct Control Valves are being successfully used in controlling enclosed cast iron radiators, enclosed copper and brass radiators, and various types of newly designed cast iron radiators used in connection with special recesses or covers which form a part of the window sills, and in controlling various types of unit heaters and unit ventilators.

Enclosures – Direct Control Valves operate successfully on any efficient type of radiator recess provided that the valve can be installed in the same stream of air that circulates through the radiator.

For such installations, Direct Control Valves can be furnished with extended stems with operating handles and dials.

Good engineering practice indicates that all recessed radiators should be accessible by means of removable grilles, for reasons of maintenance and sanitation. Beyond this, Direct Control Valves require no special consideration except that the length of the recess must be sufficient to accommodate the roughing-in requirements of the valve.

Unit Heaters – Direct Control Valves are being used extensively in the control problems involved in the use of unit heaters and ventilators, both on steam control to the units and on positive or graduated dampering control.

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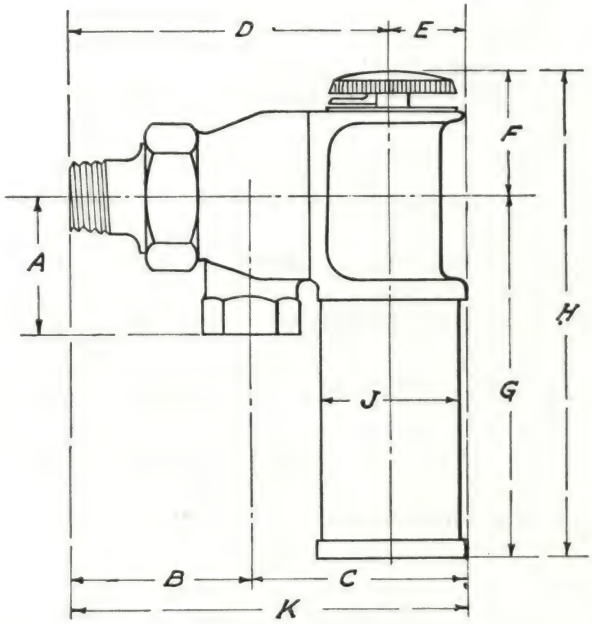


SIZE OF VALVE	TABLE OF DIMENSIONS										
	A	B	C	D	E	F	G	H	J	K	
3/4"	1 15/16	2 7/8"	3 1/8"	4 15/16	1 1/16"	2 1/8"	5 1/2"	7 5/8"	1 15/16"	6"	
1"	2 1/16	3 1/8	3 1/4	5 5/16	1 1/16	2 1/8	5 1/2	7 5/8	1 15/16	6 3/8	
1 1/4"	2 1/2	3 1/2	3 3/8	5 7/8	1 1/16	2 1/8	5 1/2	7 5/8	1 15/16	6 7/8	
1 1/2"	2 5/8	3 3/4	3 5/8	6 3/8	1 1/4	2 5/16	5 3/8	7 11/16	2	7 3/8	

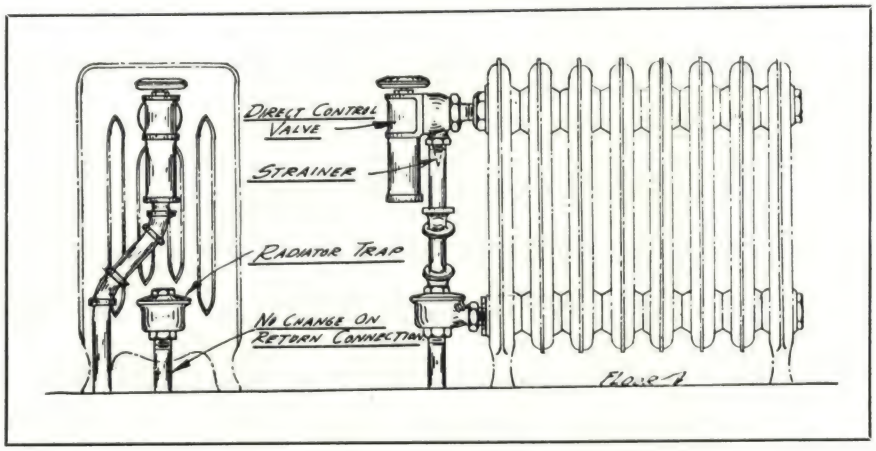
TABLE OF CAPACITIES

Up to 80 square feet..... 3/4-in. valve
81 to 140 square feet.....1 -in. valve
140 to 250 square feet.....1 1/4-in. valve
250 square feet and above..1 1/2-in. valve

This schedule applies to Direct Control Valves used on direct steam radiation operating on a vacuum steam heating system, with a minimum outside temperature of 30 degrees F. and an inside temperature of 60 to 80 degrees F. For the capacities of Direct Control Valves operating on vapor heating systems and under other temperature conditions apply to the Direct Control Valve Company.

DETAIL OF TYPICAL INSTALLATIONS

Installation on Standard C. I. Radiation



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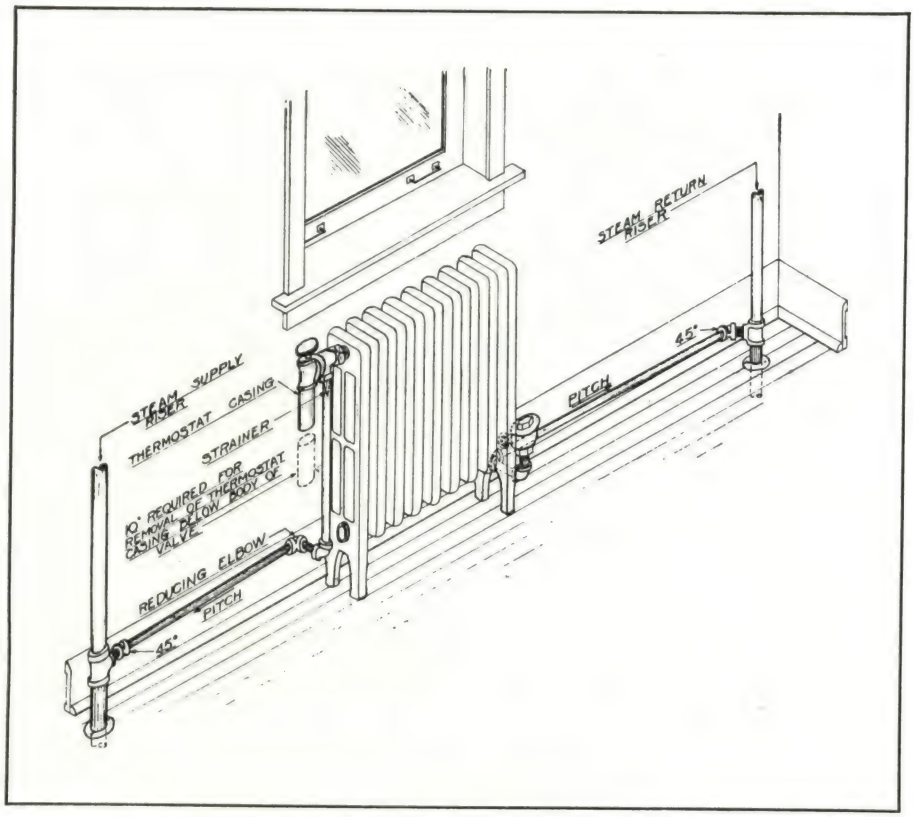
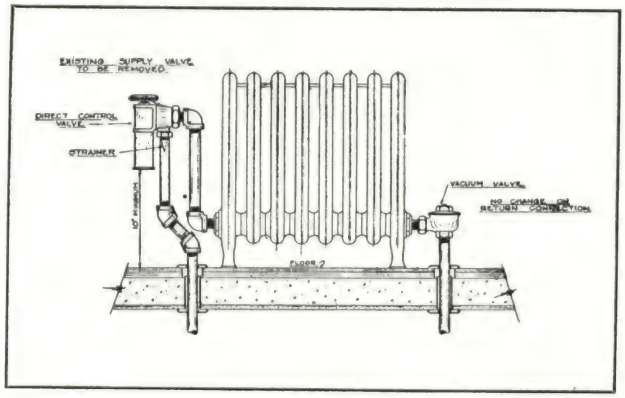
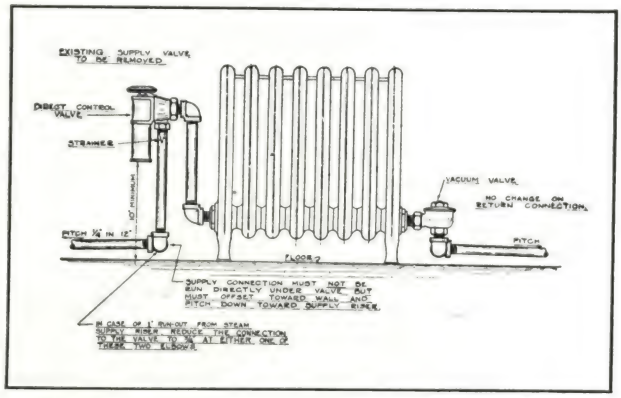


Installation on Standard Cast Iron Radiation with Exposed Run-outs





Typical Inslallations on Bottom Inlet Radiation

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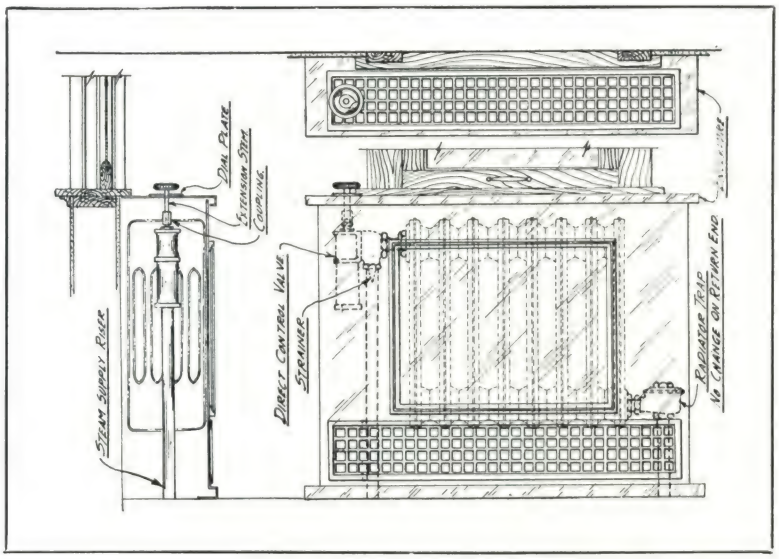
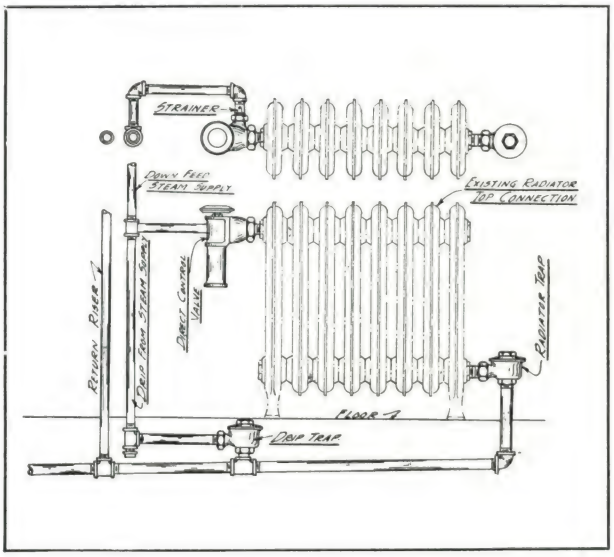
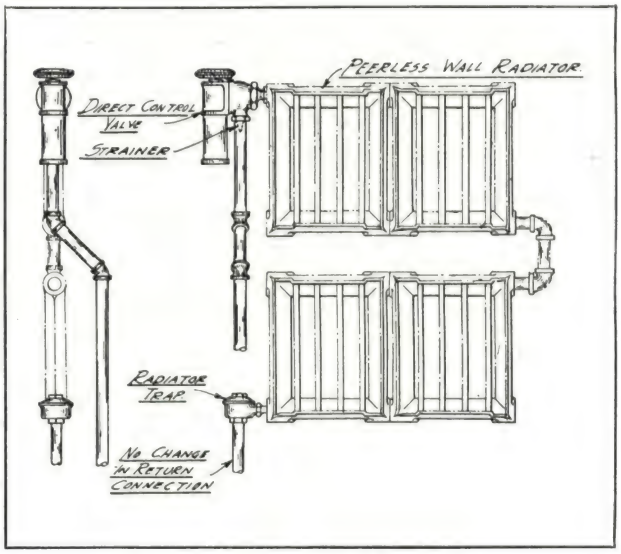


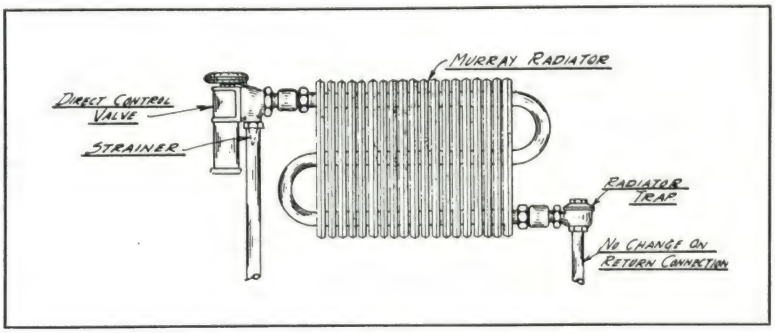
Installation in Enclosure



Installation on Down Feed System



Installation on Wall Radiation



Installation on Murray Radiation

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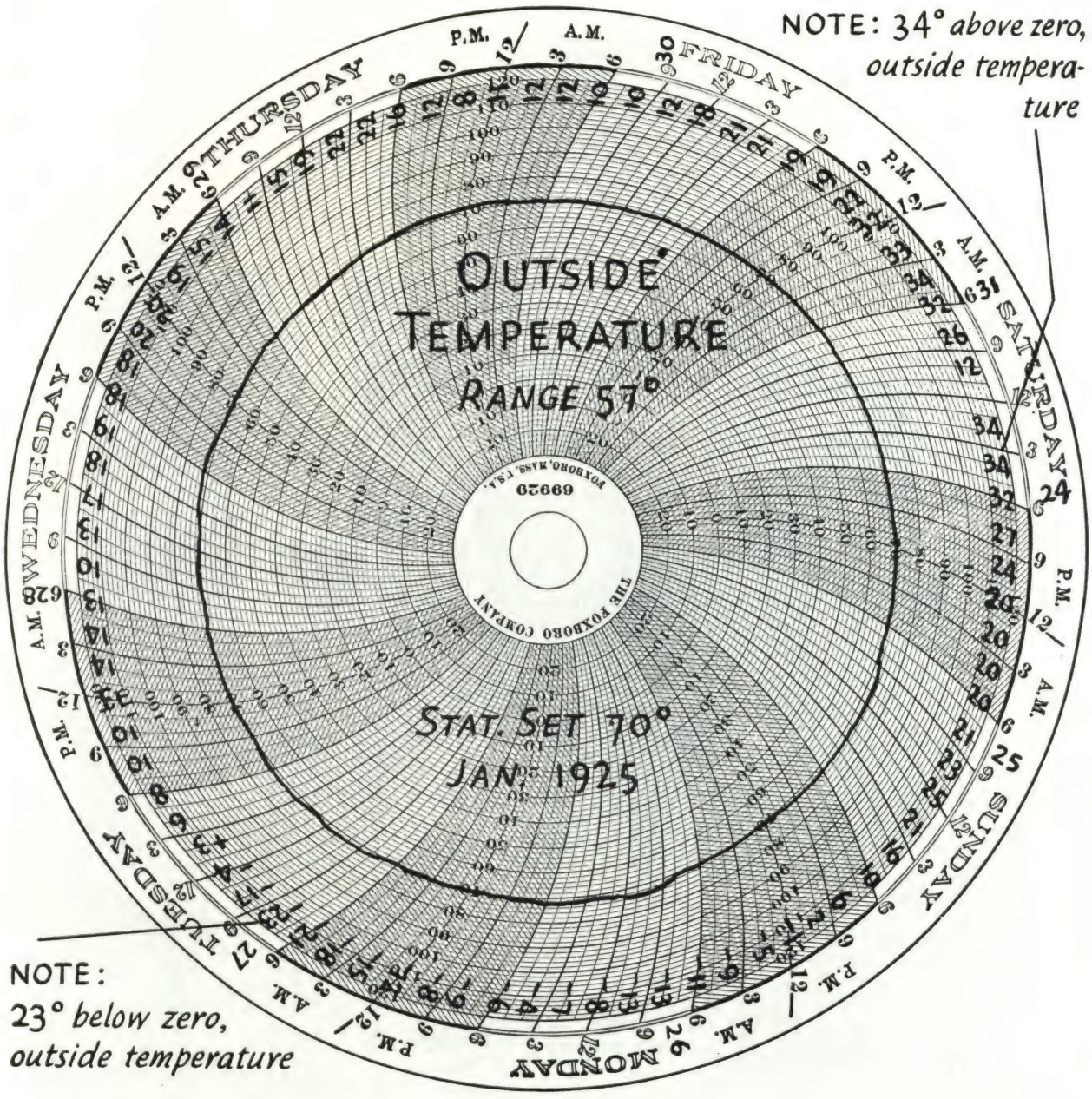

Chart showing uniform temperature obtained by the use of the Direct Control Valve. The range of outside temperature during the period of this chart reading was 57°, the minimum being 23° below zero and the maximum 34° above zero. Record taken in St. Paul, Minn., January 24-31, 1925.

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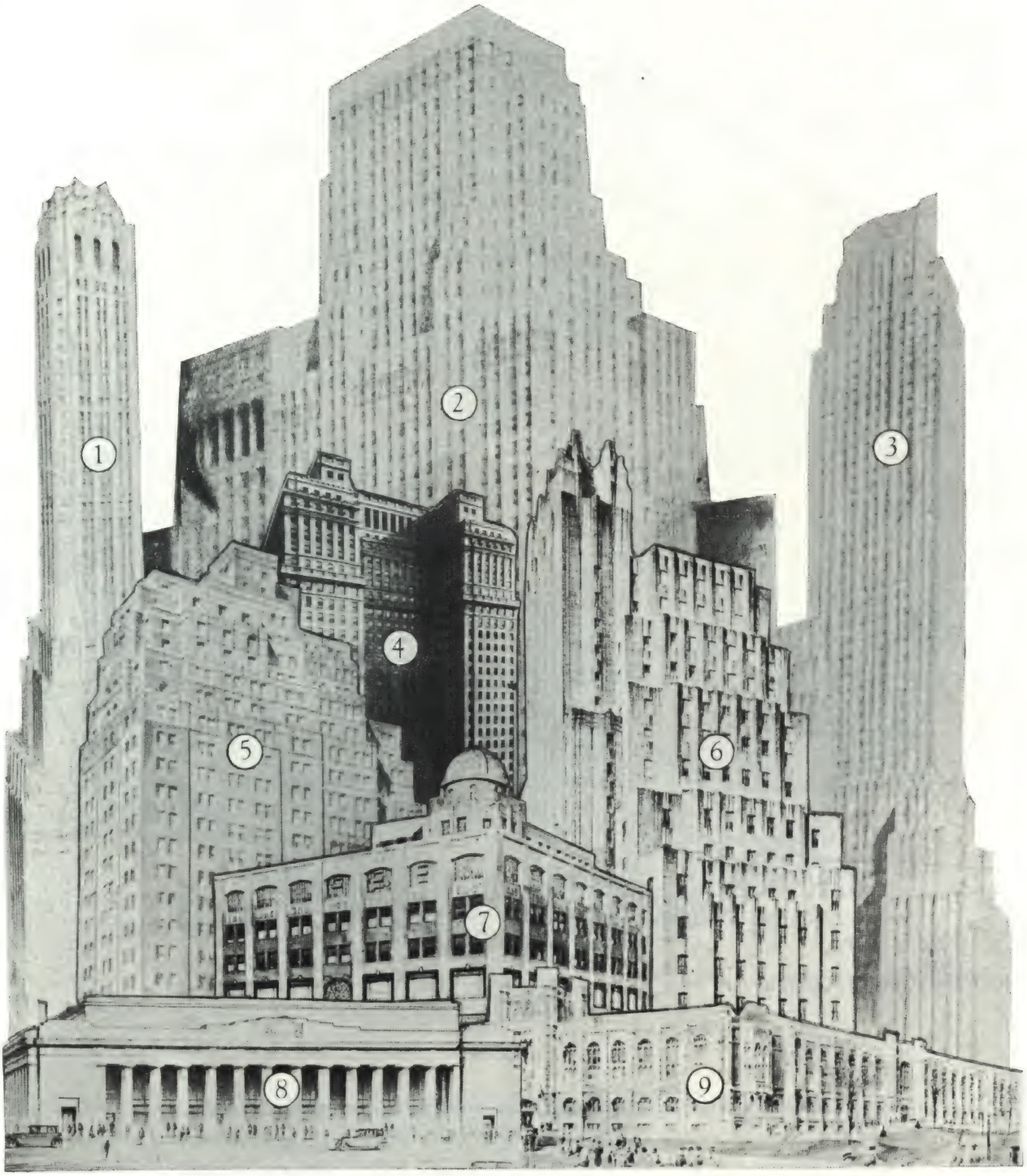
CONCENTRATED EVIDENCE



1. Farmers Trust Co. Building, New York, N. Y.
2. Salmon Tower Building, New York, N. Y.
3. 500 Fifth Avenue, New York, N. Y.
4. Fidelity Philadelphia Building, Philadelphia, Pa.
5. New Weston Hotel, New York, N. Y.
6. New York Telephone Co. Building, New York, N. Y.
7. Chapin Building, Chicago, Ill.
8. North Broad Street Station, Reading Ry. Co., Philadelphia, Pa.
9. Library Building, Oklahoma State University, Norman, Okla.

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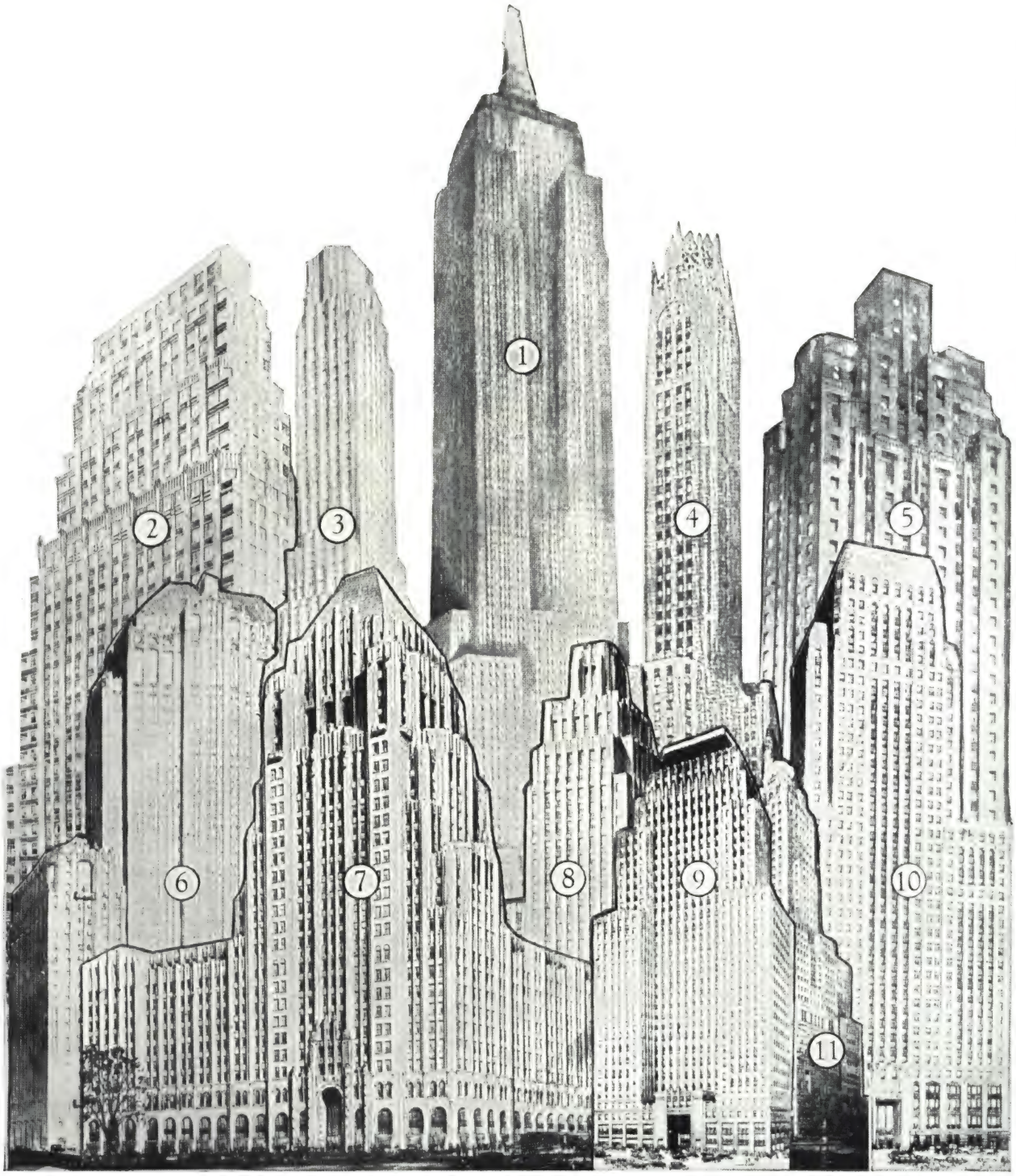
CONCENTRATED EVIDENCE



1. Empire State Building, New York, N. Y.
2. 21 West Street Building, New York, N. Y.
3. Irving Trust Co. Building, New York, N. Y.
4. R.C.A.-Victor Building, New York, N. Y.
5. Hotel Wellington, New York, N. Y.
6. Chicago Civic Opera Building, Chicago, Ill.
7. Fisher Building, Detroit, Mich.
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ARCHITECTURAL EDITION

of

The DUNHAM HAND BOOK

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The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully protected by United States Patents Nos. 1,644,114, 1,706,401, 1,727,965, 1,761,819 and 1,771,077 and Canadian Patents Nos. 282,193, 282,194, and 282,195. Additional patents in the United States, Canada and foreign countries are now pending.

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Trap Used on Differential Vacuum Heating Systems

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Trap Used on Low Pressure and Vacuum Return Line Systems

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Continued on next page

Foreword

Throughout the quarter century from the invention of the Dunham Thermostatic Radiator Trap to the introduction of the Dunham Differential Vacuum Heating System the name DUNHAM has stood for a courageous, forward-looking progress that envisioned a greater task than mere manufacturing, and sought to serve by reason of its outstanding contributions to the science of heating.

For a quarter century those products and inventions bearing the name DUNHAM have won, and held, through their universally recognized service to the heating industry, the high esteem of architects, consulting engineers and heating contractors throughout the world.

To this world-wide prestige came in 1927 a new honor in the invention and development of the Dunham Differential Vacuum Heating System. This system of heating is even more revolutionary in its operation and in the advantages it assures than was the Dunham Thermostatic Radiator Trap which 27 years ago revolutionized an industry and made possible the use of low pressure steam which has been accepted as standard until now.

The Dunham Differential Vacuum Heating System

This system has won well nigh universal acceptance by architects, engineers and contractors, undoubtedly due in a large part to the good name borne by the products of this company. This acceptance has been more than justified in the phenomenal fuel economies which have been effected in all parts of the country and in practically all types of buildings.

To those interested in actual operating costs during past heating seasons we will gladly send such data upon request.

Important

All manuscript for this section of SWEET'S *1931 edition had to be in the hands of the publishers August 1, 1930. We therefore call attention to the fact that without at all changing the principles of operation certain refinements and improved methods of installation have been made since some of the detail drawings here shown were sent to the printer. We therefore urge users of this book to secure latest detail drawings from our nearest sales office (see page 1) before laying out a Differential System.*

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THE DUNHAM SYSTEMS OF HEATING

The Dunham Systems of Heating may be described in their several adaptations to different classes or types of building as follows:

The Dunham Differential Vacuum Heating System.
The Dunham Vacuum Return Line Heating System.
The Dunham Return Heating System.
The Dunham Home Heating System.

Each of these several designs is a complete two-pipe system, the great efficiency of which is made possible by the use of the Dunham Radiator Trap, which is installed at the return outlet of each radiator or pipe coil, where it stands guard against waste of steam and constantly relieves the radiation of the enemies of heating efficiency—air and water.

The Dunham Differential Vacuum Heating System

This system is a two-pipe system in which steam is supplied to the radiators at vacuums varying with the heat losses. It is so designed that a relatively constant difference in vacuum is maintained automatically between the radiators and the return piping (the vacuum in the return line being slightly higher), thereby assuring a circulation of steam to and within the radiators whenever there is demand for heat.

It is simple in its component parts, requiring practically the same equipment as a vacuum return line system with the exception that:

(1) A properly controlled vacuum pump having capacity to create high vacuums economically must be provided.

(2) The traps must function under vacuums as high as 25 in.

(3) The radiator valves must be of the all metal packless type and be equipped with regulating plates of the proper size.

(4) The temperature controlling equipment must be selected to meet the requirements of each individual installation.

The system is flexible in operation resulting in comfortable and economical warmth for the occupants of the rooms in the milder months of early Fall and Spring as well as the extreme cold months of Winter. This is accomplished by increasing the vacuum (which is synonymous with "cooler steam") during the mild weather and by lowering the vacuum or if necessary operating under slight pressure (which is synonymous with "hotter steam") during the extreme cold weather.

The average system of heating is designed with sufficient radiation to heat a building to 70 degrees when the outside temperature is at the lowest for the season. However, since the low or minimum temperature is reached or approached only a few days during the heating season the system has too much capacity during the average weather condition, and since no provision is made to vary sufficiently the temperature of the steam supplied to the radiators, the rooms are overheated.

The Dunham Differential Vacuum Heating System saves this heat waste which amounts to 25 to 50 per cent of the total fuel consumption for the heating season.

The Dunham Vacuum Return Line Heating System

The system of steam mains and piping supply all radiation, and the return piping carries away the air and water of condensation. A vacuum is mechanically maintained in the return piping. Steam may be supplied direct from boiler plant, or through reducing valve where boiler pressure is too high (over 15 lb. gauge) for direct service, or exhaust steam may be used, supplemented by live steam through a reducing valve.

The returns all converge and grade to the suction inlet of a vacuum pump which may be either steam or motor driven. When motor driven pump is used it may also act as a boiler feed pump. Where exhaust steam is used, the discharge from the vacuum pump should go to a freely vented automatic receiver of a boiler feed pump, the vacuum pump not being used directly to feed the boiler. The system operates efficiently with steam at the lowest pressures, reducing the back pressure on engine to a minimum.

The Dunham Home Heating System

The system is simple in arrangement and design, easy and efficient in operation. It is, as its name implies, especially designed for the home or small building. It uses steam at very low pressure, not over eight ounces, for distribution of heat, which passes naturally through the steam piping and the Dunham Packless Radiator Valves into each radiator, where it is retained by the Dunham Radiator Trap until it has given off its heat, when, as water, it passes through the trap together with the air, and back to the boiler through the return piping. The air is released by the Dunham Air Eliminator, and the water returns naturally to the boiler. The Dunham Air Check on the Eliminator permits the system to produce a strong vacuum under a declining fire, thereby causing the water in the boiler to continue to vaporize on vacuum pressures, so that heat is held in the radiators for a considerable period. No troublesome air valves are used on the radiators. The end of each steam main is vented through a Dunham No. 1A Trap into the return piping, and is dripped through a wet or dry drip pipe directly back to the boiler. It is necessary that the steam pressure be automatically regulated by a sensitive damper control.

The Dunham Return Heating System

This system comprises the simplicity in arrangement and design of the Dunham Home Heating System, and it is accompanied by the same maximum efficiency. It differs from the systems already described in that it makes use of the Dunham Return Trap in addition to the Dunham Air Eliminator, which introduces the added feature of a positive automatic return of water to the boiler when it is desired to raise the steam pressure. The Dunham Condensation Pump and Receiver is used on systems with low returns.

The feature of a positive return under varying steam pressures up to 15 lb. makes this system particularly adaptable to apartment houses, small hotels and medium sized commercial buildings, schools and churches.

The check placed on the vent of system permits the system to produce a high vacuum under a declining fire, thereby causing the water in the boiler to continue to vaporize on vacuum pressures, so that heat is supplied to the radiators for a considerable period.

This system makes possible the modernizing of old one-pipe and two-pipe gravity flow systems, materially increasing their efficiency by the introduction of the Dunham Radiator Trap at each radiator, insuring positive circulation without loss of steam, and permitting the removal of all sputtering, leaking air valves which are such trouble makers in these old heating installations.

Dunham Air Line System

This is a one-pipe steam system, using a Dunham Air Line Valve on each radiator in place of the usual sputtering air valve, with a system of air line piping which may discharge the air by gravity, or be attached to an air line vacuum pump.

This system is particularly adaptable in making old one-pipe heating systems more efficient. It is easily and cheaply installed, and insures the quick removal of air from the radiators.

Continued on next page

THE DUNHAM RESEARCH LABORATORIES

Important Data of Service to Architects in the Selection of Heating Systems

The Dunham Research Laboratories play an important part in the efficiency of design and of operation of all Dunham Appliances. Extensive tests and detailed studies of each element affecting design, performance and service conditions are constantly carried on. The Dunham Differential Vacuum Heating System principle was proved by several years operation in the experimental heating system of the laboratory before the first commercial installation was made. The results obtained in commercial installations confirmed the laboratory tests. The commercial product is also tested regularly, the laboratory tests being in addition to the regular factory test which every trap, valve or other appliance must undergo before shipment. Raw materials are also subjected to technical inspection.

Radiator Tests

This and following pages show graphical results of radiator tests performed in our Research Laboratories (completely equipped for, and continually conducting, experiments in all phases of heating).

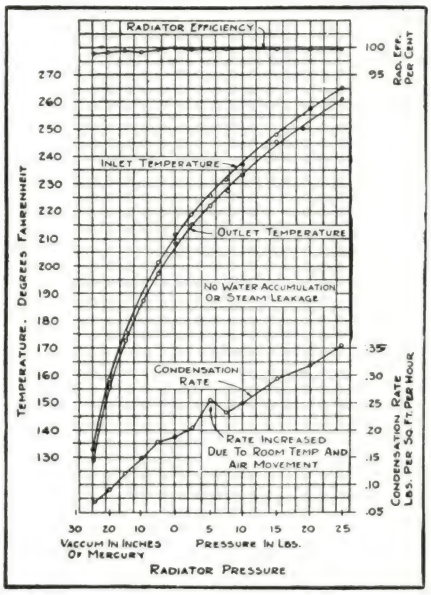

Fig. 1060A

Chart Showing High Efficiency of Dunham D1 Trap Irrespective of Pressure

This shows that the radiator performed with a constant high surface efficiency averaging 99.94% for the test period 3½ hours. This result was due to a complete releasement of air from radiator with no water accumulation nor steam discharge into vacuum return line by the Dunham D1 Radiator Trap

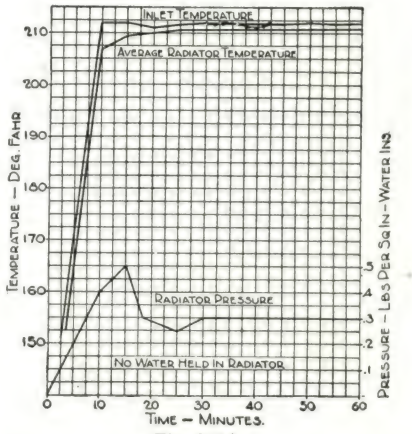

Fig. 908A

Chart Showing Rapid Warming of Radiator Equipped with Dunham Radiator Trap

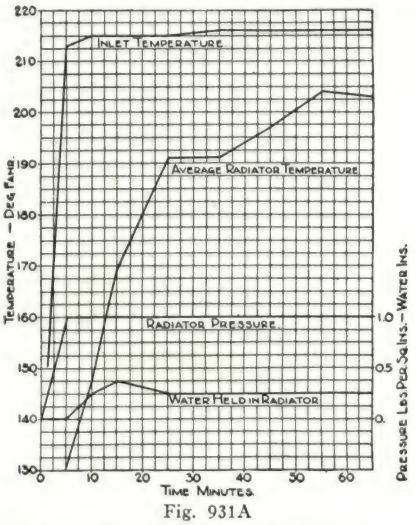

Fig. 931A

Chart Showing Slow Warming of Radiator Equipped with Air Valve

Figures 908A and 931A show data which establish clearly that the condition of low average radiator efficiency pictured in Fig. 906 on Dunham page 6 is due to failure to release air and water.

It will be noted by comparison of charts Figs. 908A and 931A that the radiator equipped with a radiator trap very quickly becomes fully heated, which means that the air was released very quickly. There was no water held in the radiator. However, the radiator equipped with air valve was not fully heated at the end of the test period of one hour because the air was released so slowly. Water was also held in the radiator

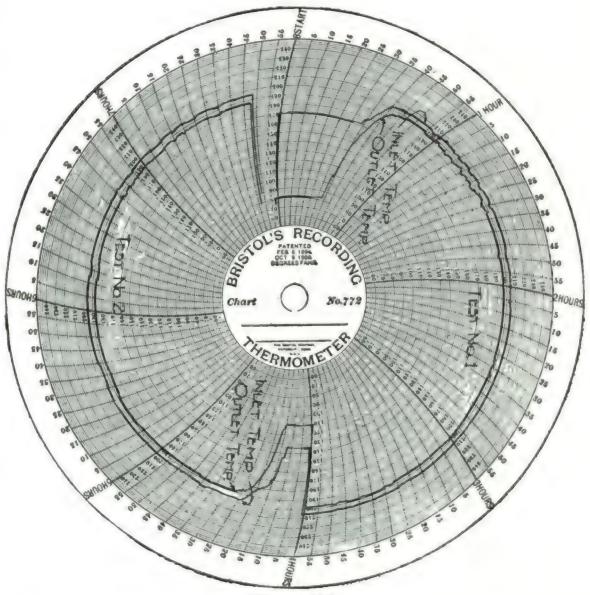

Fig. 1158

Inlet and Outlet Temperature Is Uniform under Varying Degrees of Vacuum in the Radiator During Above Test

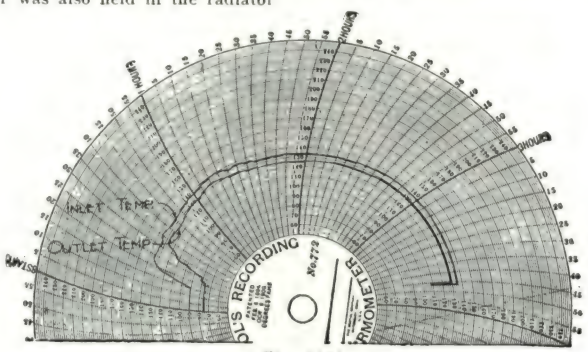

Fig. 1156

Inlet and Outlet Temperatures of a Radiator Showing Uniform Operation under High Vacuum

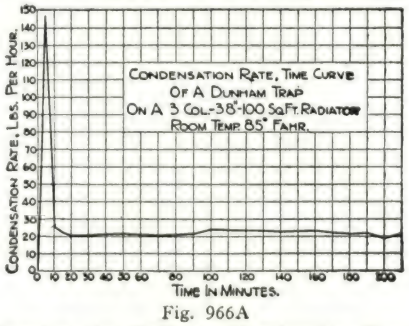

Fig. 966A

Test Showing the Radiator Condensing Rate Being High Even with a Room Temperature of 85° F.

Continued on next page

SATISFACTORY HEAT

Important Factors in the Design of Modern Heating Systems

Designing Heating Systems

There are four important factors to consider when designing any heating system as well as any Dunham Heating System.

(1) The radiation must be ample to heat the building to the specified temperature in severe weather.

(2) The boiler must be of proper size for this load with a tight chimney of proper size, so as to obtain required draft.

(3) The piping, mains, risers and spring pieces must be of proper size, and properly planned.

(4) The Dunham specialties must be properly selected for the service they are to perform and they should be properly installed.

If these factors are thoroughly considered, according to accepted methods, the results should be satisfactory, but it must be remembered that even with ample and well-designed heating equipment, objectionable and chilling drafts cannot be avoided unless the building is reasonably tight.

Satisfactory Heat

A constant predetermined temperature maintained within a building irrespective of outside weather, is *satisfactory heat.* This heat must be delivered noiselessly, economically and be quickly available in the quantity desired wherever and whenever wanted. A satisfactory heating system will supply through the radiators an amount and degree of heat which will balance heat loss from the building and maintain constant inside temperature. It is equally important that a modified heat be supplied during the milder weather which exists in most localities for 95% of the heating season, as well as that an adequacy of heat be available for the most severe weather.

Overheating has long been an engineering problem. The Dunham Differential Vacuum Heating System solves that problem and gives *satisfactory heat.*

During the greater part of the heating season this system heats the building with steam at sub-atmospheric pressures; this means steam at temperatures less than 212° which results in a pleasant, comfortable and healthful heat.

The Dunham Thermostatic Radiator Trap makes such heat possible. It automatically permits the heat to be distributed quickly, noiselessly and uniformly throughout the system.

Comparison of Present Heating Systems

One of the first types of steam heating systems used was the One Pipe System. The steam was expected to enter the radiator through the same pipe that the water of condensation returned to the boiler. The air, originally in the radiators, and that entering subsequently, was expected to find its way from the heating system through the air valve on each radiator. The exit provided for the release of air was small, so the release of air was not rapid and was compressed in the radiator, keeping a large portion of its surface cold, and mixing with the steam prevented the surface from transmitting its maximum heat.

The Two Pipe Heating System was another attempt toward securing satisfactory heat by merely adding a second pipe to the system, but did not overcome the defects of the One Pipe System, because the air valve was still relied upon for the release of air. Furthermore, steam from one radiator would pass into another radiator through the return piping (see Fig. 906), thus pocketing the air in the radiator between two walls of steam and preventing the radiators from thoroughly heating. The condensate, in trying to leave the radiator, encountered this steam from the return line, resulting in water hammer and pounding.

The Dunhamized two pipe systems using the Dunham Thermostatic Trap completely overcame these troubles. See Fig. 907D. They were the last word in steam heating until the advent of the Dunham Differential Vacuum Heating System, see Fig. 1163A and also Figs. 1062G and 1247B on Dunham pages 13 and 14, respectively, which show typical installations for large buildings.

The Dunhamized two pipe systems such as the Home Heating, Return and Vacuum Return Line Heating Systems, however, lacked the ability to operate over a sufficiently wide range of pressures to permit ready control of the heat output in response to the wide variation in weather conditions encountered. Moreover, it could not readily operate with steam at sub-atmospheric pressures because the control was not suited for the purpose.

The Dunham Differential Vacuum Heating System, therefore, provides all the advantages of previous heating systems but with the added advantage of greater economy, increased responsiveness, flexibility and comfort.

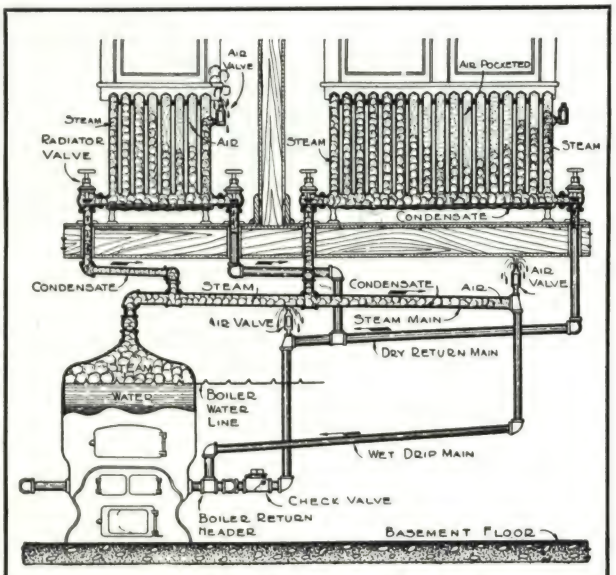

Fig. 906. The Old Two Pipe Heating System

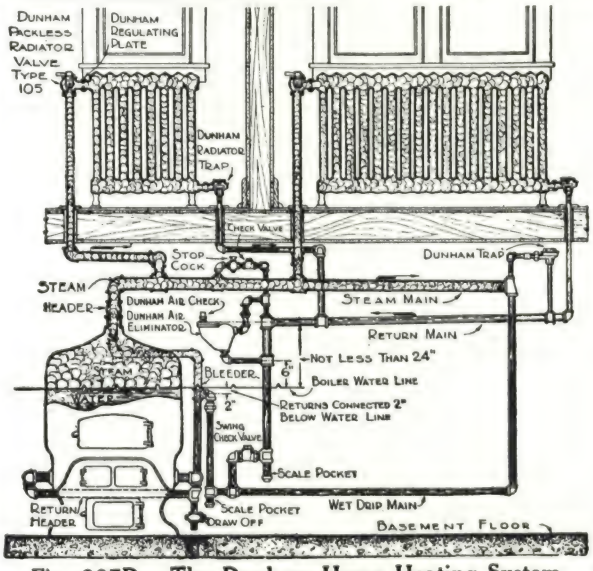

Fig. 907D. The Dunham Home Heating System

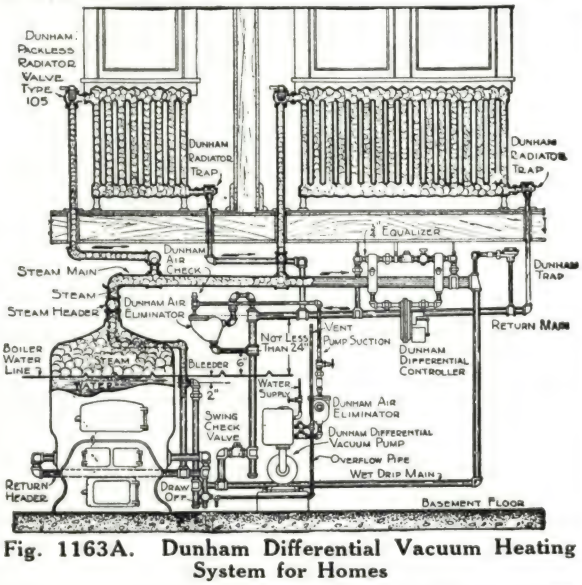

Fig. 1163A. Dunham Differential Vacuum Heating System for Homes

Continued on next page

DUNHAM DIFFERENTIAL VACUUM HEATING SYSTEM

Heating with Steam of Variable Temperatures—Cool Steam (133° F.) Warm Steam (133° to 212° F.), Hot Steam (above 212° F.)

The heating profession has long realized that there is a large amount of heat wasted in mild weather because buildings are overheated. The cause of this waste in steam heating systems is that most all of them are operated on and limited in their operation to pressures above atmospheric, even in mild weather. Steam pressures ranging from a few ounces to 2 or 3 lb. afford but a small operating range of steam temperatures to meet changes in weather conditions. That is, steam at a relatively constant pressure is usually supplied to the radiators regardless of what the outside weather may be.

The heat output of the radiators will therefore, be entirely too high in mild weather, when only a fraction of the radiation installed would actually be required to balance the heat loss of the building and maintain the desired temperature. The building temperature will increase above that desired, resulting in excessive heat loss from the building structure. This is generally termed overheating and represents a direct waste of fuel.

In designing a heating system sufficient radiation must be provided to heat the building to a specified temperature during extreme weather. The base temperature for designing the radiation is selected accordingly, usually with an assumed operating pressure of 1 to 5 lb. This results in more radiation being installed than is needed for moderate weather and an excessive amount for mild weather. Consequently, with steam circulating on pressures at atmospheric or above, overheating occurs during both mild and moderate weather, if steps are not taken to control the loss. Government weather reports show that extreme weather prevails during about 5 per cent of the average heating season when the system must be operated at full rating. This leaves 95 per cent of the heating season when the heat output of the system must be reduced if uniform room temperature is to be maintained.

Daily weather reports show that the temperature rises and falls quite rapidly over the greater portions of the country. Temperature changes of 40 deg. per day occur each winter in the Chicago area, while daily changes of 20 deg. are but slightly higher than normal. To this variation in heat demand must be added the cooling effect of wind, if a true picture of the great fluctuations in heating requirements is wanted.

The graph, Fig. 1288, shows the official maximum and minimum temperatures at Chicago for each day of the heating season of 1928-29. It clearly shows the temperature fluctuations for that season and also the extreme limits of temperature recorded in the previous 54 years. During that year, there was a total of 131 hours when the temperature was 10 deg. or lower, with but 35 hours of this at zero or below. The heating season was but 0.4 deg. warmer than the average since the year 1900.

This statement of the great variation in weather conditions from day to day is simply to point out that progress toward comfort and economy in heating should be made by making the heating system very flexible in heat output. The ideal in heating is to have output of the system just equal to the heat loss from the building if uniform room temperature is to be maintained and heat waste through overheating is to be eliminated, and the accompanying excessive open window loss is to be prevented.

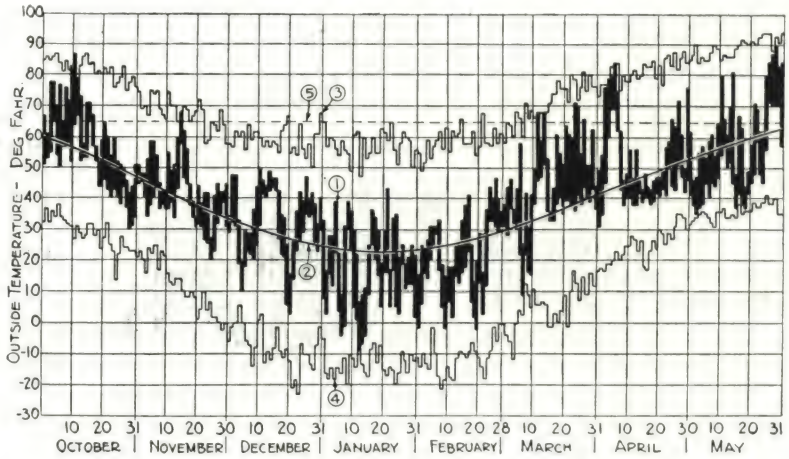

Fig. 1288. Average Temperature for Chicago Heating Season 1928-29 = 40.2°

(1) Maximum and minimum daily temperatures for 1928-29.
(2) Normal daily temperature from 54-year record.
(3) Highest temperature on record.
(4) Lowest temperature on record.
(5) 65° temperature base for degree day calculation.

PRINCIPLES AND DESIGN OF DUNHAM DIFFERENTIAL SYSTEM

The principle of the Dunham Differential Vacuum Heating System is based on the fundamental laws of heat flow and heat processes. The basis of the theory is briefly summed up in the statement of its object—to maintain steady temperatures inside a building throughout the heating season, irrespective of the daily and hourly fluctuations of the outside weather.

No Complicated Equipment Required

The Differential Vacuum Heating System accomplishes this without any complicated or delicate equipment, or any greater variety of appliances than is used by the ordinary Vacuum Return Line Heating System. No larger or special Boiler is required on this system than on any other. Any type of boiler suitable for heating work and of high efficiency can be used.

Easily Adaptable to Change-over From Existing Vacuum Return Line Systems

An ordinary, well-designed, Vacuum Return Line System can be changed over to the Dunham Differential System. Radiation does not have to be disturbed and in most instances existing piping may be used with only slight changes.

Steam Furnished at Variable Temperatures Is the Secret of Comfortable, Economical Heat

The system uses steam as a heating medium. This steam is supplied from the boiler direct or through controlled valves to the radiators at variable temperatures from 133 degrees up to 212 degrees and higher if so required. The 133 degrees temperature corresponds to 25 in. of vacuum (at sea level), and 212 degrees to zero on the gauge. By furnishing steam at this wide range of temperatures, it is possible to vary the heat output of the radiation thus preventing overheating. For instance, in mild weather, steam is supplied at a low temperature, therefore the radiator will give off only a slight amount of heat (in fact one can hold his hand on the radiator). As the weather gets colder higher temperature steam is furnished until finally in severe weather there may be a pressure on the radiation instead of the high vacuum used in mild weather.

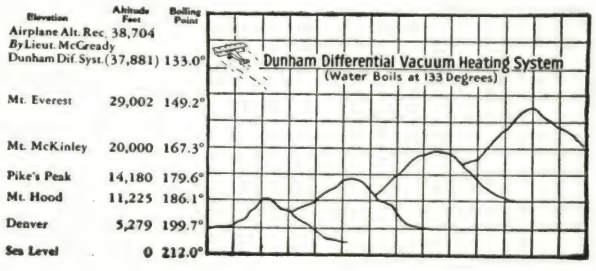

Fig. 1220A

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Based on Bed-Rock Laws of Physics

This system is simple in design, easy to install and very economical in operation.

No new principle is used to attain the long sought combination of comfortable heat at all times, with real economy. The application of the Dunham Appliances which utilize this important principle is the only thing new. These appliances are *attention-compelling and revolutionary.* They have made the Dunham Differential Vacuum Heating System the outstanding heating development of the decade, and one destined to work as radical a change in present-day heating methods as did the Dunham Thermostatic Radiator Trap when it revolutionized steam heating a quarter century ago.

A Simple Description of the Principle

It is generally known that water boiling at sea level will generate steam at 212 degrees while up in the higher altitudes where the atmospheric pressure is less, water will boil at much lower temperatures. (See opposite page.) For instance, in Denver, which is at an altitude of 5279 feet above sea level, water will boil and generate steam at about 199.7° F.

The same pressure conditions are duplicated in the boiler and system of the Differential Vacuum Steam Heating System. The temperature of the steam is governed by the Dunham control equipment and the Dunham Differential Vacuum Pump, which removes the air from the system, thereby reducing the pressure on the water in the boiler, or causing the steam to expand through Reducing Valves when they are used.

The term "Differential" is applicable because a relatively constant differential in pressure between the radiator and the return is maintained, so that the air and water will constantly flow out of the radiators. The steam is induced to completely fill them. Due to this "Differential" complete circulation is obtained and the radiators throughout the building are heated uniformly. The "cool" steam gives a "mild heat," which prevents overheating. This is more healthful, and less destructive to decorations and furniture, than the "hot" steam used in ordinary types of systems.

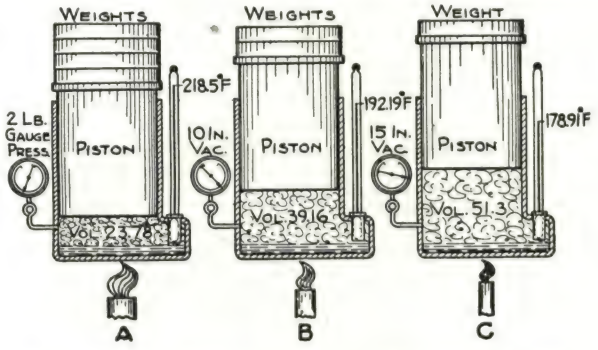

Fig. 1078A. Relation of Boiling Point and Specific Volume to Pressure

The temperature at which water will boil depends upon the pressure over the surface of the water.

By lowering the pressure on the water its boiling point is lowered over a wide range as is shown by the curve below.

The boiling point of water is the temperature at which it vaporizes without change in temperature, for the given pressure. As the boiling temperature decreases the specific volume increases.

For example, assuming the vessel "A" (Fig. 1078A) is a boiler with sufficient weights to create 2 lb. pressure on the water and sufficient fire under it to evaporate only one pound of water, the space occupied by this pound of steam will be 23.78 cu. ft. The temperature of the steam will be 218.5° F.

By removing sufficient weight a pressure of 10 in. vacuum can be secured and by reducing the fire under the boiler as shown by "B" so that only one pound of water is evaporated the same pound of steam will now have a temperature of 192.19° F. and will fill 39.16 cu. ft. of space.

Further reducing the pressure to 15 in. vacuum as in "C" the pound of steam will have a temperature of 178.91° F. and will have a volume of 51.3 cu. ft. The volume of the pound of steam at this pressure (vacuum) is more than double the volume of the pound of steam at 2 lb. gauge pressure.

This relation of steam temperatures and volume may be carried on up the range and at 25 in. vacuum it will have a temperature of 133.22° F. with a volume of 145 cu. ft. or over six times greater than that at 2 lb.

The Dunham Differential System utilizes these properties of steam.

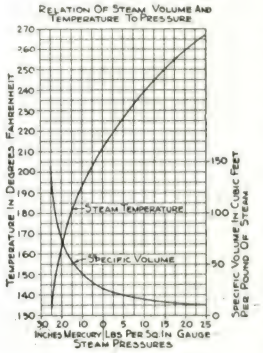

Fig. 1079

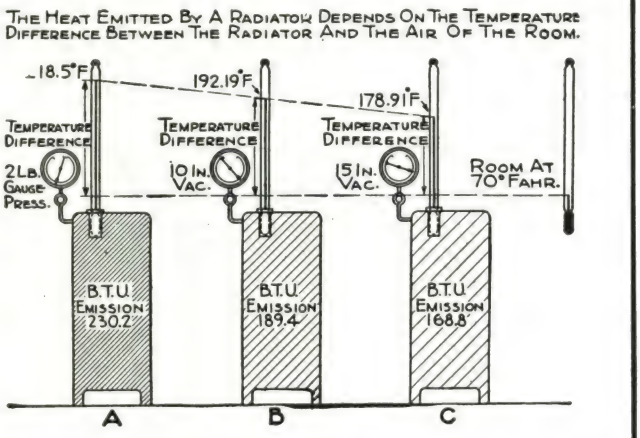

Fig. 1083A. Heat Emission from Radiation Under Varying Pressure and Temperatures

The heat given off by the radiator is proportional to the difference in temperature between the room and the radiator. By varying the temperature of the radiator, the building temperature can be kept constant, and the heat given off by the radiator kept in proportion to the heat loss from the building. By operating the system at varying degrees of pressure or vacuum the temperature of the steam supplied to the radiators is varied to suit the changing weather conditions. This is the basic principle of the Dunham Differential Vacuum Heating System. (See Fig. 1083A.)

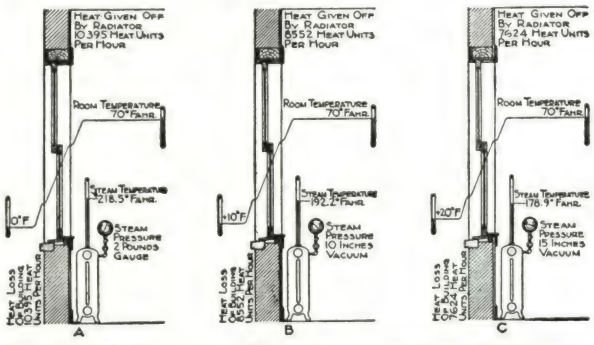

Fig. 1075A Relation of Heat Loss and Heat Emission to Temperature Difference

This illustration shows how the room temperature is maintained uniformly under changing weather conditions, by varying the steam pressure so that the heat given off by the radiator equals the heat lost by the building

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Fuel Saving of 25% or More Compared with Ordinary Types of Steam Heating Systems

On buildings changed over to the Dunham Differential Vacuum System the performance records show actual fuel savings of 25% or more compared with previous system. Thus the heat from 75 tons of fuel results in heating comfort for the same space as required 100 tons or more under the old method. This saving is accomplished with greater heat comfort to the occupants of the space heated with a resultant greater rental value to the owner.

The charts and illustrations on this page tell this story in a non-technical way.

Fig. 1066C, Steam Table Applied—This drawing gives a comparison of the properties of steam as used in the ordinary type heating system and the Dunham Differential Vacuum System.

The Ordinary System Has—

(1) Operating range zero to 5 lb. gauge pressure or higher.

(2) Temperature range 212° F. to 227.1° F.

(3) Volume per lb. steam 26.79 to 20.42 cu. ft.

The Dunham Differential Vacuum System Has—

(1) Operating range 25 in. vacuum to 5 lb. gauge pressure or higher.

(2) Temperature range 133.22° F. to 227.1° F.

(3) Volume per lb. steam 145 to 20.42 cu. ft.

By comparing the steam volumes and temperatures used in the two types of systems an index to the flexibility of each is obtained. The extreme flexibility of the Differential System eliminates overheating and reduces the heat lost through open windows.

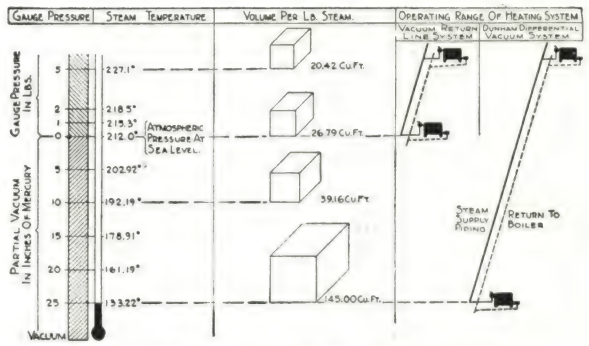

Fig. 1066C. The Steam Table Applied

Comparison of steam pressures, volumes and corresponding boiling points. Steam is produced at lower temperatures and circulated just as easily at 20 in. of vacuum as at 2 to 3 lb. gauge pressure

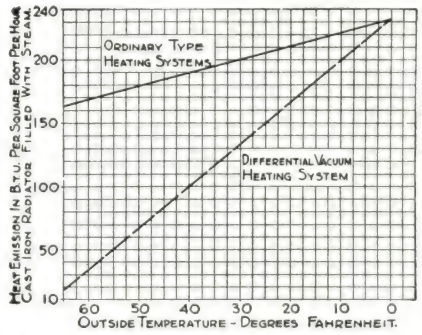

Fig. 1089A. Comparative Heat Emission from Radiators

This chart of heat emission from radiation is based on the room temperatures that would be obtained as shown by Fig. 1113A.

For example when the outside temperature is 30° F. with the ordinary type heating system the room would be overheated to 90° F. as noted from above graph. Using steam at zero gauge pressure (212° F.) the heat emission would be 200 B.t.u. per square foot per hour.

By controlling the pressure at which steam is supplied as in the Differential Heating System the heat emission is controlled in proportion to the outside weather. Using the same example with 30° F. outside, the heat emission of a radiator on the Differential System would be 132 B.t.u. per square foot per hour keeping the room substantially at 70° F. The effect of sun, wind and humidity on the building has not been considered in above graph. During cold and average weather the steam is furnished in sufficient quantity to completely fill the radiator at required degree vacuum. During mild weather the radiator may be only partly filled with steam under high vacuum.

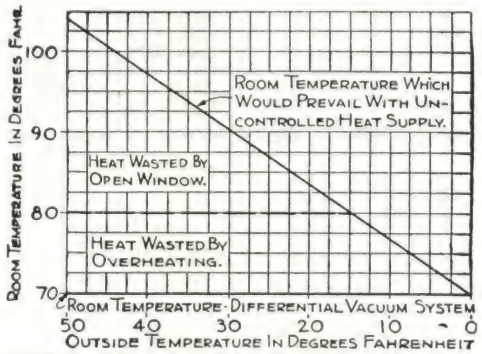

Fig. 1113A. Heat Saved by Controlling Heat Supply

This drawing shows the heat lost by overheating and wasted through open window in relation to the room temperature and the outside, disregarding the effect of sun, wind and humidity.

With the ordinary type heating system with uncontrolled heat supply the room or building would overheat in direct relation to the outside weather.

It was found by observation that occupants would allow room temperatures of approximately 80° F. before windows would be opened, we have therefore termed the excess heat between 70° and 80° as wasted through open windows. The diagonal line indicates the temperatures that would be attained if windows were kept closed, which is approximately same as would be lost if the windows were open.

Summary of Test Data Showing Economies Effected by the Dunham Differential System Over Former Systems

This summary is simply to bring to the architect's attention some examples of actual savings made by changing over from ordinary vacuum systems to the Dunham Differential System.

Complete, authentic records are on file at any of our offices and may be had on request. We give below only the names of a few jobs and the actual saving in percentages.

Job	Location	Savings Per Cent	Job	Location	Savings Per Cent
The Temple Bldg.	Rochester, N. Y.	37.92	Barry Apartments	Chicago, Ill.	32
Prairie Oil Gas Co. Bldg.	Independence, Kan.	44.08	Hotel Winthrop	Tacoma, Wash.	42.5
Medical Arts Bldg.	Portland, Ore.	25.46	Rienza Hotel	Chicago, Ill.	27.1
Standard Oil Co. Bldg.	Omaha, Neb.	35.7	Golden High School	Golden, Colo.	50.17
Delaware Bldg.	Akron, Ohio	27.46	Douglass High School	Douglass, Kan.	25.8
Butler County Jail	Allison, Iowa	52.5	Danley Mach. Spec.	Chicago, Ill.	55.52

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

General Description of Parts and Operation

The Dunham Differential Vacuum Heating System is a two-pipe system using steam at pressures less or greater than atmospheric pressure. The parts are very similar to the well known vacuum return line heating system of which this is a further development. The system may be controlled manually or automatically, as described on this and the following pages.

Fig. 1062G shows a typical layout of a manually controlled system having a steam source with Dunham Sub-atmospheric Reducing Valves to supply steam at the desired temperature in the radiation; a properly designed system of steam piping; a Dunham Packless Radiator Valve, with regulating plate in the inlet of each radiator; a Dunham Thermostatic Trap on the outlet of each radiator; a system of return piping; a Dunham Differential Vacuum Pump with Differential Controller. This controller is governed by the pressure difference existing between the radiation and return piping.

Any Good Piping Job Is Sufficient

The piping is assembled so as to remain tight over a long period of years, just the same as is required for any other good job. The same quality of workmanship which is used to assemble the hot water supply piping is easily sufficient if proper provision is made for the slightly greater expansion.

Control of Steam Supply

In smaller installations steam is supplied at the same vacuum (absolute pressure) at which it is to be used in the heating system by controlling the rate of heat generation at the boiler. On larger installations and on central station installations steam is furnished at a higher pressure than is required by the system and is reduced by means of pressure reducing valves to the desired vacuum or absolute pressure. These valves may either be manually or thermostatically controlled.

Wide Range of Flexibility

Heating Systems are seldom operated for 24 hours per day except in very severe weather, so the building is usually below the required temperature when the heating plant is started up each morning. The building may be brought up to temperature slowly, or rapidly, as desired, by circulating steam at say a 10-in. vacuum or even on pressures above atmosphere. When the building is up to the desired temperature on manually controlled systems the engineer can set the pressure reducing valve for the vacuum required to maintain the room temperature; on automatic installation the thermostat will govern. The amount of steam to be supplied under this vacuum will, naturally, depend on the rate of heat loss from the building at the time.

Regulating Plate at Each Radiator Assures Uniform Steam Distribution

By careful design and installation of a piping system, it is possible to get a distribution of steam at pressures which are fairly uniform throughout the piping. The use of a regulating plate in each radiator inlet valve assists steam distribution at all periods of the heating cycle. They interpose a small resistance to the flow of steam and create a reservoir condition within the supply piping, thus equalizing the pressure conditions at the entrance of each and every radiator.

How the Radiator Trap and Regulating Plate Prevent Excessive Heat Loss

During the heating-up period and while the radiators are filling with steam, the radiator traps are open to the return pipe and they remain open until steam reaches the trap, when they close.

When the radiators are completely filled with steam and under normal operation, the regulating plates, as already stated, produce a semi-reservoir condition in the steam mains as compared with the condition when filling, by supplying an area for the flow of steam that is in proper relation to each size of radiator; if through some abnormal condition, the condensing rate of some radiator would be increased, the regulating plate will tend to prevent such a radiator from condensing an excessive amount of steam, notwithstanding the demand for it. This is of value in reducing heat loss through excess window ventilation.

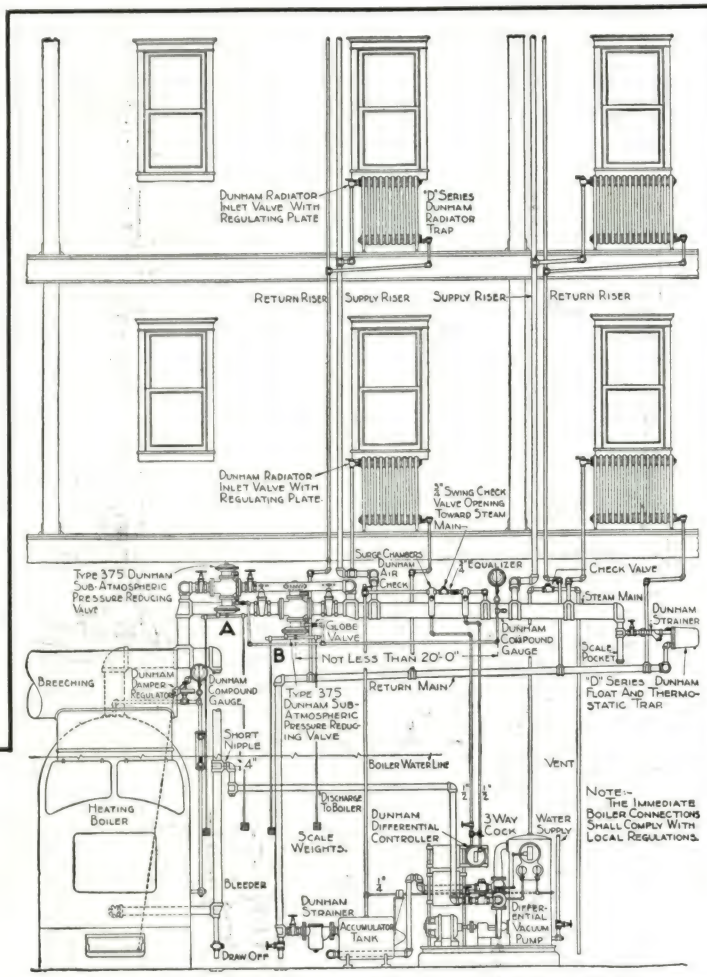

Fig. 1062G. Typical Layout of a Manually Controlled System for Heating with Steam Below Atmospheric Pressure

Note: See Fig. 1247B, Next Page, for Automatically Controlled System

Trap Used on Differential Vacuum Heating Systems

The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully protected by United States Patents Nos. 1,644,114, 1,706,401, 1,727,965, 1,761,819 and 1,771,077; Canadian Patents Nos. 282,193, 282,194 and 282,195. Additional patents in the United States, Canada and foreign countries are now pending.

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DUNHAM DIFFERENTIAL SYSTEM (Continued)
General Description of Parts and Operation (Continued)

Exact Heat Control for Mildest Days

Radiators of a heating system completely filled with steam under varying degrees of vacuum meet the average heat loss required during a season, but early autumn and late spring days with very much higher outside temperatures, require such a small heat output that even with a high vacuum, a radiator full of steam at a temperature corresponding to that pressure (vacuum) might under such conditions overheat the building if the system was not capable of further heat reduction. In the Dunham Differential System the quantity of steam supplied during such periods is reduced under a high vacuum, and the regulating plate controls its admission to each radiator so that each remains partly filled, balancing the heat input to the radiator with the heat loss of the building.

Thermostatic Radiator Traps

The thermostatic radiator trap on the outlet of each radiator is of importance, for by its use a positive differential can be maintained between the pressure (vacuum) in the radiator and the pressure (vacuum) in the return pipe, thus securing satisfactory heating.

Steam Circulation Is Maintained by Jet Exhauster Type Vacuum Pump

Steam circulation is maintained by the Dunham Differential Vacuum Pump capable of producing a high vacuum. The pump motor is controlled by the Dunham Differential Controller which is an automatic electric switch actuated by the pressure difference in the radiation and return piping. The function of this controller is to automatically start or stop the pump so that a small but substantially constant pressure difference is maintained. This differential will furnish a head sufficient to cause steam flow toward the returns.

System May Be Manually or Automatically Controlled

There are three distinct methods of heat control:

(a) Manual Control, using Dunham Sub-atmospheric Reducing Valves, adjusting these so as to furnish a uniform sufficient flow of Sub-atmospheric Steam. This method and method B are used in the "D" series system. (See Fig. 1062G.)

(b) Automatic Control, by the additional function of an automatic valve controlled from one or more Room Thermostats. This automatic valve takes the place of the larger of the Sub-atmospheric Reducing Valves. (See Fig. 1247B.)

(c) Automatic operation, as used in the "DH" series system and also in such "D" series installations in which the boiler is controlled by a Room Thermostat.

Automatic Control by Thermostats—Fig. 1247B illustrates a typical layout of a heating system which gives automatic control of the steam supply.

Thermostats located in key rooms are used to control the operation of the larger of the two supply valves previously referred to. This valve, located directly in the steam main, is a motor operated valve. Its function is to admit additional steam to the heating system when the room thermostat calls for heat and to stop this flow when it is no longer required.

The room thermostats are electrically connected to the motor of this valve through a control panel, arranged so that the steam in the system may be either automatically controlled or manually controlled when special conditions may demand it.

In buildings where varying wind conditions cause different demands for heat on the windward side, the use of several thermostats located on different sides of the building in separate key rooms has been the practice. The heating system may be under the control of any one of these thermostats.

The Zoning System—As buildings become larger or as the use of their several parts are more varied, it has been found that more economical means of satisfactory heating will be obtained by using a multiple system called zoning.

Note: This system is described in detail on Dunham pages 19, 20, 21.

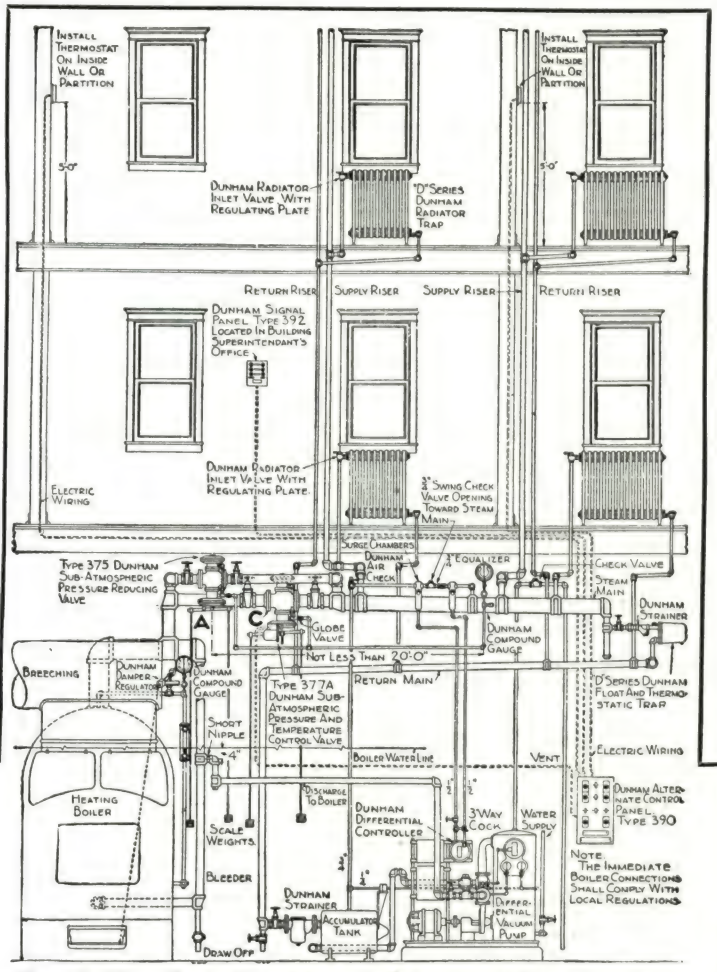

Fig. 1247B. Typical Layout of an Automatically Controlled System for Heating with Steam Below Atmospheric Pressure

Note: See Fig. 1062G, Preceding Page, for Manually Controlled System

Trap Used on Differential Vacuum Heating Systems

The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully protected by United States Patents Nos. 1,644,114, 1,706,401, 1,727,965, 1,761,819 and 1,771,077; and Canadian Patents Nos. 282,193, 282,194 and 282,195. Additional patents in the United States, Canada and foreign countries are now pending.

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DUNHAM DIFFERENTIAL SYSTEM (Continued)

The "D" Series for Large Buildings—Over 3000 Sq. Ft. Equivalent Direct Radiation Manually or Automatically Controlled

The "D" series Dunham Differential Vacuum System is for the heating of office buildings, hotels, apartment houses, schools and groups of buildings, etc. It is for use on any system with more than 3000 sq. ft. of equivalent direct radiation.

In this system the boiler serves as a heat storage from which steam is supplied according to the demand of the Sub-Atmospheric Pressure Reducing Valve or Temperature Control Valve. The manually controlled system (see Dunham page 13) uses two sub-atmospheric pressure reducing valves. The small valve "A" supplies steam in mild weather, valve "B" in cold weather. In extreme weather both valves may be used, if necessary. By shifting the weights of the valve in use, the steam pressure (vacuum) is controlled in accordance with outside weather conditions.

In the automatically controlled system (see Dunham page 14) a Temperature Control Valve "C" is substituted for valve "B."

The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully protected by United States Patents Nos. 1,644,114, 1,706,401, 1,727,965, 1,761,819 and 1,771,077; and Canadian Patents Nos. 282,193, 282,194 and 282,195. Additional patents in the United States, Canada and foreign countries are now pending.

Central Station Heating

The Dunham Differential Vacuum Heating System is especially adapted to Central Station Steam Supply, both from the standpoint of the Central Station Company and the Consumer. It offers great economy of steam consumption, low condensate temperatures, complete circulation even though the pressure carried on the distributing mains from the boiler plant is low.

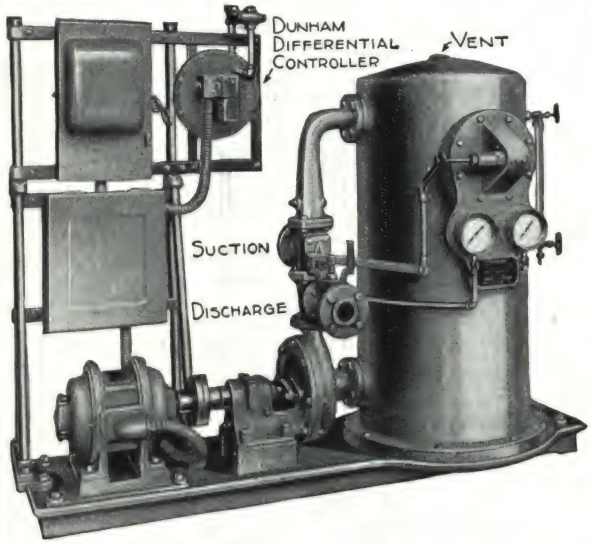
Exhaust Steam

Exhaust steam may be circulated under vacuum, thus saving steam formerly wasted. Greater economy and greater capacity of engines or pumps is also secured. The application of this system reduces the back pressure to a vacuum and greater power output will be obtained at reduced steam consumption.

The Dunham Differential Controller

This starts and stops the pump maintaining, under all steam supply conditions, a greater vacuum in the returns than in the radiators.

This assures complete circulation at all times. In severe weather when steam pressure above atmospheric is required (to maintain the room temperature) the Differential Controller automatically stops the pump until pressure conditions in the system make its operation necessary.



Dunham Differential Vacuum Pump, "D" Series

The Dunham Differential Vacuum Pump operates on the Jet Exhauster principle. The Dunham Exhauster is a special design and has great air and vapor handling capacity. Under high pressures water is supplied from the receiving tank to the exhauster by a motor driven enclosed impeller type centrifugal pump of high efficiency.

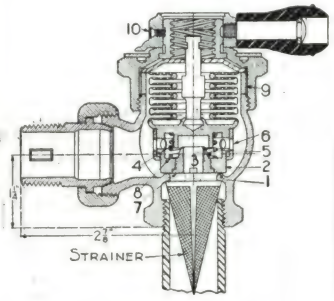
The pump exhausts air and water from return piping under very high vacuums and discharges condensate to the boiler. It is a completely assembled compact unit ready for piping and wiring connections.

For Complete Details, see Dunham Pages 17-18.

Process Work

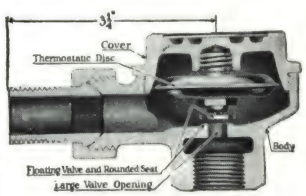
In installations where high steam pressures and temperatures are necessary for process work the building heating system can be operated more economically by applying the differential principle to it. By reducing the high steam pressure through reducing valves the heat input may be controlled and the over-all economy of the plant improved.

Heat Control Valve Type 180



For Details see Page 40

Dunham Thermostatic Radiator Trap



Sectional View of Trap

Sectional view of Dunham Differential Thermostatic Radiator Trap, sizes, styles and specifications, see Dunham pages 16, 35, 36, 37, 38

All traps used in connection with the Dunham Differential Vacuum Heating System are known as "D" Series. They function uniformly over a wide range of pressures and temperatures from 25 in. of vacuum to 25 lb. gauge pressure.

(See graph Fig. 1060A, Dunham page 5.)

Dunham Regulating Plate Type 192

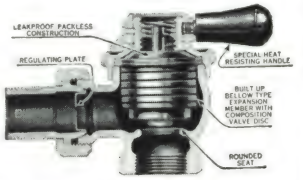
The Dunham Regulating Plate, which is inserted in the union of the Dunham Packless Radiator Valve, distributes the steam proportionately to each radiator.

For complete details see Dunham pages 35-36

Dunham Packless Radiator Valve

Dunham Packless Radiator Valves with Regulating Plate must be used on all radiators to secure proper balance. Either Type 105 (lever handle) or Type 145 (wheel handle) may be used.

The valve is made packless by means of the bellows construction. The plate orifice is calibrated to the number of feet of radiation in each radiator.



Sectional View, Type 105 Dunham Packless Radiator Valve with Regulating Plate

For sizes, styles and specifications, see Dunham pages 35, 36, 37, 38

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Fig. 1062G Typical Installation "D" Series Manual Heat Control—Method 1

For Specific Data on Parts, see Index, Dunham Page 3, This Catalogue

The building temperature is controlled by adjusting manually the two Dunham Sub-atmospheric Pressure Reducing Valves, the operator being guided by a thermometer in the building. A long distance indicating or recording thermometer can be used to advantage, making the manual control very convenient.

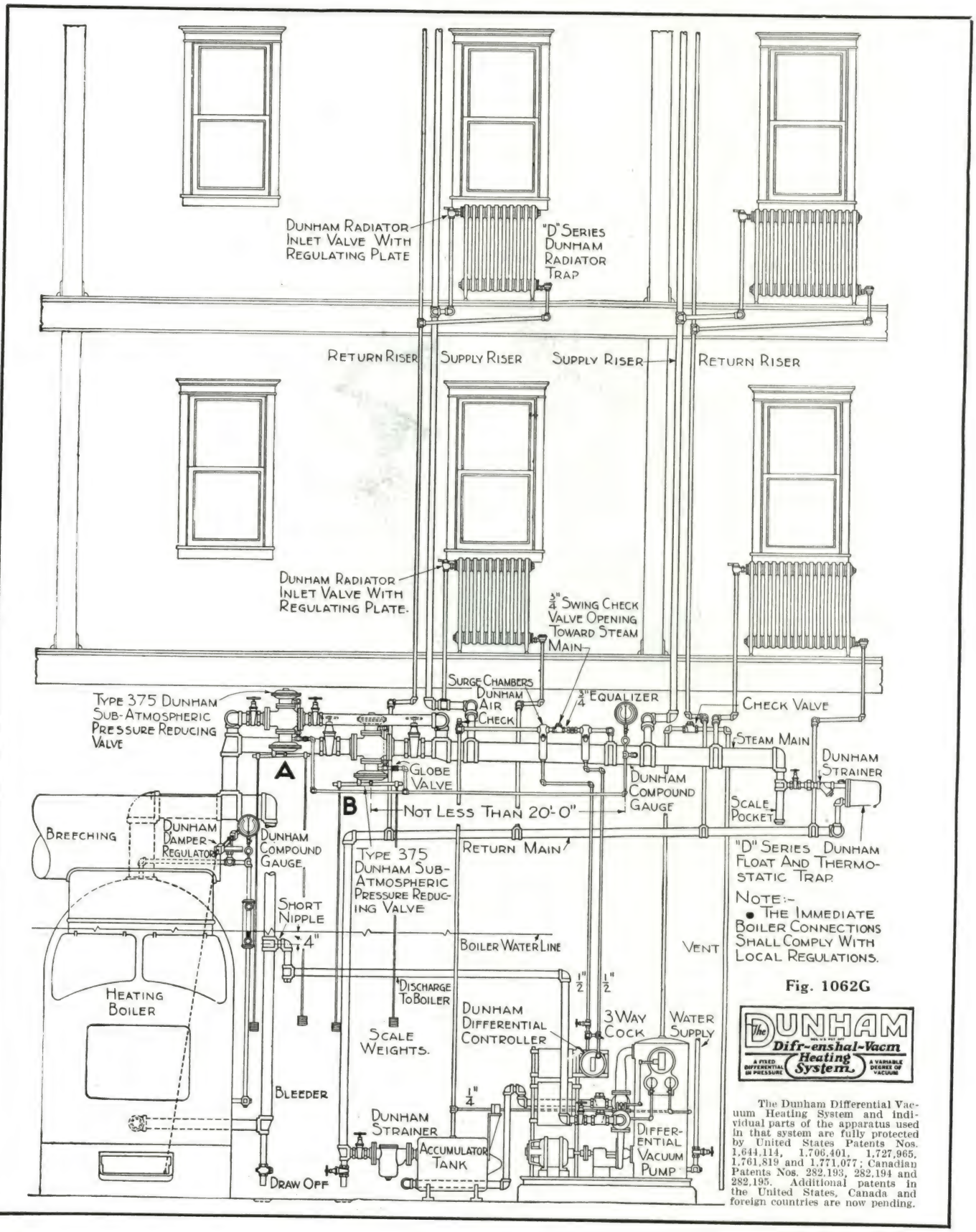


Fig. 1062G

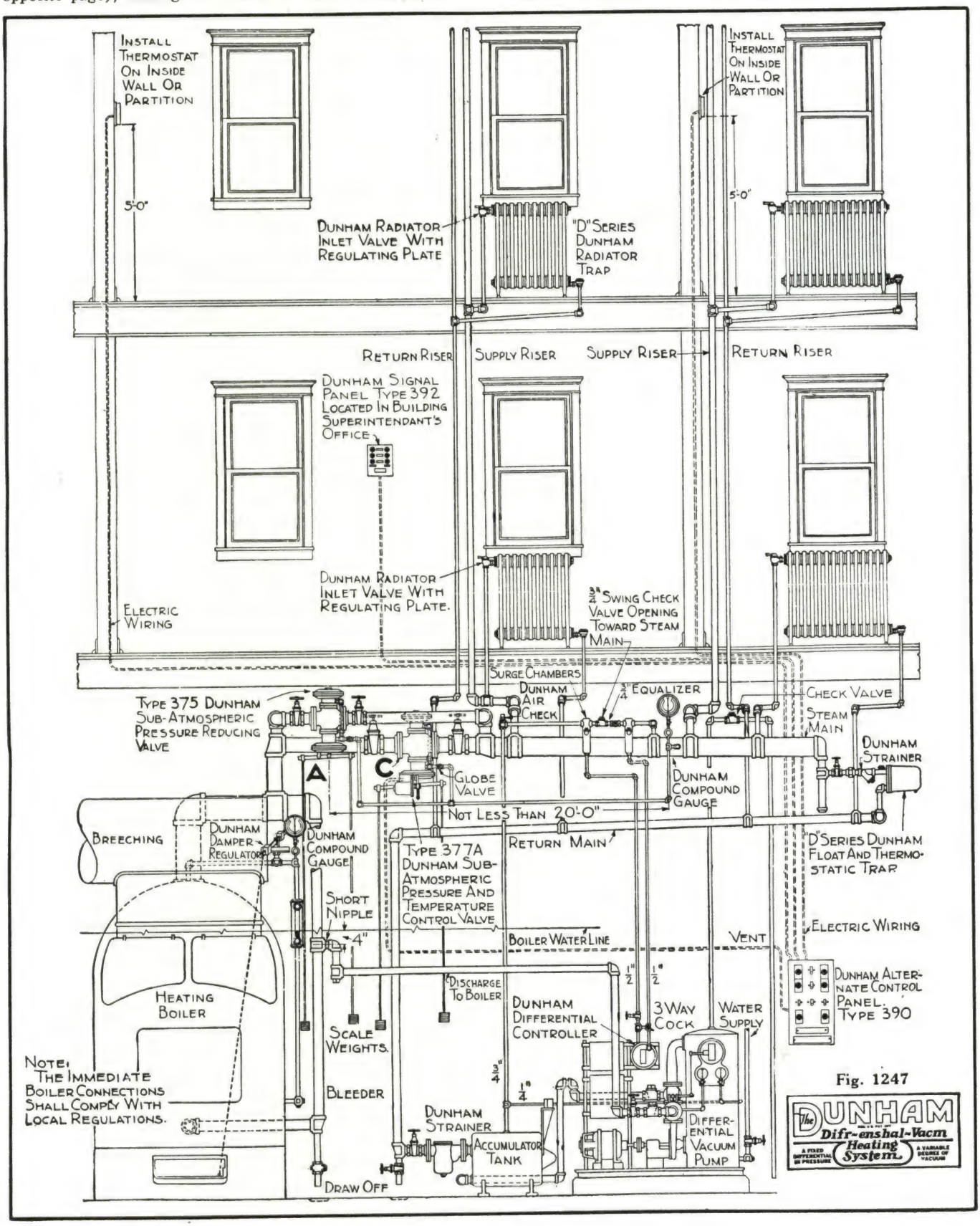
The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully protected by United States Patents Nos. 1,644,114, 1,706,401, 1,727,965, 1,761,819 and 1,771,077; Canadian Patents Nos. 282,193, 282,194 and 282,195. Additional patents in the United States, Canada and foreign countries are now pending.

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Fig. 1247B Typical Installation, "D" Series Automatic Heat Control—Method 2

For Specific Data on Parts, see Dunham Pages 35 to 58, This Catalogue

In this method the control valve "C" is operated from a room thermostat and takes the place of the large Dunham Sub-Atmospheric Pressure Reducing Valve "B" in Fig. 1062G (on opposite page), making the control of the heat supply to the building automatic. Valve "A" in this case will supply the minimum heating load and temperature while control valve "C" will supply the balance of heat in order to maintain the building temperature. For capacities of valve "C," see Dunham page 15.



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DUNHAM DIFFERENTIAL SYSTEM (Continued)

Sub-atmospheric Pressure Reducing Valve—Type 375A

These valves are for use only on Dunham Differential Vacuum Heating Systems. The maximum initial steam pressure must not exceed 10 lb. The reduced pressure may be varied by adjustment from slightly below the initial pressure to sub-atmospheric pressures as low as 25 in. of vacuum.

For Type 377A Sub-atmospheric Pressure Reducing Valve, see Dunham Page 21
For Other Pressure Reducing Valves, see Dunham Page 50

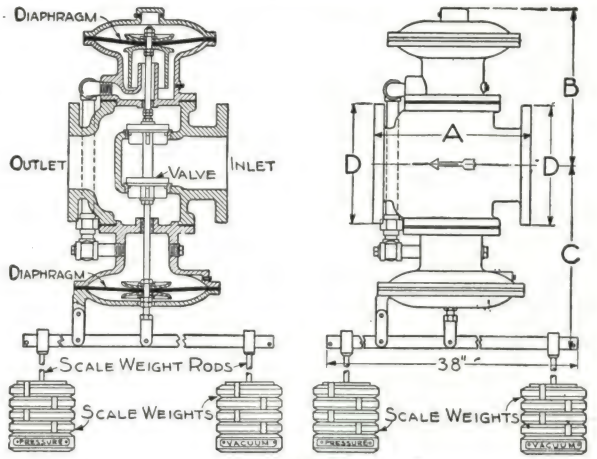


Fig. 1250A

TYPE 375A SUB-ATMOSPHERIC PRESSURE REDUCING VALVE

Pipe size, inches	Conn.	Dimensions in inches				Approx. shipping weight lbs.	Code
		A	B	C	D		
2	Flgd.	8⅜	10⅛	13½	6	200	Arrow
3	Flgd.	10¼	12⅛	14½	7½	235	Arrohead
4	Flgd.	12	12⅝	15⅛	9	300	Arroroot
6	Flgd.	15½	15	17½	11	485	Arroyo
8	Flgd.	19	16¾	19	13½	655	Arsacid
10	Flgd.	19½	18 3/16	20½	16	770	Arsenal
12	Flgd.	26½	20⅛	22½	19	850	Arsenic
14	Flgd.	30½	22 11/16	25 1/16	21	920	Arsenide

Capacities of Type 375A Valves

Sq. Ft. Radiation	4500	6000	11000	18000	42000	55000	73000	114000	150000	200000
Size Small Valve A, Inches.....	2	2	3	3	4	4	6	6	8	8
Size Large Valve B or C, Inches	3	4	4	6	6	8	8	10	12	14

Example: Installation having 9200 sq. ft. of equivalent direct radiation excluding piping, requires:

(A) A 3 and 4-in. Sub-atmospheric Pressure Reducing Valve Type 375A for a manually controlled system (Application 1).

(B) A 3-in. Sub-atmospheric Pressure Reducing Valve Type 375A and a 4-in. Sub-atmospheric Pressure and Temperature Control Valve Type 377A (Application 2).

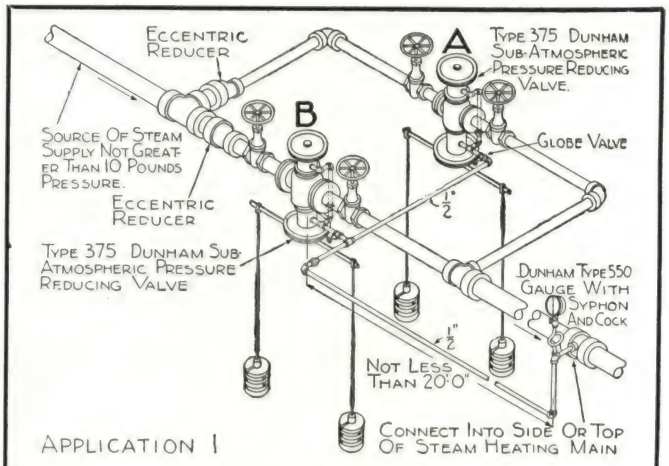


Fig. 1149D

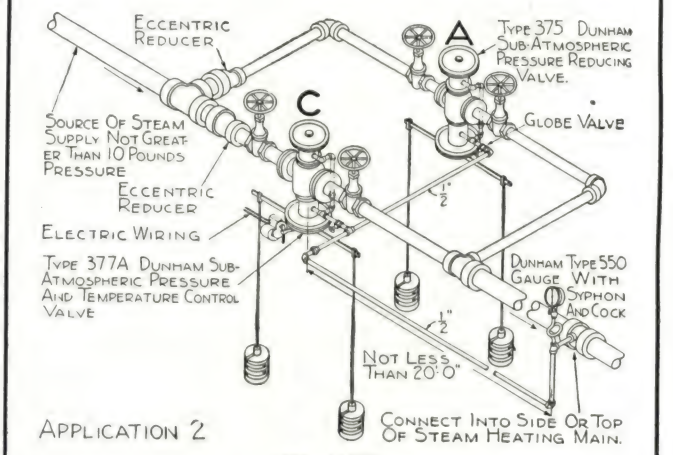


Fig. 1150E

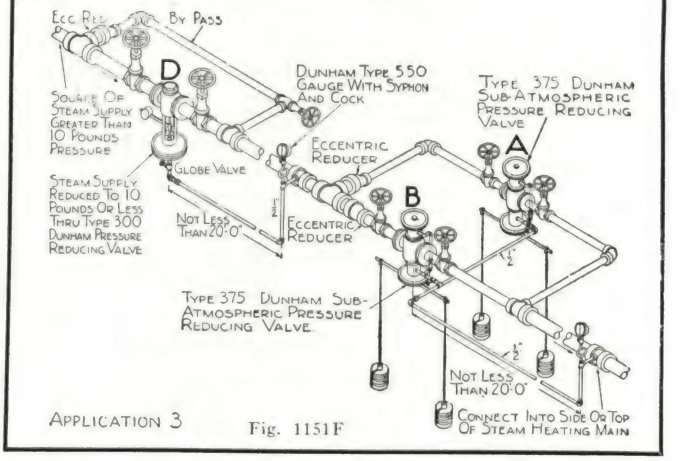


Fig. 1151F

The sub-atmospheric pressure reducing valve is installed in the horizontal steam main as shown in Figs. 1149D, 1150E, and 1151F. In operation, sub-atmospheric pressures (vacuum) are secured by retarding the admission of steam into the steam heating main until the desired vacuum is reached. If the rate of steam admission is too great, pressure on the main increases causing the valve to partially close, thus reducing the steam supply which permits the vacuum desired to again be obtained. Adjustment allows a greater or lesser vacuum to be maintained on the outlet side of the valve.

Application 1 is a manually controlled Differential System using steam at not more than 10 lb. initial gauge pressure. For higher initial pressures see Application 3. Two Sub-atmospheric Pressure Reducing Valves are used as shown by Fig. 1149D. Valve "A" supplies steam in mild weather. The second valve, "B," supplies steam in cold weather. In extreme weather both valves may be used if necessary.

Application 2 is an automatically controlled system on which a Dunham Temperature Control Valve "C," operated from one or several thermostats is substituted for valve "B." Sub-atmospheric Pressure Reducing Valve "A" supplies steam in mild weather. As the weather becomes colder the Sub-atmospheric Pressure and Temperature Control Valve "C" supplies the necessary additional steam. The Thermostat must be placed in a typical room on the most exposed side of the building and at a point most remote from the source of steam supply measured along the steam piping. Its location should also represent the average building temperature and heat requirements.

Application 3 is a manually controlled system with initial steam pressure greater than 10 lb. gauge. The Pressure Reducing Valve "D" is used to reduce the steam pressure to 10 lb. or less before supplying the Sub-atmospheric Pressure Reducing Valves "A" and "B." If automatic temperature control is desired, valve "C" is substituted for valve "B." See Application 2.

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)
Dunham Differential Traps—"D" Series

For Pressures 25 In. Vacuum to 25 Lb. Gauge

Thermostatic Radiator Trap

The Dunham Radiator Trap is an appliance which was first put into service in 1903 and completely revolutionized Steam Heating. It made the low pressure steam heating system practical. It automatically permits air and water to pass from the radiator without passing steam, consequently maintains the radiator at its maximum efficiency.

All traps used in connection with the Dunham Differential Vacuum Heating System are known as "D" Series. They function uniformly over a range of pressures and temperatures from 25 in. of vacuum to 25 lb. gauge pressure. Fig. 1060A, Dunham page 5, shows the performance of a Dunham D1 Radiator Trap over this range of pressures and temperatures.

For other Thermostatic Radiator Traps, see Dunham pages 36, 37, 38, 42, 45.

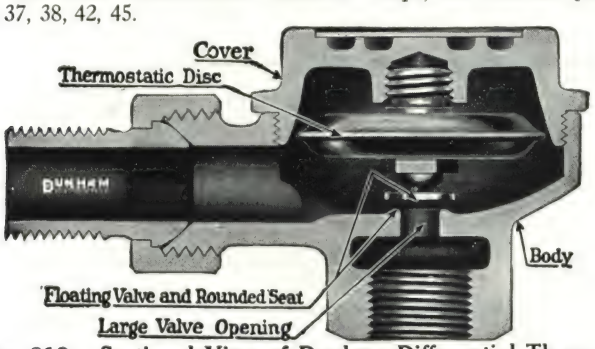


Fig. 819. Sectional View of Dunham Differential Thermostatic Radiator Trap

Angle Pattern | Straightway Pattern | Right Hand Pattern | Left Hand Pattern

Fig. 1222

SPECIFICATIONS
(For pressures 25 in. vacuum to 25 lb. gauge)

Size	Style	Tapping, in.	Capacity direct radiation sq. ft.	Net wt.	Code	Dimensions, in. A	B	C	D	E
No. D1	A.P.	½	100	22 oz.	Deatom	3¼	1⅛	. . .	2 7/16	. . .
	S.W.	½	100	22 oz.	Deatude	3¼	. . .	1¾	2 7/16	½
	R.H.	½	100	22 oz.	Deattos	3¼	. . .	1¾	2 7/16	½
	L.H.	½	100	22 oz.	Deatwan	3¼	. . .	1¾	2 7/16	½
No. D2	A.P.	½	350	27 oz.	Deabhor	3¼	1⅛	. . .	3 1/16	. . .
	S.W.	½	350	28 oz.	Deabbey	3¼	. . .	1¾	3 1/16	½
	R.H.	½	350	28 oz.	Deabate	3¼	. . .	1¾	3 1/16	½
	L.H.	½	350	28 oz.	Deabyss	3¼	. . .	1¾	3 1/16	½
No. D3	A.P.	¾	800	28 oz.	Dealp	3 5/16	1 3/16	. . .	3 1/16	. . .
	S.W.	¾	800	30 oz.	Dealper	3 5/16	. . .	1¾	3 1/16	½
	R.H.	¾	800	30 oz.	Dealpine	3 5/16	. . .	1¾	3 1/16	½
	L.H.	¾	800	30 oz.	Dealpest	3 5/16	. . .	1¾	3 1/16	½
No. D4	A.P.	¾	1500	5 lb.	Dedrink	2¼	2 1/16	3¾	5	. . .
	S.W.	¾	1500	5 lb.	Dedrench	2¼	2 1/16	3¾	5	15/16
No. D5	A.P.	1	3000	6 lb.	Dedrizzle	2 5/16	2 5/16	4	5	. . .
	S.W.	1	3000	6 lb.	Dedrift	2 5/16	2 5/16	4	5	15/16

The Nos. D1 and D2 Traps are conforming with the standard dimensions "A" (3¼ in.) as adopted by the Heating and Piping Contractors' National Association for ½-in. radiator traps. The Nos. D1, D2 and D3 Traps are regularly furnished nickelplated, and with union nut and nipple, threaded right hand. Supplied in angle, straightway, right hand, or left hand pattern. Bronze body and cover.

The Nos. D4 and D5 Traps are painted blue and furnished in either angle or straightway patterns with female right hand threaded connections, both inlet and outlet. Cast iron body and cover.

The thermostatic discs are coated by a special process, which will lengthen the life of the traps by retarding normal corrosion.

When not otherwise stipulated on order the regular angle pattern traps of size called for will be shipped.

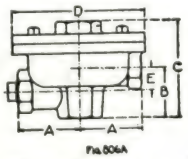
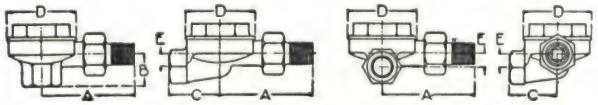


Fig. 806A. Traps Nos. D4 and D5



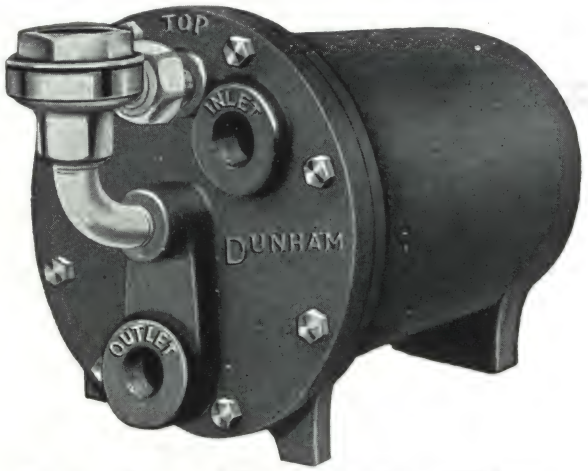
Angle Pattern | Straightway Pattern | Right Hand Pattern
Traps Nos. D1, D2 and D3

(Dimensions of Left Hand Pattern are the same as those of the Right Hand Pattern)

Fig. 805

Float and Thermostatic Traps

These traps quickly handle large volumes of water on sudden calls for maximum duty. They open automatically for water and air and close for steam. The water is handled by the float valve, so constructed that the opening is always sealed with water with no opportunity for steam leakage. The air is handled by the thermostatic valve. They combine the Dunham Thermostatic Valve Principle with the float. The "D" Series Traps are specially made for the Differential Vacuum Heating System.



Dunham Float and Thermostatic Trap "D" Series

Trap No.	Size of tapping, in.	Capacity sq. ft. equi. direct rad.	Net wt. lb.	Dimensions, in. A	B	C	D	E	F	G	Code
D22	¾	1600	14	11¼	6⅜	9⅛	1⅝	3¼	¾	5½	Debloater
D23	1	2800	15	11¼	6⅜	9⅛	1⅝	3¼	¾	5½	Deblockade
D16	¾	3600	24	14⅛	7⅞	10½	1⅜	4¼	1½	7⅞	Deblare
D17	1	5200	24	14⅛	7⅞	10½	1⅜	4¼	1½	7⅞	Deblazon
D18	1¼	8000	33	15½	9⅝	12⅛	2	4⅞	1¾	9½	Deblest
D19	1½	10000	33	15½	9⅝	12⅛	2	4⅞	1¾	9½	Deblithe
D20	2	14000	42	19¾	11⅞	15½	2¼	6⅞	1⅜	9⅛	Deblink

Capacities given are based upon a condensation rate of ¼ lb. per sq. ft. of cast iron direct radiation per hour, at a pressure differential of 1 in. of mercury, which is equivalent to ½ lb. per sq. in. All traps have right hand female tappings.

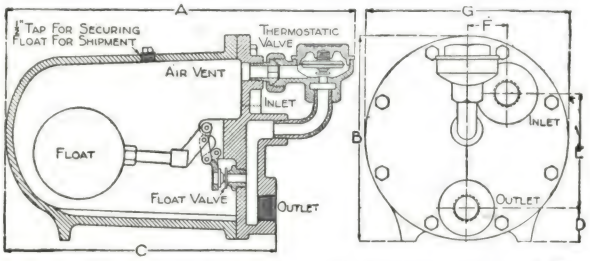


Fig. 1161A. Traps Nos. D16, D17, D18, D19 and D20

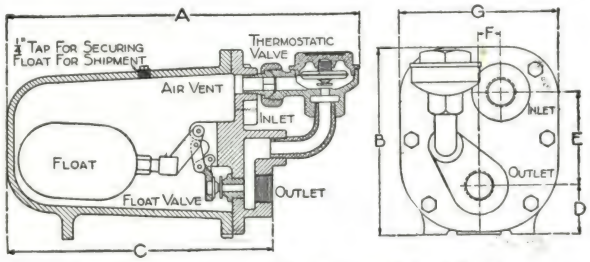


Fig. 1162A. Traps Nos. D22 and D23

Note: For other types of Dunham Float and Thermostatic Traps, see Dunham pages 43, 44.

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Pipe Sizes for Differential System and Capacities and Dimensions of "D" Pumps

Pipe Sizes

The tables show steam mains and steam risers slightly larger than a Vacuum Return Line System, because of the larger volume of steam to be circulated in mild weather, although a smaller weight of steam is circulated. Ample grade of all pipes must be provided to insure free circulation. *Experience proves that a Differential System using vacuum return line pipe sizes will secure a fuel saving up to 25% over vacuum return line operation. Experience also proves that a system using Differential pipe sizes will secure fuel savings from 25% to 40% or more.*

Drips

The steam mains are dripped direct to boiler return header and drip mains vented through a "D" Series Trap to the return main on systems operating without reducing valves. The pressure in the boiler, radiators and supply piping will be the same, permitting condensate to enter boiler. Should a higher pressure be carried in boiler than in the system (where Reducing Valve is used for admitting Sub-atmospheric steam into the system) then "D" Series Float and Thermostatic Traps must be used on mains and connected to returns leading to Differential Pump. The same applies when steam piping is too low for gravity return to boiler. No lift connections can be used.

TABLE 15. STEAM MAINS

Pipe sizes, in.	Capacities in square feet of direct cast iron radiation for each length									
	*Length of runs in feet									
	100	200	300	400	500	600	800	1000	1500	2000	3000
2	820	580	470	420	370	330	290	260	220	180	150
2½	1530	1070	880	770	670	610	540	470	400	340	280
3	2780	1940	1580	1380	1220	1110	970	860	720	600	500
3½	4400	3080	2510	2200	1940	1760	1530	1360	1140	970	790
4	6200	4320	3520	3120	2720	2480	2160	1920	1600	1360	1120
5	11000	7730	6240	5520	4880	4400	3840	3440	2880	2430	1980
6	17750	12400	10200	8800	7850	7130	6240	5520	4560	3920	3200
8	41400	28800	23600	20700	18400	16600	14500	12800	10800	9100	7470
10	72600	51000	41400	36200	32000	29000	25400	22500	18900	15900	13100
12	114000	80000	65300	57200	50400	46000	40000	35400	29700	25200	20700
14	148000	104000	84200	73800	64900	59000	51600	45900	38300	32500	26500
16	210000	148000	120000	105000	92700	84000	73800	65400	54900	46400	37800

TABLE 16. RETURN MAINS

Pipe sizes, in.	Capacity in square feet of radiation									
	1	1¼	1½	2	2½	3	3½	4	5	6
* 400 ft.	800	1600	4000	11000	21000	38000	55000	78000	138000	220000
*1000 ft.	500	1000	2500	7000	13000	23500	34000	48000	86000	138000
*2000 ft.	350	800	1800	5000	9000	16000	24000	34000	60000	98000
*3000 ft.	300	600	1500	4000	7500	13500	20000	28000	50000	80000

TABLE 18. RISER SIZES

Pipe size, in.	Capacity in square feet of radiation											
	Supply									Return		
	¾	1	1¼	1½	2	2½	3	3½	4	¾	1	1¼
* 200 ft.	40	80	174	270	550	905	1600	3080	4320	1000	2000	4500
* 400 ft.	28	57	126	195	392	650	1140	2200	3120	800	1600	3400
* 600 ft.	23	46	99	156	315	520	912	1760	2480	640	1200	2500
*1000 ft.	18	35	77	120	246	402	708	1360	1920	500	1000	2100
*2000 ft.	12	25	55	86	174	285	498	968	1360	350	700	1500

TABLE 17. STEAM MAIN DRIPS

Pipe sizes, in.	1¼	1½	2	2½
Capacity in sq. ft.	1000	2000	4000	6000

TABLE 19. RADIATOR CONNECTIONS, TOP INLET
Valve Types 105 or 145 with Regulating Plates

Square feet of direct radiation	Supply			Return		
	Size inlet valve, in.	Vertical pipe to inlet valve, in.	Horizontal runout to riser, or spring piece to main from a first floor radiator, in.	Trap No.	Stub to trap and size of trap, in.	Horizontal runout to riser or first floor radiator, in.
1— 25	½	½	¾	D1	½	¾
26— 80	¾	¾	1	D1	½	¾
81—100	¾	¾	1¼	D1	½	¾
101—140	¾	¾	1¼	D2	½	¾
141—170	¾	¾	1½	D2	½	¾

TABLE 20. ALLOWANCES FOR RESISTANCE TO FLOW
In Feet of Pipe

Pipe size, in.	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16
For elbows	2	2	2	3	5	6	9	10	14	19	24	35	47	59	70	82
For globe valves	2	3	3	5	7	9	14	15	21	28	36	53	70	88	106	124

*In sizing pipes the length of the piping must be ascertained and the frictional resistance of fittings and valves considered. It is customary to reduce the resistances to equivalent length of straight pipe, which must be added to the actual length. In table 20 these resistances are given in feet of pipe.

The length equals the distance along piping from source of supply (boiler or reducing valve) to the top of the riser, plus allowance for elbows, valves (Table 20) and plus 25 ft. allowance for last radiator connection.

Do not reduce any steam main below 2 in. in size at its end.

Spring pieces, that is, connections from steam main to riser must always be made one size larger than the riser. Make return spring pieces same size as return riser.

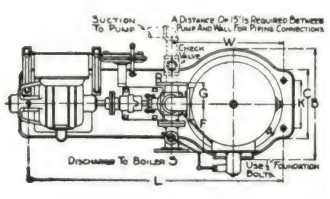
Use pipes two sizes larger than vertical pipe for supply spring-pieces and radiator runouts over 8 ft. long.

This data is thoroughly reliable if properly used.

Our engineering department is available for the checking of plans.

Capacities and Dimensions of "D" Series Dunham Differential Vacuum Pumps

These pumps are for use on "D" Series Dunham Differential Heating Systems only and are specially built for this purpose. Do not specify "D" Series Pump for any other system.



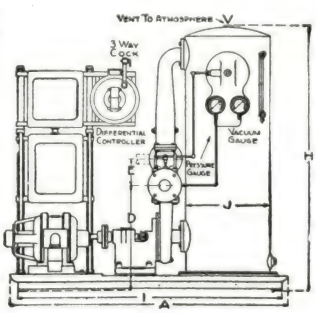


Fig. 1289

CAPACITIES AND DIMENSIONS STANDARD DIFFERENTIAL PUMPS

No.	D3	D8		D16		D26		D40	D50
Rated	3000	8000		16000		26000		40000	50000
Kind of electric current	Any current	Single phase	2 or 3 phase or d.-c.	2 or 3 phase or d.-c.	Single phase	2 or 3 phase 50–60 cycle or d.-c.	2 or 3 phase 25 cycle single phase or d.-c.	Any current	Any current
Hp.	1	1½	1½	2	2	3	3	5	7½
A	60⅜	63¾	60⅜	60⅜	63¾	60⅜	63¾	66⅞	81¼
B	24	24	24	24	24	24	24	26	30
C	15	18½	15	15	18½	15	18	19¾	22
D	21⅛	21⅛	21⅛	21 7/16	21 7/16	22¾	22¾	23 1/16	25 13/16
E	5 3/16	4 13/16	4 13/16	4 7/8	4 7/8	5 13/16	5 13/16	5 7/8	5 13/16
F	8 5/16	8 5/16	8 5/16	8¾	8¾	10 11/16	10 11/16	11 3/16	14¼
G	3¼	3¼	3¼	4	4	4½	4½	5⅛	6
H	46	46	46	52	52	58	58	58¼	62½
I	57¾	61⅛	57¾	57¾	61⅛	57¾	61⅛	64¼	79
J	18	18	18	18	18	18	18	20	24
K	10¾	14⅛	10¾	10¾	14⅛	10¾	14⅛	15¼	17
L	55¾	59	55¾	55¾	59	55¾	59	62	76¼
R	1½	1½	1½	2	2	2½	2½	3	5
S	1¼	1½	1½	2	2	2½	2½	3	3
V	1	1	1	1	1	1½	1½	1½	1½
W	25 15/16	25⅛	25 15/16	25 15/16	25⅛	25 15/16	25⅛	26 13/16	34⅜

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Installation of Accumulator Tank, Lift Connections and "D" Series Pump Connections

Accumulator Tank

The accumulator tank must be the low point of the system, with returns grading toward and into the inlet of tank.

The location of the accumulator tank is also important in relation to the suction of the pump. Wherever possible the accumulator tank should be installed so that its outlet tapping is slightly above the pump suction, that is, so the condensate can flow by gravity from the accumulator tank to the pump. See Fig. 1180.

Where this is not feasible the tank should be placed as high as possible, so as to keep the lift at a minimum. It requires approximately 1 in. of vacuum for each foot of lift. By keeping the lift at a minimum the amount of vacuum used to lift the water is also kept to a minimum with a higher vacuum available for the system.

Accumulator Tank and Strainer are furnished with "D" Series Pumps.

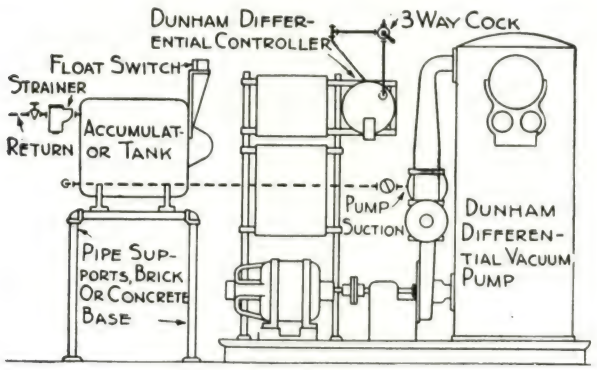


Fig. 1180

ACCUMULATOR TANK TAPPING SIZES AND STRAINER SIZES AS FURNISHED WITH "D" SERIES PUMP

Size of pump	Size of accumulator tank, in.	Accumulator tank tappings		Size of pump discharge, in.	Size of strainer, in.
		Inlet, in.	Outlet, in.		
D3	18x18	2	1½	1¼	2
D8	18x18	3	1½	1½	3
D16	18x24	3	2	2	3
D26	18x36	4	2	2½	4
D40	18x36	4	3	3	4
D50	18x36	5	3	3	5

Tested check valves are furnished for both suction and discharge of pump and vent from accumulator tank and receiver tank. Strainer is furnished.

Lift Connections

These must not be used in Differential Systems, except between Differential Pump and Accumulator Tank. An extra lift connection is required at the tank when distance of lift becomes greater than 4 ft.

As an example assume that there is an 8-ft. height from the Accumulator Tank outlet to the Pump Suction. Break up this vertical distance into two lengths placing a lift pocket in the middle, because in this manner with the pump running under normal operating conditions it is possible to lift the water from the accumulator tank to the pump suction with less vacuum than would be required by using only one straight lift pipe.

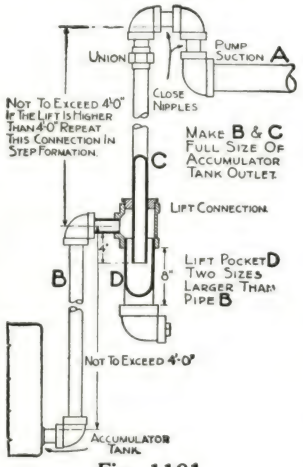


Fig. 1181

By normal operating conditions we mean—when the pump is pulling a vacuum on the system and the accumulator tank is being kept fairly dry.

Under these conditions there is not a solid column of water in the entire lift pipe, it being broken up with slugs of air between slugs of water; as the slug of water comes over into the lift fitting half way up the lift pipe the total work is reduced. The vacuum energy not being used in lifting the water is then available to create a higher vacuum in system which again gives lower fuel cost.

See Dunham Page 47 for Data on Dunham Lift Fittings.

Installation of "D" Series Pump and Pump Connections

The pump should be placed on a solid concrete foundation extending from 3 in. to 6 in. above boiler room floor. Make pipe connections substantially as shown by installation details shown in Fig. 1183.

Do not connect to the Differential Vacuum Pump any return mains from hot water heaters, or other equipment carrying higher steam pressure than that carried in the Differential System as this would reduce the pump efficiency.

The Differential Vacuum Pump maintains a difference in pressure between radiators and return piping and circulation of steam to radiators. When pump is in operation, pressure gauge "A" should indicate about 20 lb.

Condensation gravitates into Tank "E" and is drawn by Pump through check valve "F" and discharged into Tank "B." Float in Tank "B" rises and permits valve "C" to return condensate to boiler through check valve "G" (or open receiver when high pressure boilers are used). Air is released through air check "H" above Tank "E" and check "I" on Tank "B."

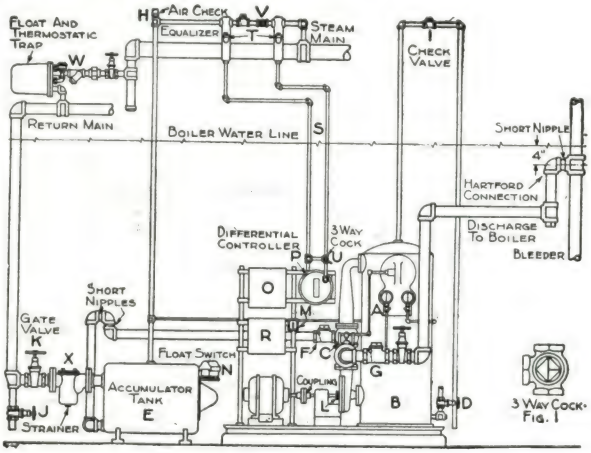


Fig. 1183. "D" Series Pump and Connections

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Type "D" Series Zoning—Individual Temperature Control for Sections of Buildings or Groups of Buildings

By "zoning" is meant the division of a heating system into smaller complete units for the purpose of separate control to secure lower operating costs.

Different parts of buildings require different quantities of heat at different times due to class of occupancy of various parts of building, sun and wind effect on the different sides, and buoyancy of the heated air as in very tall buildings. Therefore, all large buildings should be "zoned" to secure maximum conservation of steam and correct heating of all sections.

The Dunham Zone Temperature Control in conjunction with the Dunham Differential Vacuum Heating System, see Fig. 1247B, Dunham Page 14, provides remote electrical control of the steam supply as required by each zone.

General Description of the System

Each zone operates from its own thermostat located at a suitable control point or "key-room." Furthermore each zone must be served by its own Differential Pump where the building is divided into two or more independent zones.

Note: For small buildings and change-over jobs control can be obtained by two or more thermostats operating with a single Differential Pump in conjunction with Alternate Control Panel described on Dunham Page 20.

A building may be divided into any number of zones but an average size building could conveniently be divided into two zones—one set of piping caring for the west and south sides, the other set for the north and east sides. Usually in ordinary heating, Duplex Pumps are specified. This, in the Differential System, will allow a pump on each zone. The heating costs will be more uniform and fuel costs less. The illustration below shows a large building divided into four zones. The same theory is applied to groups of buildings—each independently controlled from the boiler room.

Simplicity of Operation

A building is divided into the necessary zones by having each zone supplied from its own steam main. The supply of steam from each main is controlled by a Dunham Type 377A (electrically operated) Sub-atmospheric Pressure and Temperature Control Valve (described on Dunham Page 21). One or more thermostats are located at the proper points in the zone and set to a predetermined degree.

Automatic Remote Control—When the room thermostat of any zone calls for heat, the sub-atmospheric control valve for that zone opens automatically, allowing more steam to flow into it, producing the required rate of heat transfer from the radiation. When the proper value is reached this additional steam supply is stopped. This operation is repeated whenever required by room temperature conditions.

Manual Remote Control—The control valves for each section being electrically operated can also be remotely controlled independently of the thermostats. A Dunham Zone Control Panel in the boiler room shows the operating engineer at a glance the temperature conditions in the various zones and he can, by simply throwing a switch, accelerate or decelerate the rate of steam flow to the particular zone.

Controlling Factors in Designing a Zoning System

(1) Buoyancy—Heated air rises within the building due to flue effect. This causes the upper floors of tall buildings to be overheated after the system is full of steam.

(2) Exposure—Sunshine, wind and other weather conditions cause variable heat demands on different sides of buildings.

(3) Type of Occupancy—Sections of the same building may require different degrees of heat due to their particular uses, such as storage, manufacturing, office space, etc., or periods of occupancy.

No particular rule can be given for the zoning of a building, each is an individual problem and should be studied carefully.

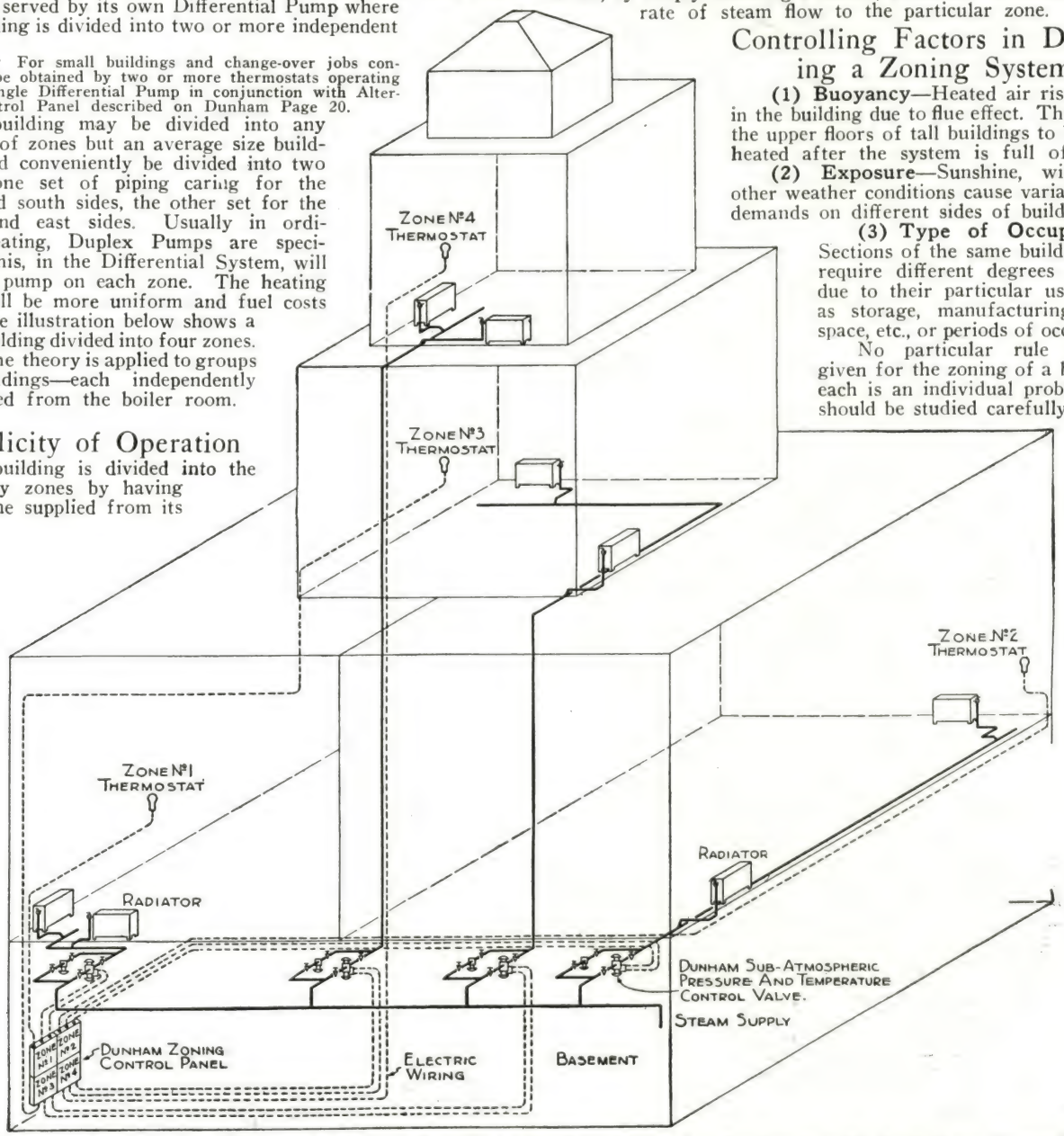


Fig. 1245. Schematic Illustration of a System Equipped with Four Zones (or Sections), with Each Zone Controlled Independently of the Others. This Drawing Does Not Give Actual Piping Details, the Purpose Being to Illustrate the Control System Only—and Not the Heating System

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Types of Control

The system of control is arranged so that:

A single valve may be controlled by a single thermostat.

A single valve may be controlled by several thermostats.

Several valves may be controlled each by its own thermostat.

Several valves may be controlled each by several thermostats.

The control panel in each case is centralized in the boiler room.

Where heating systems are divided into complete zones (or for systems where only one thermostat is intended to control one valve) Control Panel Type 391 is used.

Either control provides the following advantages:

It centralizes control of the entire steam supply.

It permits either automatic or manual operation.

It gives the attendant the information he desires regarding temperature conditions prevailing in various parts of the building, in addition to informing him whether or not the valve is admitting steam to the system.

Each panel is provided with a red and a green light for each thermostat and each valve. Switches are provided for transferring the system from automatic control to manual operation. Each thermostat has a switch to permit its being disconnected from the control.

A line switch is also provided on the control panel to disconnect the entire control system from the electric supply line.

When the operating element of a thermostat is in "cold" position the motor of the valve operates to open valve and causes red signal lights for this circuit to show. When the valve has opened, the light indicating the position of the valve also shows red, this indicates that steam is being called for. The increased supply of steam to the system results in a rise of the temperature of the building. The thermostat responds when sufficient heat has been supplied and causes the red light (indicating the temperature condition at the thermostat) to be extinguished and the green light to show. Simultaneously the motor operates, closing the valve. When the valve has closed, the signal light for the valve will show green, the red light being extinguished.

Signal Lights—The signal lights are standard 2 C.P. 125 volt Candelabra base lamps which may be secured from any electrical supply station. To remove and replace a lamp, it is only necessary to remove the two screws holding the "jewel" cover plate, then pull lamp forward and unscrew it from its socket, screw in the new light and then push it back and replace the plate.

Relays—The relays are located behind the relay cover plate so the contacts are accessible from the front. Two screws hold the relay cover plate.

The terminals for the wires from the thermostats and the motor are at the bottom of the cabinet, and final connection may be made through the opening provided. Two screws hold the terminal cover plate. The terminals are clearly marked for connecting the wires.

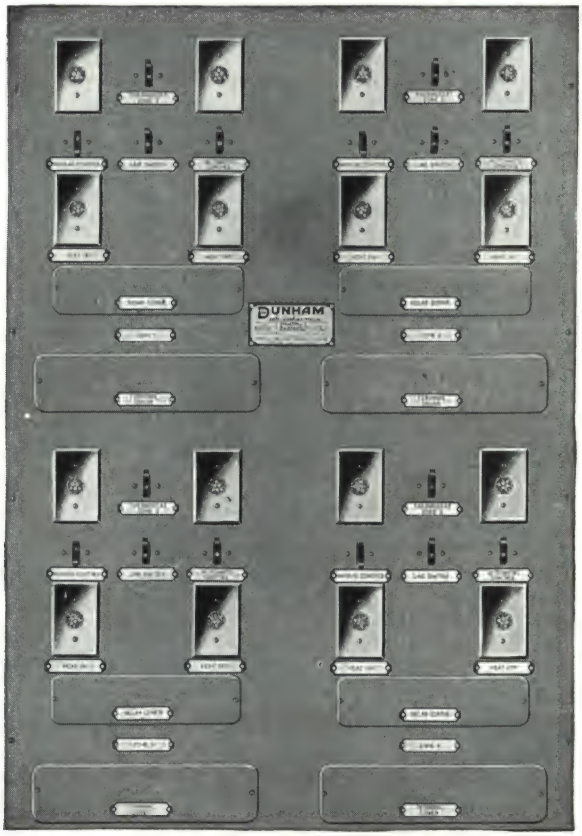
Installation of Control Panel—The leads are brought into the cabinet, a sufficient length being left so that each can be connected to its terminal through the terminal cover.

Zone Control Panel—The Zone Control Panel Type 391, enables the engineer to know the temperature conditions in the building, and regulates by zones the temperature in the various parts of the building in proportion to the weather conditions, sun and wind effect or for period of occupancy. Each zone has supply and return piping independent of the other zones. The Type 377A valve in the supply to each zone, is controlled by the thermostat located in that zone, through the control panel located in the boiler room, all being connected by electric wiring.

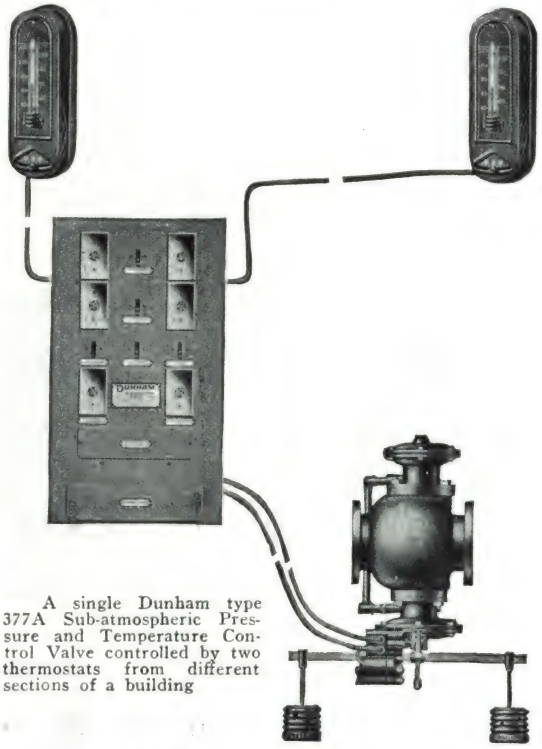
The Zone Control Panel is equipped with lights which indicate to the engineer the heat condition in the zone. Green light indicates the zone is at the desired temperature, a red light, that additional heat is required. Another set of red and green lights indicates whether the Type 377A valve is supplying the additional steam or is closed.

Alternate Control Panel—The Alternate Control Panel, Type 390, enables the engineer to know temperature conditions in the building and to regulate the temperature in various parts of the structure. The application is similar to "Zoning" (described on Dunham page 19) and is recommended for systems that cannot be readily divided into separate zones. The piping arrangement may not permit this ideal, complete division, but the medium size building and the change-over installation may have the benefit of control through this Control Panel in conjunction with Type 377A Sub-Atmospheric Pressure and Temperature Control Valve.

The panel is located in the boiler room and is connected by electric wiring to Type 377A Valve. It is also connected to two or more thermostats, located at different points of the building (to obtain heat control of the coolest part, depending upon wind and sun effect upon the building). The panel is equipped with lights which indicate to the engineer the heat conditions in the building—a green light is shown when the thermostat indicates proper temperature and a red light flashes



Type 391 Four Zone Control Panel



A single Dunham type 377A Sub-atmospheric Pressure and Temperature Control Valve controlled by two thermostats from different sections of a building

Alternate Control Panel Type 390

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

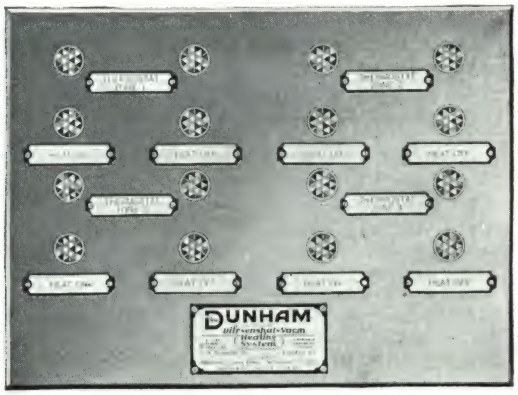
when the thermostat is below this temperature. Any thermostat calling for heat automatically takes charge of the heat supply. The panel is also provided with switches for obtaining manual control.

The equipment is mounted on a blue enamel metal panel box. The function of each switch is given on an etched zinc name plate. The "jewel" plates are polished nickel.

Type 392 Signal Panel for Superintendent's Office

When desired a Signal Panel can be provided to be located in the building superintendent's office enabling him to observe temperature conditions and operation of the temperature controlled valves in the various zones.

This panel will indicate simultaneously with the panel in the boiler room the range of temperature existing in the building and the position of the temperature controlled valves.



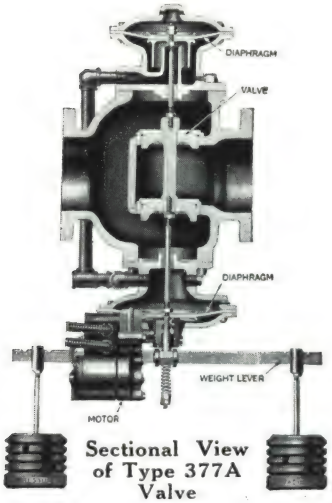
Type 392 Signal Panel

Sub-atmospheric Pressure Reducing Valves

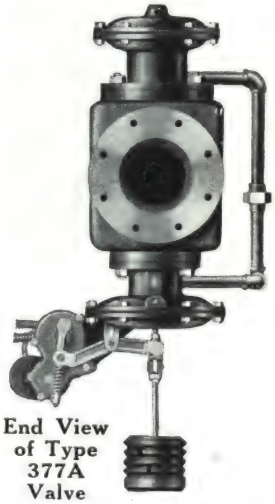
Type 377A Valve is used in connection with a Type 375A Valve and is controlled by one or several thermostats. The method of piping is shown by Fig. 1246B Dunham page 14. Where the steam is supplied at a pressure greater than ten pounds a reducing valve is used between boiler and the sub-atmospheric pressure reducing valves to reduce boiler pressure to about two pounds gauge. The Type 375A valve supplies the steam required by mild weather. As the weather becomes colder necessary additional steam is supplied by valve 377A in response to the thermostat's operation.

Type 377A Valve—This valve is motor operated, controlled from one or more room thermostats, otherwise it has the same design and construction as the valve Type 375A (see Dunham page 15). It is used in place of valve "B" when automatic control is desired.

The motor is a universal type requiring 110 volts d-c. or a-c. 25-60 cycle current. Wiring diagram is furnished with valve.

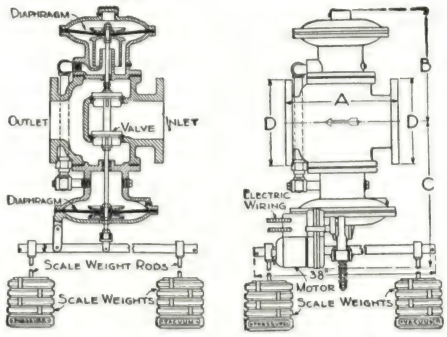


Sectional View of Type 377A Valve



End View of Type 377A Valve

Type 377A Valve



Type 377A Sub-atmospheric Pressure and Temperature Control Valve

Standard flanged connections only

Pipe size, in.	Approx. ship. weight, lb.	Code	Dimensions in inches			
			A	B	C	D
2	240	Arrowmo	8 3/8	10 1/4	15	6
3	275	Arroheadmo	10 1/4	12 1/8	16	7 1/2
4	340	Arrorootmo	12	12 5/8	16 5/8	9
6	525	Arroyomo	15 1/2	15	19	11
8	695	Arsacidmo	19	16 3/4	20 1/2	13 1/2
10	810	Arsenalmo	19 1/2	18 5/16	22	16
12	890	Arsenicmo	26 1/2	20 1/8	24	19
14	960	Arsenidemo	30 1/2	22 11/16	26 1/2	21

Notes:

Valves are all standard flange. Operating range: Minimum initial pressure. 10 lb.; reduced 25-in. vacuum.

Install valve to permit access to scale weights. Extend scale weight rod by means of 1/8-in. pipe to within 6 ft. from floor

Capacities of this valve are same as for Type 375A given on Dunham page 15 in this catalogue

Thermostats and Their Location

The thermostats operate at 20 volts. The use of low voltage thermostats permit the wires to be run in conduits provided for other low voltage apparatus (if in keeping with local ordinances). It also makes possible the thermostat cables being run on the baseboard wherever other means are not provided.

The thermostat should be located in a "Key-Room" representing the average temperature requirements and at the most exposed point in the zone or building. It should be installed on an inside wall 5 ft. from the floor line. The "Key-Room" should have exposure and radiation. To determine the proper location of "Key-Room," study the particular conditions of the building.

No particular rule can be laid down but the following schedule will serve as a guide:

1. *In a residence* locate thermostat in an important living room (not closely exposed to effect of radiant heat from fireplace or radiator), preferably near end of steam main but not directly over boiler room.

2. *Small Apartments, Stores and Apartments.* Locate in a heated hall or other large room where janitor has control of radiators. Thermostat should be set for a hall temperature that will obtain when building temperature is maintained at 70°. Radiators in "Key-Room" should be equipped with lock and shield valves.

3. *Large Apartments, Hotels and Office Buildings.*

(a) Locate in heated hall or large lobby or building manager's office.

(b) Use one or more thermostats with switch arrangement. Locate thermostat at central points "Key-Rooms" where wind exposure or sun may affect heat losses from building.

(c) Where several wings are encountered, a thermostat should be located in each wing and a suitable switch arrangement provided so that only one thermostat (the one on coldest exposure) will control the building temperature at any one time.

Set thermostats for temperatures that will obtain in their respective locations when building temperature is maintained at 70°. Radiators in "Key-Rooms" should have lock and shield valves.

4. *Factories, Warehouses and Garages.*

(a) Locate in an office or salesroom having exposure and radiation. Set thermostat to maintain a room temperature at point of location which will give desired temperature in the rest of building.

(b) On interior column, or partition, near most exposed side of building.

5. *Churches.* Locate in room most suitable, depending upon piping design, use of rooms, etc.

6. *Schools.* Locate in main study hall, using lock and shield valves on radiators.

7. *Hospitals and Like Institutions.*

(a) Locate in business office for small building. Set thermostat to maintain the room temperature at point of location which will give desired temperature in the rest of building.

(b) On large installations zoning is advisable. Locate thermostats in each of the several wings or zones so that they will control building temperature.

8. *Up Feed System.* The location of the thermostat should be in a room giving average conditions and on side influenced most by wind exposure.

9. *Downfeed System.* The thermostat should preferably be placed on the lowest floor supplied by the downfeed system.

10. If *"Zoning"* or *"Alternate Control"* is adopted, install thermostats in suitable location for controlling heat for each "zone."

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

Heating Specifications "D" Series, Dunham Differential Vacuum Heating System

(1) General Conditions—The general conditions governing this work shall be those established as standard by the American Institute of Architects which shall apply hereto.

(2) Construction and Material—The heating apparatus, proposed herewith includes the furnishing, delivery and erection on the premises of all necessary material and labor, which shall be first class in all particulars, and in accordance with the specifications and plans.

(3) Inspection—The Heating Contractor must at all times allow the C. A. DUNHAM COMPANY'S Representative to come on the job for the purpose of inspection and must lend any assistance necessary to expedite and complete the work. Any instructions given by the C. A. DUNHAM COMPANY'S Representative and confirmed in writing regarding changes to make system conform to plans or specifications and details shall be considered a part of this specification.

(4) Boiler—The steam boiler shall be a.....with guaranteed rating for.....sq. ft. of radiation installed upon suitable foundation, and equipped with all necessary connections and trimmings, including a safety valve set to blow at 10 lb. pressure, a Dunham Compound Gauge 15 lb. x 30 in. vacuum and a 7-in. Dunham Damper Regulator. (Omit Regulator on gas fired and automatic oil fired installations.)

(5) Smoke Pipe—Connect boiler to chimney with suitable black iron smoke pipe gauge..... Size to be as recommended by Boiler Manufacturer. Smoke pipe must be provided with hand stop damper. (Omit stop damper on gas fired installation.)

(6) Pressure and Temperature Control—On all systems not equipped with full automatic control of fire, install Dunham Sub-Atmospheric Control Valves of size shown on plans, with necessary gate valves. Install Dunham 15 lb. x 30 in. compound gauges where directed. If Thermostats and Dunham Control Panels are to be used, Heating Contractor shall furnish, install and wire these, all in accordance with manufacturer's details and instructions.

(7) Pipe and Fittings—Furnish and erect with tight connections all necessary piping of sizes shown on plans and run as indicated, supported and properly graded to insure free and noiseless circulation. Use fittings of cast iron of standard quality. The ends of all pipes shall be reamed or filed. Proper provision must be made for expansion. Use graphite and oil for making up all pipe joints applied to male thread only. Provide for expansion of mains and risers by loop type expansion joints and swing connections in mains wherever possible. In other cases provide approved all-metal packless expansion joints. Piping to be properly anchored.

(8) All steam tappings in boiler shall be connected full size of tapping into a steam header which shall be dripped to the return header through a bleeder. All spring pieces to steam and return mains shall be taken off the top of mains at 45 degrees. On down-feed systems, take the spring pieces from the bottom of steam main at 90 degrees.

(9) The end of each steam main and each drip point shall be drained, through a gate valve, Dunham Strainer, and "D" Series Dunham Trap as indicated on plans.

No lift connections shall be used at drip points.

(10) Grade steam mains, return mains and drip mains ½ in. in 10 ft. All steam supply branches such as spring pieces, offsets in steam risers and runouts to radiators shall in each case be installed one size larger than the vertical pipes to which they connect and shall be given as much grade as possible ½ in. per ft. is preferable.

(11) Return mains shall be connected together into the accumulator tank of Dunham Differential Vacuum Pump as shown in detail furnished by manufacturer. Lift connections must not be used except between pump and accumulator tank.

(12) Risers are to be run concealed or in the open as directed by the architect. Each down-feed steam riser must be dripped into the return through a "D" Series Dunham Trap. Install traps as instructed by manufacturer. All concealed piping must be tested and made tight at 15 lb. water pressure before being concealed and covered.

(13) All union connections, flanges, packing nuts on gate and globe valves and on gauge glass of boiler must be drawn up tight so as to prevent air leaking into system when under a high vacuum. This work must be performed after system is completed and while it is working with a vacuum in both steam and return lines.

(14) Floor Plates, Sleeves—Furnish approved floor and ceiling plates, protecting sleeves on all pipes passing through floors or finished partitions.

(15) Differential Vacuum Pump—Furnish and install one or several (as indicated on plans) Dunham Differential Vacuum Pumps of "D" series size..... having a differential rating of..... sq. ft. of equivalent direct radiation. The pump (or pumps) shall be installed, connected and wired in accordance with manufacturer's instructions and local regulations.

(15A) Domestic Hot Water and Blast Heater—Condensation from this equipment shall be returned to boiler by other means than Dunham Differential Vacuum Pump.

(16) Check Valves—Check valves shall be horizontal swing type with brass disc, best grade obtainable. They shall be installed where called for by the plans, and in accordance with accompanying details. They shall be tested for tightness.

(17) Radiation—Furnish and install radiation as shown on the plans. There shall be.....sq. ft. of direct radiation of approved make. All radiators must be provided with top inlet tapping. Furnish ½-in. eccentric bushing in the return tapping. All air valve tappings shall be plugged.

(18) Radiator Traps and Valves—Each radiator shall be provided with a Dunham "D" Series Radiator Trap of suitable capacity. A Dunham Packless Radiator Valve with Dunham Regulating Plate shall be installed at inlet connection according to manufacturer's instructions.

(19) Painting—All exposed piping in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed by architect. Radiators shall be painted as directed by architect. All pipe joints and all uncovered piping in basement, front and other exposed parts of boiler shall be painted one coat of black asphaltum when the system is hot and under a vacuum. The finishing coat of paint must be applied when the entire system is under vacuum, so that paint will fill up small leaks.

(20) Covering—Cover all steam mains and spring pieces with four-ply, 1 in. thick asbestos sectional covering and fittings with asbestos cement. Cover all steam and return risers and other piping run concealed in outside walls with two-ply, ½ in. thick asbestos sectional covering. Cover boiler as specified by boiler manufacturer.

(21) Finishing Up—After system has been in operation two weeks, thoroughly blow down and clean out system as follows:

Remove the safety valve and connect a temporary blow-off pipe to the safety valve tapping, extending it outside or to some suitable drain. Shut off all radiator valves or valves in main. Fill the boiler with water to top of gauge glass. Build a very hot fire and blow steam and water out through the safety valve tapping and pipe connected thereto. Fire hard with not more than 10 lb. pressure on the boiler. Supply cold water constantly in at bottom of the boiler. Continue this for six hours. At the end of the period, close the water feed valve, draw the fire quickly, open blowoff at bottom of boiler and entirely drain the boiler, replace the safety valve. Fill the boiler slowly after it becomes cold.

Remove the cover of each trap and wipe off grease and dirt accumulation. Replace trap cover tightly on body.

(22) Test—The System when finished and cleaned shall be tested for tightness as directed by C. A. DUNHAM COMPANY'S Representative. Contractor shall furnish labor and material for performing test.

(23) Guarantee—The Heating Contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise, with a vacuum of 15 in. in steam main. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season and that defect is due to faulty material or poor workmanship, the Heating Contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

(24) Finally—Nothing herein contained can be construed to relieve the Heating Contractor from making good and perfect work in all usual details of construction, and he will be held responsible to provide and furnish necessary material and to perform all necessary labor and to bear all expenses incidental to the satisfactory completion of the work.

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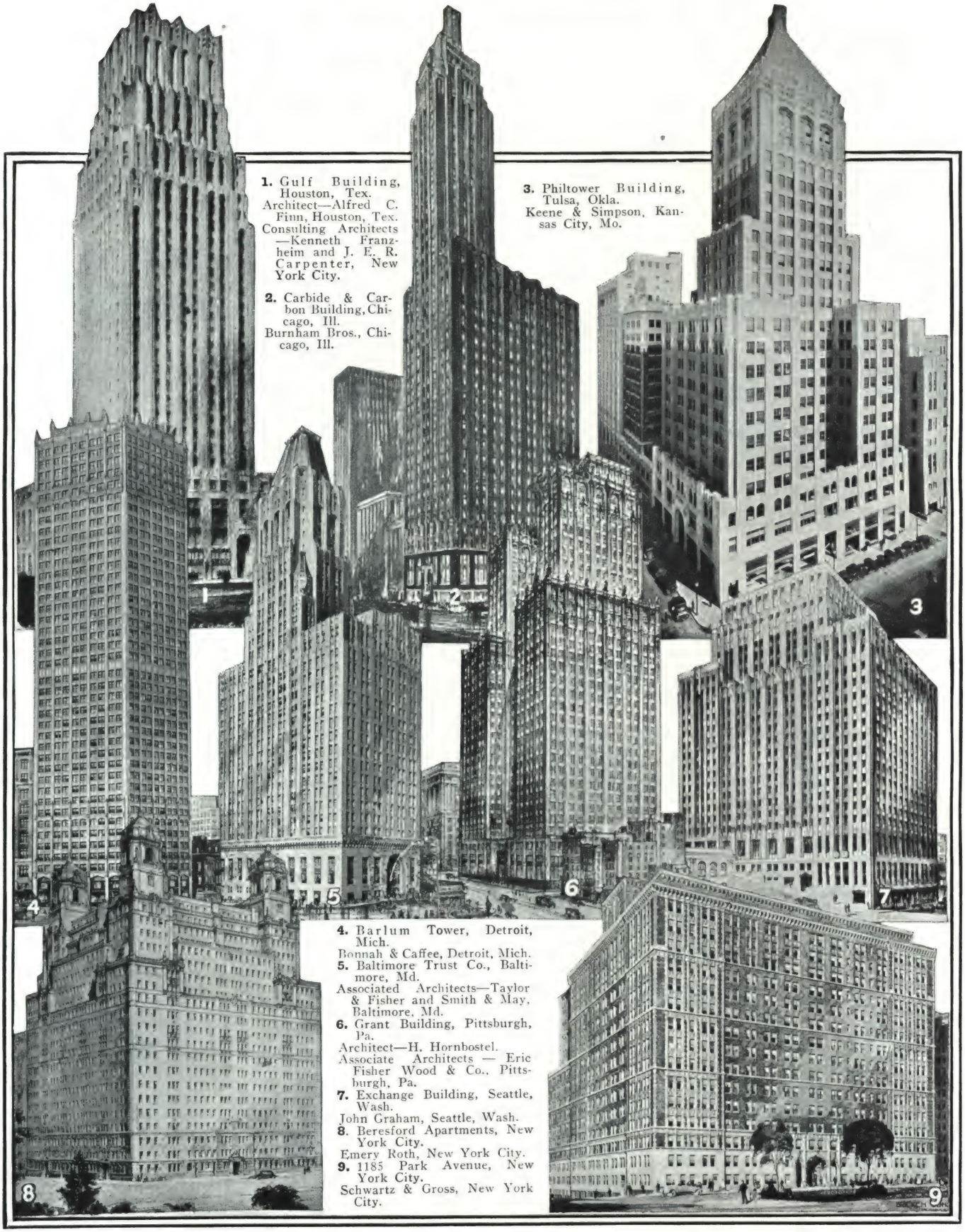
A Few of the 800 Buildings Which Are Effecting Substantial Savings in Fuel and More Comfortable Heat Through the Dunham Differential Vacuum Heating System



1. Gulf Building, Houston, Tex.
Architect—Alfred C. Finn, Houston, Tex.
Consulting Architects—Kenneth Franzheim and J. E. R. Carpenter, New York City.

2. Carbide & Carbon Building, Chicago, Ill.
Burnham Bros., Chicago, Ill.

3. Philtower Building, Tulsa, Okla.
Keene & Simpson, Kansas City, Mo.

4. Barlum Tower, Detroit, Mich.
Bonnah & Caffee, Detroit, Mich.

5. Baltimore Trust Co., Baltimore, Md.
Associated Architects—Taylor & Fisher and Smith & May, Baltimore, Md.

6. Grant Building, Pittsburgh, Pa.
Architect—H. Hornbostel.
Associate Architects — Eric Fisher Wood & Co., Pittsburgh, Pa.

7. Exchange Building, Seattle, Wash.
John Graham, Seattle, Wash.

8. Beresford Apartments, New York City.
Emery Roth, New York City.

9. 1185 Park Avenue, New York City.
Schwartz & Gross, New York City.

Continued on next page

DUNHAM DIFFERENTIAL SYSTEM (Continued)

"DH" Series for Installations Up to 3,000 Sq. Ft. of Radiation—Entirely Automatic

The "DH" Series is for small installations with gravity returns to boiler having a total equivalent direct radiation load of not more than 3000 sq. ft. (excluding piping.) It is entirely automatic in operation.

This system will heat properly any residence or small building without the usual fuel and heat waste caused by overheating and resultant excessive window ventilation. If furnishes steam to the radiators at subatmospheric pressures with correspondingly low radiator temperatures, causing a uniform, mild and healthful heat to be distributed throughout the building. This gives the occupants a comfort heretofore unknown, with healthier living conditions.

In most severe weather the steam can be furnished at, or above, atmospheric pressure.

A relatively fixed differential is maintained between the radiator and return pressures; this insures the radiators heating evenly. Economical operation is the natural result of such performance. The system is simple in design, durable and exceedingly flexible to meet varying weather conditions. The outstanding feature of economy of operation is accomplished by:

(1) Regulating the amount of pressure, or the degree of vacuum, at which the steam circulates in the supply piping and radiators.

(2) Controlling the vacuum in the return piping so that a substantially constant difference is maintained between the radiator and return piping pressures.

Operation

When the system starts up initially cold, the room thermostat starts both the fire and the Differential Vacuum Pump.

With the system cold the radiator traps will be opened and the vacuum created by the pump will be carried through the return piping, radiators and steam piping to the boiler. Vaporization will start in the boiler and steam will be circulated to the radiators at a lower temperature than if the boiler was at atmospheric pressure (see Dunham page 8). The pump continues to function until the desired room temperature is reached, when it is stopped by the thermostat. In mild weather the heat demand will be small, requiring higher vacuums and lower steam tem-

Dunham Differential Vacuum Pump, "DH" Series

Differential pump No.	Cap., sq. ft. direct rad.	Motor horse power	Ship. wt., lb.	Pipe tapping I in.	Dimensions (in.) (see drawing on next page) A	B	C	D	E	F
DH2A	2000	½	300	½	26 9/16	14 5/8	5 15/16	4 3/4	20 7/16	30 7/16
DH3	3000	¾	350	¾	29 9/16	16	6 5/8	4 1/4	23 15/16	33 7/16

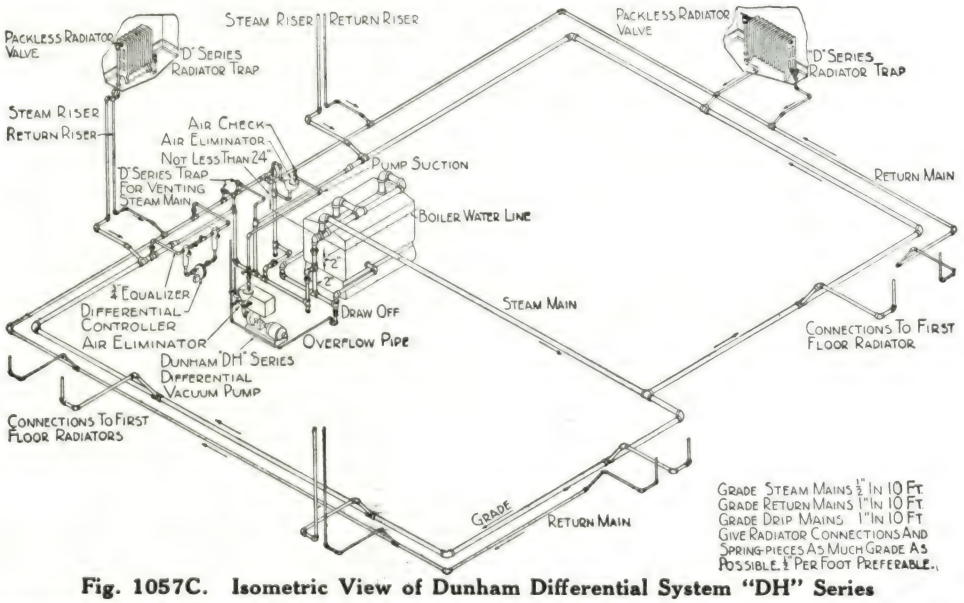


Fig. 1057C. Isometric View of Dunham Differential System "DH" Series

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DUNHAM DIFFERENTIAL SYSTEM (Continued)

peratures, but in cold weather the fire will be accelerated for longer periods resulting in lower vacuum and high steam temperatures.

Pump Equipment

The pump is made in two sizes, DH2A for 2000 sq. ft. capacity and DH3 for 3000 sq. ft. capacity. It uses the Jet Exhauster principle same as the "D" Series Pump. It is to be installed on a low foundation or grouted directly to a suitable basement floor as its location has no relation to the boiler water line. It should be located as remote as possible from principal living rooms. The drawings on this page give application of this pump on gas, oil or coal fired boilers.

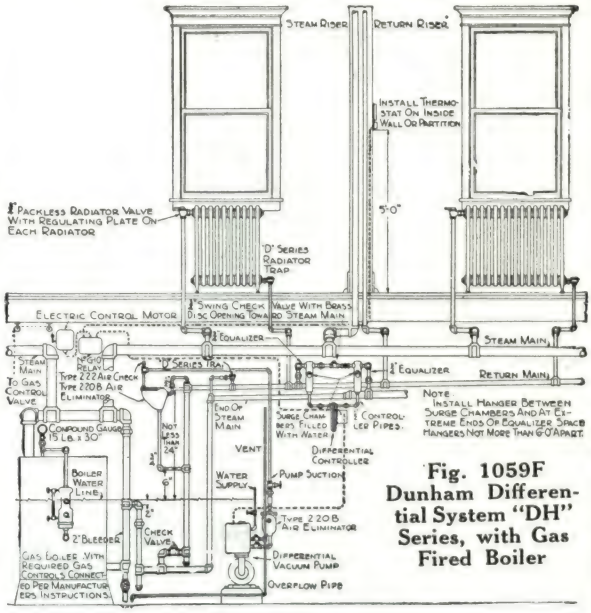

Fig. 1059F Dunham Differential System "DH" Series, with Gas Fired Boiler

Surge chambers and differential controller, Fig. 1175B, below, are shipped assembled, and should be installed with the equalizer in the piping at the end of the steam main carrying the heaviest load. The controller to be wired to pump motor using armored wire.

In residences and small buildings single phase current only is ordinarily available. Polyphase current is not available unless the building is connected with a power line. Keep this in mind when specifying the current characteristics for this pump.

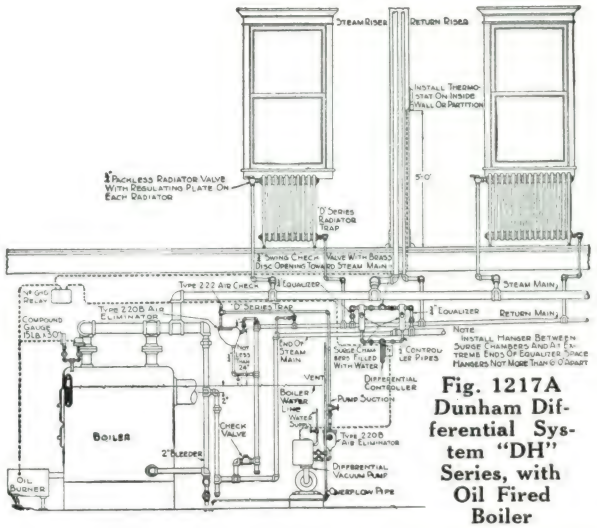

Fig. 1217A Dunham Differential System "DH" Series, with Oil Fired Boiler

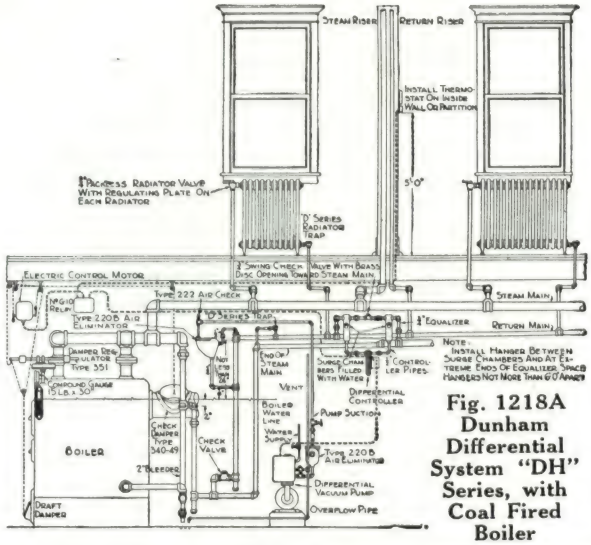

Fig. 1218A Dunham Differential System "DH" Series, with Coal Fired Boiler

DETAILS OF "DH" SERIES PUMP AND DIFFERENTIAL CONTROLLER

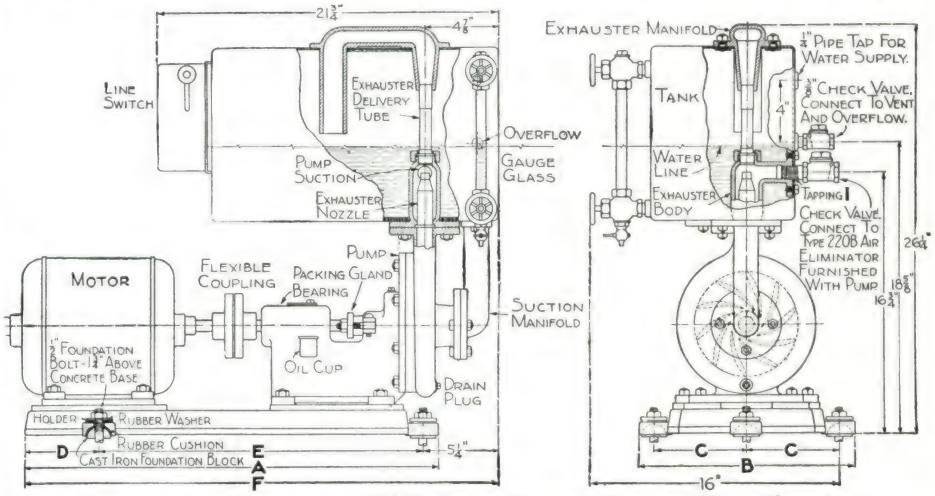

Fig. 1049B. Dimensions "DH" Series Pump. Side and End Elevation

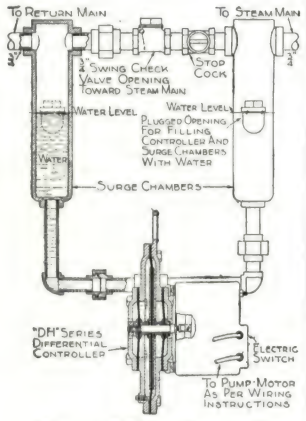

Fig. 1175B. Controller for "DH" Series Dunham Differential

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DUNHAM DIFFERENTIAL SYSTEM (Continued)
Heating Specifications "DH" Series, Dunham Differential Vacuum Heating System

(1) General Conditions—The general conditions governing this work shall be those established as standard by the American Institute of Architects.

(2) Construction and Material—The heating apparatus proposed includes the furnishing, delivery, and erection on the premises of all necessary material and labor, which shall be first class in all particulars and in accordance with specifications and plans.

(3) Inspection—The Heating Contractor must at all times allow the C. A. DUNHAM COMPANY'S Representative to come on the job for the purpose of inspection and must lend any assistance necessary to expedite and complete the work. Any instructions given by the C. A. DUNHAM COMPANY'S Representative and confirmed in writing regarding changes to make system conform to plans or specifications and details shall be considered a part of this specification.

(4) Boiler—The steam boiler shall be a.....with guaranteed rating for.....sq. ft. of direct radiation installed upon suitable foundation and in accordance with manufacturer's setting instructions. It shall be equipped with all necessary connections and trimmings, including a safety valve set to blow at 10-lb. pressure, a Dunham Compound Gauge 15 lb. x 30-in. vacuum and a 10-in. Dunham Damper Regulator. (Omit Regulator on gas fired and automatic oil fired installations.)

(5) Smoke Pipe—Connect boiler to chimney with suitable iron smoke pipe same size as boiler smoke outlet. Smoke pipe must be provided with approved Dunham Check Damper and hand stop damper between check damper and boiler. (Omit Dunham Check Damper on automatic oil fired installations.) (Omit check damper and hand stop damper on gas fired installations.)

(6) Pipe and Fittings—Furnish and erect with tight connections all necessary piping of sizes shown on plans and run as indicated, supported and properly graded to insure free and noiseless circulation. Use fittings of cast iron of standard quality. The ends of all pipes shall be reamed or filed. Proper provision must be made for expansion. Use graphite and oil for making up all pipe joints applied to male thread only.

(7) All steam tappings in boiler shall be connected full size of tapping into a steam header which shall be dripped to the return header through a bleeder. All spring pieces to steam and return mains shall be taken off the top of mains at 45°.

(8) The end of each steam main shall be dripped as indicated on the plans by means of a drip line to boiler, properly vented through Dunham "D1" Trap in accord with details furnished by manufacturer.

(9) Grade steam mains ½ in. in 10 ft. Grade return mains and drip mains 1 in. in 10 ft. All steam supply branches such as spring pieces, offsets in steam risers and runouts to radiators shall in each case be installed one size larger than the vertical pipes to which they connect and shall be given as much grade as possible. ½ in. per ft. is preferable.

(10) Return mains shall be connected to the Dunham Differential Vacuum Pump as shown in detail furnished by manufacturer.

(11) Risers are to be run concealed or in the open as directed by the architect. All concealed piping must be tested and made tight at 15-lb. water pressure before being concealed and covered.

(12) All union connections, flanges, packing nuts on gate and globe valves and on gauge glass of boiler must be drawn up tight so as to prevent air leaking into system when under a high vacuum. This work must be performed after system is completed and while it is working with a vacuum in both steam and return lines.

(13) Floor Plates, Sleeves—Furnish approved floor and ceiling plates and protecting sleeves on all pipes passing through floors or finished partitions.

(14) Thermostatic Control—Contractor shall furnish and install where shown on plans a Series 10 Minneapolis Honeywell Thermostat according to manufacturer's instruction. (If this thermostat is being supplied with oil or gas burner under another contract, then the Heating Contractor shall connect Differential Vacuum Pump to the Thermostatic Control.)

(15) Differential Vacuum Pump and Air Eliminator—Furnish and install a "DH" Series Dunham Differential Vacuum Pump. The pump shall be installed and connected in accordance with manufacturer's instructions and details. The necessary electric wiring between pump and differential control, shall be connected to the thermostatic equipment in accordance with manufacturer's instructions and in conformity with all local regulations.

Furnish and install on return main in accordance with manufacturer's instructions a Dunham Air Eliminator. Install a Dunham Air Check on vent opening of eliminator.

(16) Check Valves—Check valves shall be horizontal swing type with brass disc, best grade obtainable. They shall be installed where called for by the plans and in accordance with accompanying details. They shall be tested for tightness.

(17) Radiation—Furnish and install radiation as shown on the plans. There shall be.....sq. ft. of direct radiation of approved make. All radiators must be provided with top inlet tapping. Furnish ½-in. eccentric bushing in the return tapping. All air valve tappings shall be plugged.

(18) Radiator Traps and Valves—Each radiator shall be provided with a Dunham "D" Series Radiator Trap of suitable capacity. A Dunham Packless Radiator Valve with Dunham Regulating Plate shall be installed at inlet connection according to manufacturer's instructions.

(19) Painting—All exposed piping in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed by architect. Radiators shall be painted as directed by architect. All pipe joints and all uncovered piping in basement, front and other exposed parts of boiler shall be painted one coat of black asphaltum when the system is hot and under a vacuum. The finishing coat of paint must be applied when the entire system is under vacuum, so that the paint will fill up small leaks.

(20) Covering—Cover all steam mains and spring pieces with 4-ply, 1-in. thick asbestos sectional covering and fittings with asbestos cement. Cover all steam and return risers and other piping run concealed in outside walls with two-ply, ½-in. thick asbestos sectional covering. Cover boiler as specified by boiler manufacturer.

(21) Finishing Up—After system has been in operation two weeks, thoroughly blow down and clean out system as follows:

Remove the safety valve and connect a temporary blow-off pipe to the safety valve tapping, extending it outside or to some suitable drain. Shut off all radiator valves or valves in main. Fill the boiler with water to top of gauge glass. Build a very hot fire and blow steam and water out through the safety valve tapping and pipe connected thereto. Fire hard with not more than 10-lb. pressure on boiler. Supply cold water constantly in at bottom of the boiler. Continue this for six hours. At the end of the period, close the water feed valve, draw the fire quickly, open blow-off at bottom of boiler and entirely drain the boiler, replace the safety valve. Fill the boiler slowly after it becomes cold.

Remove the cover of each trap and wipe off grease and dirt accumulations. Replace trap cover tightly on body.

(22) Test—The system when finished and cleaned shall be tested for tightness by filling it with water to its very top. The water shall be left standing in the system at least four hours after all leaks have been made tight, when final test and inspection in presence of Dunham Representative shall be made for leaks. The contractor must take precaution to guard against damage from freezing during test.

(23) Guarantee—The Heating Contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise, with a vacuum of 15 in. in steam main. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season and that defect is due to faulty material or poor workmanship, the Heating Contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

(24) Finally—Nothing herein contained can be construed to relieve the Heating Contractor from making good and perfect work in all usual details of construction, and he will be held responsible to provide and furnish necessary material and to perform all necessary labor and to bear all expenses incidental to the satisfactory completion of the work.

Continued on next page

DUNHAM VACUUM RETURN LINE SYSTEM

The Dunham Vacuum Return Line System is a two-pipe steam heating system, one set of pipes for steam distribution, another set for air and return water. It differs from other forms of steam heating in that circulation is induced more by the vacuum in the return piping, pulling the air out of the radiator and inducing the steam to rush in and fill its place, than by the force or pressure behind the steam pushing it onward to force the air out and displace it.

Comparison with Differential System

The Dunham Differential System is built on the same basic principle and has all the advantages of the Vacuum Return line system plus the superior economy and comfort of positively controlled heat under all operating conditions. This applies to the use of exhaust steam in the Differential System as well as when live steam is used.

Therefore the Dunham Differential Vacuum Heating System described on Dunham Pages 7 to 27 should be specified for any installation where economy of operation is the deciding factor.

Piping and Design

(1) The system using a low pressure heating boiler with a Dunham electric driven vacuum pump suitable for buildings where exhaust steam is not available.

(2) The system using exhaust steam from the engines of the power plant, supplemented, if needed, by live steam from high pressure boiler. In this case a steam driven pump is used.

Each system is a two-pipe system, using one set of pipes for steam distribution, another for air and return water.

The general position of all the component parts of a system using low pressure on a boiler is clearly shown by the elevation drawing, Fig. 889A. Similar information on a system using exhaust steam is shown by the elevation drawing, Fig. 882A.

All piping, both steam supply and return, must grade in the direction of flow, with the exception of the steam supply springpieces to up-feed risers, and the runouts to radiators, which must have especially good grade (½ in. per foot is recommended) back to the main and riser respectively, and be made of at least one size larger pipe.

The ends of all steam mains, and all other points to be dripped, shall be dripped through proper Dunham Traps installed as shown in details.

Each drip point shall be provided with a scale pocket, a gate valve and strainer on steam side of trap.

No drips from high pressure steam piping shall be connected into the vaccum return piping unless ample Flash Tank is provided and installed. It is best however to run all such drips to the receiver of the boiler feed pump.

The purpose of the drip trap is to drain a certain amount of steam piping. In some cases this is exposed to room temperature of say 70°, in others to temperature in cold space or basement. These conditions determine trap capacity needed.

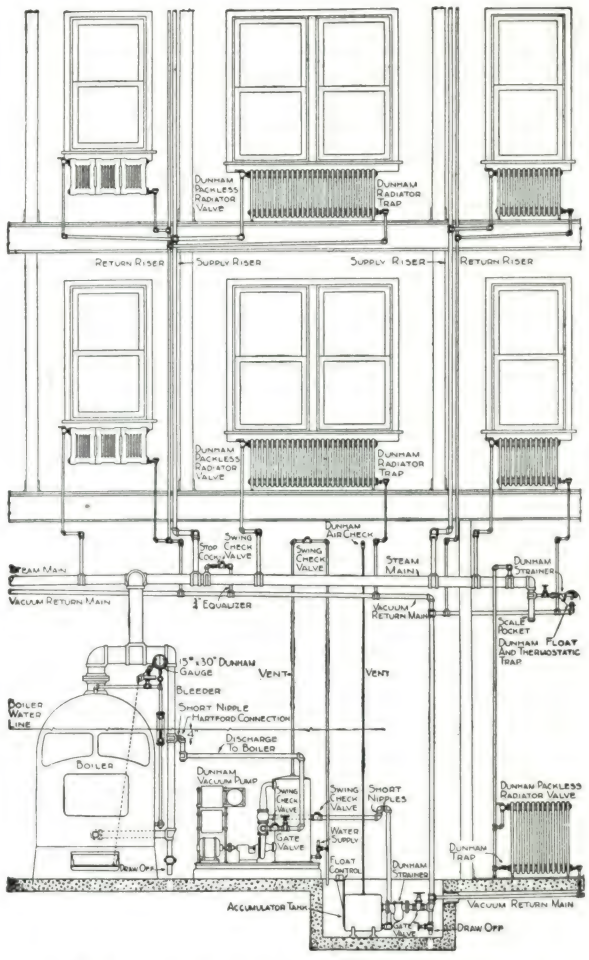

Fig. 889A. Dunham Vacuum Return Line Heating System Using Low Pressure Boiler and Dunham Vacuum Pump with Accumulator Tank and Float Control

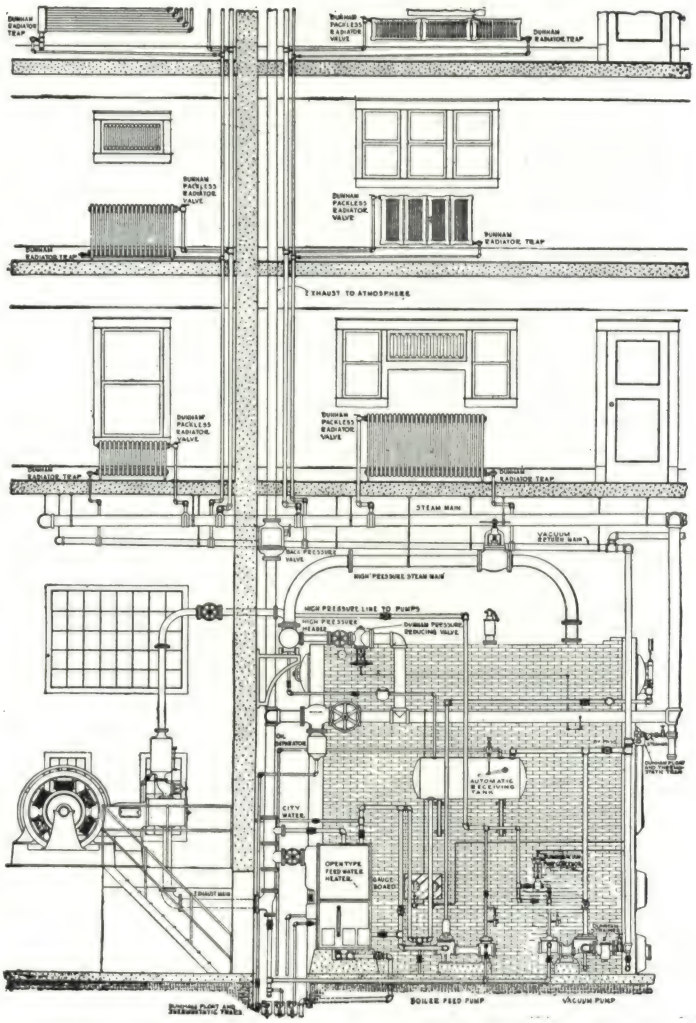

Fig. 882A. Dunham Vacuum Return Line Heating System Using Exhaust Steam

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DUNHAM VACUUM RETURN LINE SYSTEM (Continued)

Radiator Connections

Any type of radiation may be used. The supply valve at each radiator for purposes of economy must be of the packless type to prevent the re-admission or leakage of air into the system. Sizes of the connections are given in Table 11, Dunham page 32, also the size of the runout connections.

Removal of Oil

The need for a good oil separator is obvious. It should be automatically dripped through a No. 22 Dunham Float and Thermostatic Trap, installed 6 ft. lower than drip outlet. The drip from the oil separator must go to waste. Fig. 848A shows a Dunham Trap dripping a separator as used on installations operating on pressures above atmospheric.

When the exhaust line is under vacuum the separator cannot be dripped as shown by Fig. 848A. It must be dripped through a No. 9A Dunham Trap as shown by Fig. 968A, installing pipe "B" which should be terminated near the ceiling. Omit connections "A." These are used when it is necessary to lift the waste from the oil separator to discharge it to sewer located at a higher level. The return trap with a 1-in. Dunham Pressure Reducing Valve and all connections at "A," are included. Omit pipe "B" when connection "A" is used.

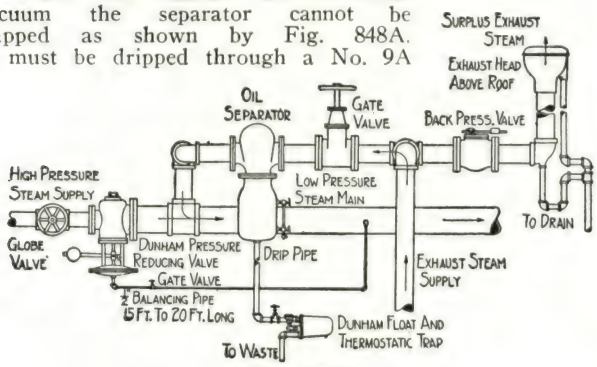

Fig. 899B

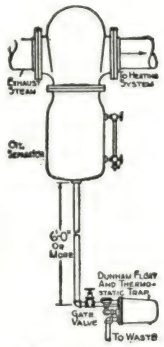

Fig. 848A

Method of draining oil separator on system using exhaust steam above atmosphere

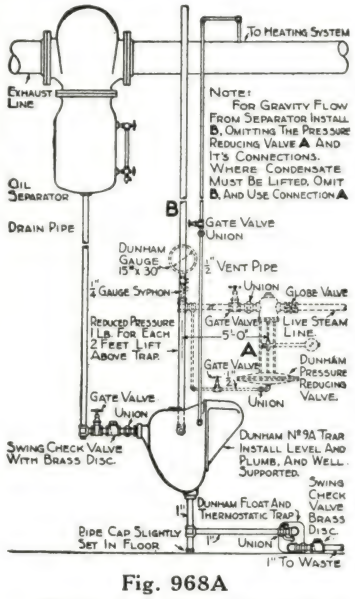

Fig. 968A

Method of draining oil separator on exhaust heating system carrying vacuum on exhaust line (connection B) as used in the Dunham Differential System. To lift waste to sewer located at higher level, use connection A

Pipe Sizes

The desired initial pressure and the allowable drop in pressure control the sizing of the piping. The following capacity tables are based upon a 1 lb. pressure drop in the total given length of straight smooth pipe. To maintain a pressure in the farthest radiator an initial pressure of 2 lb. should be maintained. When a lesser initial pressure is desired with a corresponding smaller drop the piping should be more liberal in size.

In using these tables the length of run is the distance along the piping from the source of steam supply to the farthest radiator, with all allowances for resistance of elbows and valves expressed in terms of equivalent lengths added. For these allowances see Table 6, Dunham page 34.

Spring pieces, that is, the connections from the horizontal mains to the vertical risers, must always be made one size larger than the riser.

The steam and return mains must be carefully and uniformly graded in the direction of flow with a fall of not less than ½ in. in 10 ft. Spring pieces and radiator runouts must be given maximum possible grade toward the main and riser respectively, not less than ½ in. per foot.

TABLE 12. STEAM MAINS. VACUUM RETURN LINE SYSTEM

Pipe sizes, in.	Capacities in square feet of direct cast iron radiation for each length of run *Length of runs in feet (see note in last column, this table)										
	100	200	300	400	500	600	800	1,000	1,500	2,000	3,000
2	1,130	800	650	570	500	450	400	350	300	250	200
2½	2,100	1,470	1,200	1,050	925	840	735	650	550	460	380
3	3,800	2,660	2,160	1,900	1,670	1,520	1,330	1,180	990	830	680
3½	5,500	3,850	3,140	2,750	2,420	2,200	1,920	1,700	1,430	1,210	990
4	7,750	5,400	4,400	3,900	3,400	3,100	2,700	2,400	2,000	1,700	1,400
5	13,800	9,650	7,800	6,900	6,100	5,500	4,800	4,300	3,600	3,040	2,480
6	22,200	15,500	12,600	11,000	9,800	8,900	7,800	6,900	5,700	4,900	4,000
8	46,000	32,000	26,200	23,000	20,200	18,400	16,100	14,200	12,000	10,100	8,300
10	80,700	56,500	46,000	40,300	35,500	32,200	28,200	25,000	21,000	17,700	14,500
12	127,000	89,000	72,500	63,500	56,000	51,000	44,500	39,400	33,000	28,000	23,000
14 OD	164,000	115,000	93,500	82,000	72,000	65,600	57,400	51,000	42,600	36,100	29,500
16 OD	234,000	164,000	133,400	117,000	103,000	93,600	82,000	72,600	61,000	51,500	42,100

NOTES*

*For Table 12—The length equals the distance along piping from source of steam supply (Boiler, Pressure Reducing Valve or Central Station, Service Main) to farthest radiator plus allowance for elbows and valves in main (Table 6, Dunham Page 34) and plus 25 ft. allowance for last or top radiator connection.

TABLE 13. RETURN MAINS. VACUUM RETURN LINE SYSTEM

Pipe sizes, in.		1	1¼	1½	2	2½	3	3½	4	5	6
Capacity in square feet per length of run in feet.	400 ft.	800	1,600	4,000	11,000	21,000	38,000	55,000	78,000	138,000	220,000
	1,000 ft.	500	1,000	2,500	7,000	13,000	23,500	34,000	48,000	86,000	138,000
	2,000 ft.	350	800	1,800	5,000	9,000	16,000	24,000	34,000	60,000	98,000
	3,000 ft.	300	600	1,500	4,000	7,500	13,500	20,000	28,000	50,000	80,000

*For Table 14—The length of run equals the distance along piping from source of steam supply to the top of each riser plus the allowance for elbows, valves (Table 6, Dunham Page 34) and plus a 25-ft. allowance for resistance to entrance to radiator.

For Radiator Connections, see Table 11, Dunham Page 32, and Dunham Pages 37, 38, this catalogue.

TABLE 14. VERTICAL RISER SIZES

Pipe sizes		Steam risers									Return risers		
		¾	1	1¼	1½	2	2½	3	3½	4	¾	1	1¼
*Capacity in square feet per length of run in feet. (See note in last column, this table)	200 ft.	66	133	290	450	920	1,510	2,660	3,850	5,400	1,000	2,000	4,500
	400 ft.	47	95	210	325	655	1,080	1,900	2,750	3,900	800	1,600	3,400
	600 ft.	38	76	166	260	525	865	1,520	2,200	3,100	640	1,200	2,500
	1,000 ft.	29	59	129	200	410	670	1,180	1,700	2,400	500	1,000	2,100
	2,000 ft.	20	42	92	143	290	475	830	1,210	1,700	350	700	1,500

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DUNHAM VACUUM RETURN LINE SYSTEM (Continued)

Sags and Pockets

Emphasis is placed upon the need for careful piping, design and installation; the entire avoidance of sags or pockets; and the careful grading of all spring pieces and run-outs.

A vacuum system should be designed and installed so that the entire piping will completely free itself from all water by gravity.

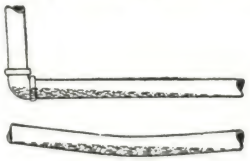


Fig. 900

Water pockets result from improperly graded or bent piping

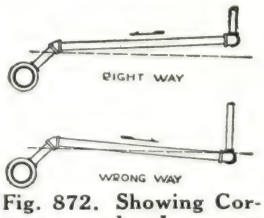


Fig. 872. Showing Correct and Incorrect Grades of Spring Pieces

Lift Connections

While it is possible to locate radiators and piping below return piping by using lift connections, it is not always advisable to do what is possible. The suggestion is made that lift fittings be used sparingly, and only when absolutely necessary. A vacuum system without lifts can circulate under emergency conditions without the vacuum pump. Where lifts are present the vacuum pump must be continually in operation, or circulation is stopped. Lifts must always be provided with a lift pocket and draw off at low point. Lift at radiators must have the Dunham Trap at high point, or above the lift as illustrated in Fig. 958A, Dunham page 47. The lift connection should always be carried above the pipe into which it is discharged. (Fig. 957A, page 47). Dunham Lift-Fittings are made in sizes ¾ to 2 in. inclusive. See also Fig. 879 on Dunham page 47 for lift connection in return main.

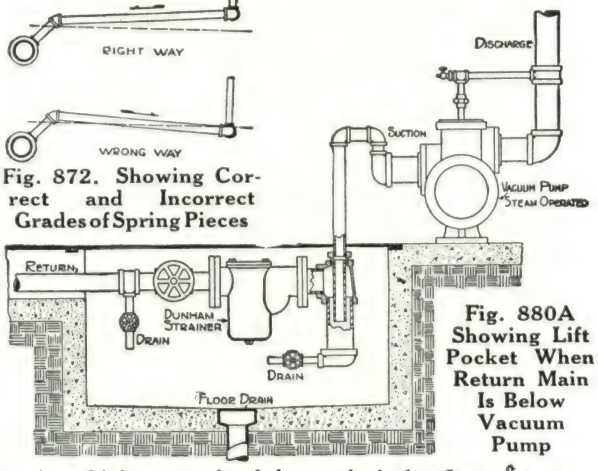


Fig. 880A Showing Lift Pocket When Return Main Is Below Vacuum Pump

Vacuum Pump

Data on the Dunham Vacuum Pump will be found on Dunham pages 52, 53, 54 and 55. It is always preferable to install the pump so that the return will always be above the suction inlet of pump. Should unavoidable necessity bring the return below the pump suction a lift pocket must be provided, and the connection made as illustrated in Fig. 879, Dunham page 47 and Fig. 880A. The Dunham Accumulator Tank gives good service in such cases, omitting lift pocket and placing tank in the pit. The air and condensate drain into the tank and when high water level is reached the float operated electric switch will start the Dunham Vacuum Pump, thus securing drainage of system regardless of vacuum being present on system—an important advantage for night service as the vacuum pump then can function as a condensation pump.

The discharge from the Dunham Vacuum Pump is brought back direct to boiler through a swing check valve and gate valve. Fig. 898A.

The discharge from a steam operated vacuum pump may go directly to a liberally vented receiver of an automatic boiler feed pump, Fig. 883A, or to an air separating tank. From the tank the returns may flow by gravity through a feed water heater, to the boiler feed pump to be returned to the boiler. Fig. 885A. The operation of the vacuum pump should be automatically controlled by the Dunham Vacuum Pump Governor. The cylinder of the vacuum pump should be protected from damage by foreign matter by the Dunham Suction Strainer. It is good design to provide a valved by-pass around vacuum pump so that returns may go directly to boiler in the case of the electric driven pump, or in case of the steam pump to boiler feed pump to care for emergency conditions. (Fig. 883A).

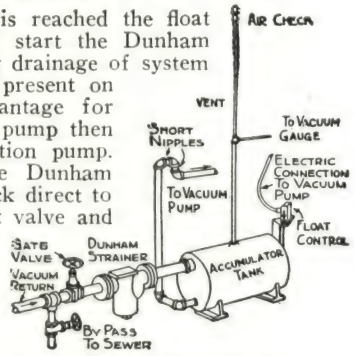


Fig. 714A. Connections to Dunham Accumulator Tank

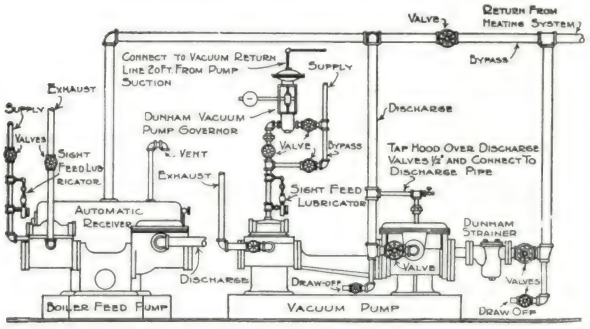


Fig. 883A. Showing Connections to Steam Operated Vacuum Pump, Boiler Feed Pump with Automatic Receiver

Equalizer Connection

The steam and return mains should be connected at a convenient point in boiler room as shown by Fig. 1153. This method will equalize the system when a natural partial vacuum is formed on low fire operation.

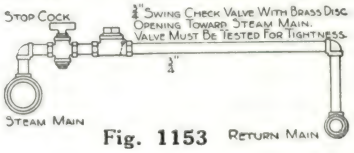


Fig. 1153

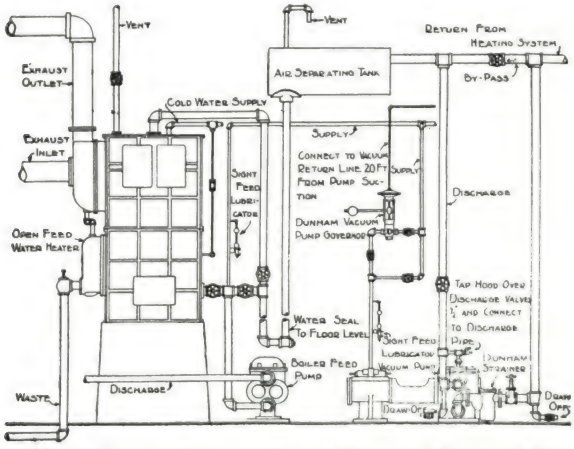


Fig. 885A. Connections to Steam Operated Vacuum Pump, Automatic Boiler Feed Pump and Open Feed Water Heater

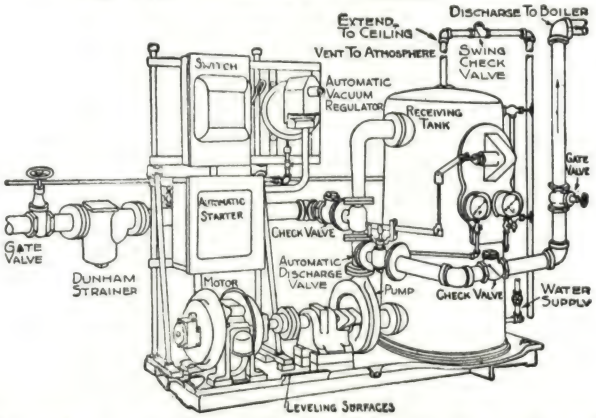


Fig. 898A. Dunham Centrifugal Vacuum and Boiler Feed Pump with Automatic Vacuum Control

See pages 52-55 for additional installation instructions

DUNHAM VACUUM RETURN LINE SYSTEM (Continued)

Automatic Exhaust Steam Control

The Dunham Vacuum Heating System in using exhaust steam, provides a simple arrangement to supply live steam automatically, if for any reason the exhaust steam becomes insufficient for the heating requirements. This is accomplished by the arrangement of a back-pressure valve and a Dunham Pressure Reducing Valve installed in the horizontal steam main. The pressure balancing pipe from low pressure steam main to bottom of the diaphragm of the reducing valve is connected at a distance of not less than 20 ft. from the reducing valve. A gate valve being installed as shown in Fig. 899B Dunham Page 28. The back pressure valve prevents waste of steam through the exhaust head as long as the heating system requires steam. With an over-supply of exhaust steam, the pressure increases. When it reaches the maximum point for which the back pressure valve is set, this valve, acting as a safety valve, opens and releases the steam through the exhaust head. When the heating system requires more steam than is supplied by the exhaust, the pressure decreases. Then the reducing valve opens at the pressure for which it is set, supplies live steam as long as it is needed and then automatically closes.

Specifications for Dunham Vacuum Return Line Heating System

(1) General Conditions—The general conditions governing this work shall be those established as standard by the American Institute of Architects which shall apply hereto.

(2) Construction and Material—The heating apparatus, proposed herewith includes the furnishing, delivery and erection on the premises of all necessary material and labor, which shall be first class in all particulars, and in accordance with the specifications and plans.

(3) Inspection—The Heating Contractor must at all times allow the C. A. DUNHAM COMPANY'S Representative to come on the job for the purpose of inspection and must lend any assistance necessary to expedite and complete the work. Any instructions given by the C. A. DUNHAM COMPANY'S Representative and confirmed in writing regarding changes to make system conform to plans or specifications and details shall be considered a part of this specification.

(4) Boiler—The steam boiler shall be a.....with guaranteed rating for..... sq. ft. of radiation installed upon suitable foundation, and equipped with all necessary connections and trimmings, including a safety valve set to blow at 10 lb. pressure, a Dunham Compound Gauge 15 lb. x 30-in. vacuum and a 7-in. Dunham Damper Regulator. (Omit Regulator on gas fired and automatic oil fired installations.)

(5) Smoke Pipe—Connect boiler to chimney with suitable black iron smoke pipe gauge..... Size to be as recommended by Boiler Manufacturer. Smoke pipe must be provided with hand stop damper. (Omit Hand Stop Damper on gas fired installations.)

(6) Pipe and Fittings—Furnish and erect with tight connections all necessary piping of sizes shown on plans and run as indicated, supported and properly graded to insure free and noiseless circulation. Use fittings of cast iron of standard quality. The ends of all pipes shall be reamed or filed. Proper provision must be made for expansion. Use graphite and oil for making up all pipe joints applied to male thread only. Provide for expansion of mains and risers by loop type expansion joints and swing connections in mains wherever possible. In other cases provide approved all-metal packless expansion joints. Piping to be properly anchored.

(7) All steam tappings in boiler shall be connected full size of tapping into a steam header which shall be dripped to the return header through a bleeder. All spring pieces to steam and return mains shall be taken off the top of mains at 45 degrees. On downfeed systems take the spring pieces from the bottom of steam main at 90°.

(8) The end of each steam main and each drip point shall be drained, through a gate valve, Dunham Strainer, and Dunham Trap as indicated on plans.

Drip the bottom of each down-feed riser through Dunham Trap into dry return main. No lift connections shall be used at drip points.

(9) Grade steam mains, return mains and drip mains ½ in. in 10 ft. All steam supply branches such as spring pieces, offsets in steam risers and runouts to radiators shall in each case be installed one size larger than the vertical pipes to which they connect and shall be given as much grade as possible. ½ in. per ft. is preferable.

(10) Return mains shall be connected together into the Dunham Vacuum Pump as shown in detail furnished by manufacturer. Lift connections must not be used except at the pump.

(11) Risers are to be run concealed or in the open as directed by the architect. Install traps as instructed by manufacturer. All concealed piping must be tested and made tight at 15 lb. water pressure before being concealed and covered.

(12) All union connections, flanges, packing nuts on gate and globe valves and on gauge glass of boiler must be drawn up tight so as to prevent air leaking into system when under a partial vacuum. This work must be performed after system is completed and while it is under a vacuum in both steam and return lines.

(13) Floor Plates, Sleeves—Furnish approved floor and ceiling plates, protecting sleeves on all pipes passing through floors or finished partitions.

(14) Dunham Vacuum Pump—Furnish and install one (or Duplex) Dunham Vacuum Pump of size....., having a rating of ..... sq. ft. of equivalent direct radiation. The pump (or pumps) shall be installed, connected and wired in accordance with manufacturer's instruction.

(15) Check Valves—Check valves shall be horizontal swing type with brass disc, best grade obtainable. They shall be installed where called for by the plans, and in accordance with accompanying details. They shall be tested for tightness.

(16) Radiation—Furnish and install radiation as shown on the plans. There shall be..... sq. ft. of direct radiation of approved make. All radiators must be provided with top inlet tapping and with ½-in. eccentric bushing in the return tapping. All air valve tappings shall be plugged.

(17) Radiator Traps and Valves—Each radiator shall be provided with a Dunham Radiator Trap of suitable capacity. A Dunham Packless Radiator Valve shall be installed at inlet connection.

(18) Painting—All exposed piping in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed by architect. Radiators shall be painted as directed by architect. All pipe joints and all uncovered piping in basement, front and other exposed parts of boiler shall be painted one coat of black asphaltum when the system is hot and under a vacuum. The finishing coat of paint must be applied when the entire system is under vacuum, so that paint will fill up small leaks.

(19) Covering—Cover all steam mains and spring pieces with four-ply, 1 in. thick asbestos sectional covering, and fittings with asbestos cement. Cover all steam and return risers and other piping run concealed in outside walls with two-ply, ½ in. thick asbestos sectional covering. Cover boiler as specified by boiler manufacturer.

(20) Finishing Up—After system has been in operation two weeks, thoroughly blow down and clean out system as follows:

Remove the safety valve and connect a temporary blow-off pipe to the safety valve tapping, extending it outside or to some suitable drain. Shut off all radiator valves or valves in main. Fill the boiler with water to top of gauge glass. Build a very hot fire and blow steam and water out through the safety valve tapping and pipe connected thereto. Fire hard with not more than 10 lb. pressure on the boiler. Supply cold water constantly in at bottom of the boiler. Continue this for six hours. At the end of the period, close the water feed valve, draw the fire quickly, open blowoff at bottom of boiler and entirely drain the boiler; replace the safety valve. Fill the boiler slowly after it becomes cold.

Remove the cover of each trap and wipe off grease and dirt accumulation. Replace trap cover tightly on body. Install the Dunham Regulating Plates in the radiator valves.

(21) Guarantee—The Heating Contractor shall guarantee the apparatus installed under these specifications to circulate steam thoroughly through every radiator without noise, under a steam pressure on the heating mains not to exceed two pounds. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season and that defect is due to faulty material or poor workmanship, the Heating Contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

(22) Finally—Nothing herein contained can be construed to relieve the Heating Contractor from making good and perfect work in all usual details of construction, and he will be held responsible to provide and furnish necessary material and to perform all necessary labor and to bear all expenses incidental to the satisfactory completion of the work.

Continued on next page

THE DUNHAM RETURN HEATING SYSTEM

The Dunham Return Heating System is a system utilizing steam at any desired pressure up to 15 lb. An operating pressure of 1 lb. is recommended as the most economical. The use of the Dunham Return Trap and Dunham Air Eliminator provides an automatic return of water to the boiler when it is desired to raise the steam pressure.

The Dunham Return Heating System is a two-pipe system. The steam and the water of condensation each have their respective pipes, and, by virtue of the Dunham Radiator Trap, steam cannot enter the return pipe until it condenses and becomes water. Collision between steam and water is thus made impossible and unpleasant noises eliminated. The sputtering, leaking air valve on each radiator is also eliminated. The air, which freely passes through the trap, is conducted away in the pipe which carried away the water.

The Dunham System makes possible maximum radiator efficiency, and the use of every bit of steam in the radiators; none is wasted. It keeps the radiators free from air, permitting a quick and rapid circulation. The radiators are each easily controlled by a non-leakable radiator valve.

Principal Parts

In its physical parts the Dunham Return Heating System consists principally of a steam boiler, radiators, piping, the Dunham Radiator Trap, the Dunham Packless Radiator Valves with regulating plates, and the Dunham Return Trap or Condensation Return Pump. Any good reputable make of boiler of proper capacity for the radiation may be used. Radiators may be of any good recognized make. The Dunham Company does not sell boilers, radiators, or pipe; it sells only the Dunham heating appliances. The Company also furnishes information covering the preferable methods of installing the entire plant to make possible a successful heating system.

Specifications

Articles 1 to 3 inclusive same as for Dunham Vacuum Return Line System, see Dunham Page 30 this catalogue.

4. **Boiler**—The steam boiler shall be a .....with guaranteed rating for .....sq. ft. of direct radiation installed upon suitable foundation and in accordance with manufacturer's setting instructions. It shall be equipped with all necessary connections and trimmings, including a safety valve set to blow at 10-lb. pressure, a Dunham Compound Gauge 15 lb. x 30-in. vacuum and a 7-in. Dunham Damper Regulator. (Omit Regulator on gas fired and automatic oil fired installations.) The boiler must be so installed that the distance between the normal boiler water line and the lowest return pipe shall permit the installation of the return trap at the height hereinafter specified. Furnish boiler pit if necessary.

5. **Smoke Pipe**—Connect boiler to chimney with suitable iron smoke pipe same size as boiler smoke outlet. Smoke pipe must be provided with approved Dunham Check Damper and hand stop damper between check damper and boiler. (On gas and automatic oil fired installations omit Dunham Check Damper.) (Omit hand stop damper on gas fired installations.)

Articles 6 and 7 same as Dunham Page 30.

8. The end of each steam main shall be dripped in the manner indicated on the plans. If dripped directly to the boiler, each drip must be sealed below water line before being connected with any other drip, and a Dunham Trap must be installed at the top. When dripped through Dunham Traps into the dry return piping, a full size scale pocket must be provided and the Dunham Trap shall be installed at least four feet from the scale pocket, and located above the dry return piping, into which they discharge. A gate valve and Dunham Strainer shall be installed on the inlet side of each Dunham Trap used for dripping purposes.

9. Grade steam mains ½ in. in 10 ft. Grade return mains and drip mains 1 in. in 10 ft. All steam supply branches such as spring pieces, offsets in steam risers and runouts to radiators shall in each case be installed one size larger than the vertical pipes to which they connect and shall be given as much grade as possible, ½ in. per foot is preferable.

10. Return mains shall be connected to the Dunham Return Trap as shown in detail furnished by manufacturer.

Articles 11, 12 and 13 same as Dunham Page 30.

14. **Return Trap**—Install as shown, a No.....Dunham Return Trap, setting same level and plumb, and with its bottom not less than 6 in. above the boiler water line. make piping connections in accordance with the details furnished with trap, place return trap as much higher as return piping permits. A steam connection full size of tapping in trap shall be made directly with the steam header at boiler.

Furnish and install in accordance with manufacturer's instructions a Dunham Air Eliminator. Install a Dunham Air Check, Type 222, on vent opening of Eliminator.

Articles 15 to 22 inclusive same as Dunham Page 30.

Trap No. 10A

The Heart of the Dunham Return Heating System

The Dunham Return Trap

See Dunham Page 47 in this Catalogue for full description

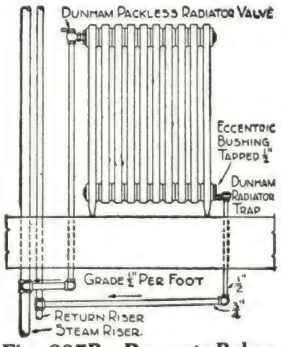


Fig. 807B. Runouts Below Ceiling

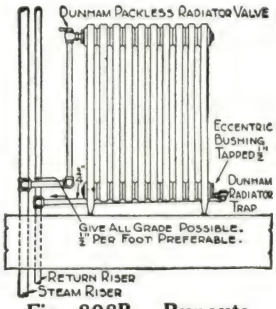


Fig. 808B. Runouts Above Floor

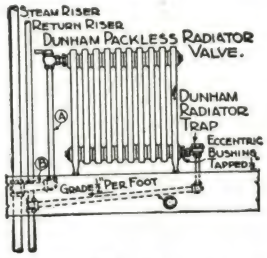


Fig. 809B. Runouts Between Floor and Ceiling

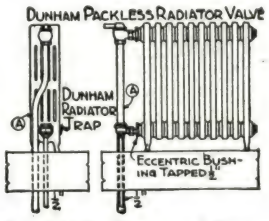


Fig. 810B. Trap and Valve at Same End of Radiator

Column radiators only, not to exceed 15 sections. Recommended for upper floors in small buildings to simplify piping.

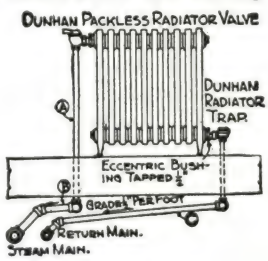


Fig. 813A. Spring Pieces and Radiator Connections for First Floor Radiator

General Note: Grade all horizontal spring pieces and runouts not less than ½ in. per foot.

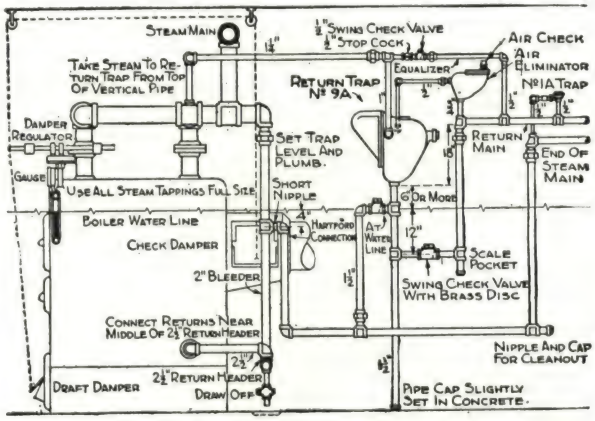


Fig. 962A. Boiler Connections for Dunham Return Trap 9A

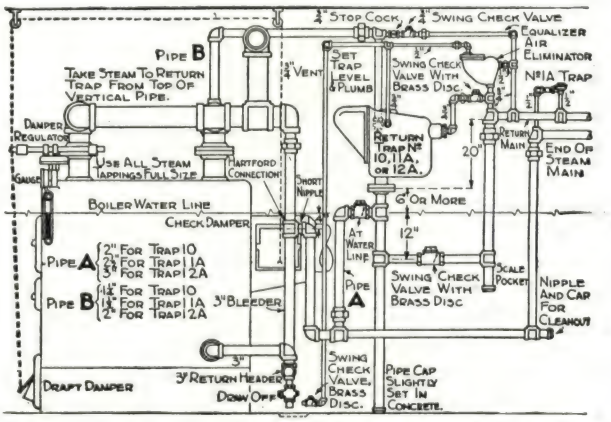


Fig. 963A. Boiler Connections for Traps 10A, 11A, 12A

THE DUNHAM RETURN HEATING SYSTEM (Continued)

TABLE 7. STEAM MAINS. RETURN HEATING SYSTEM

Pipe sizes inches	Capacities in square feet of direct cast iron radiation for each length *Length in feet							
	100	200	300	400	500	600	800	1000
2	670	570	470	410	360	330	290	250
2½	1,090	930	760	670	590	530	470	410
3	1,930	1,650	1,340	1,170	1,030	940	820	730
3½	2,810	2,400	1,950	1,710	1,510	1,370	1,200	1,060
4	3,900	3,340	2,720	2,380	2,100	1,900	1,670	1,480
5	7,000	5,950	4,850	4,260	3,740	3,400	2,980	2,640
6	11,200	9,550	7,780	6,830	6,000	5,460	4,780	4,240
8	23,400	20,000	16,250	14,250	12,540	11,400	10,000	8,840
10	40,800	34,800	28,400	24,800	21,900	19,900	17,400	15,400

*Length equals distance along piping from source of steam supply to top of each riser plus allowances for elbows, valves (Table No. 6, Dunham Page 34) and plus 25 ft. allowance for radiator connection.

TABLE 8. RETURN MAINS. RETURN HEATING SYSTEM

Pipe sizes	Capacity in square feet								
	1	1¼	1½	2	2½	3	3½	4	5
Mains under 400 ft. long.....	400	1,400	2,700	5,500	9,000	16,000	23,000	32,000	57,000
Mains over 400 ft. long.....	300	1,000	1,700	3,400	5,500	10,000	14,000	20,000	35,000

TABLE 9. STEAM MAIN DRIPS. RETURN HEATING SYSTEM

Pipe Sizes.....	1¼	1½	2	2½	3	3½	4	5
Capacity in sq. ft.....	1,400	2,700	5,500	9,000	16,000	23,000	32,000	57,000

TABLE 10. RISER SIZES. RETURN HEATING SYSTEM

Pipe sizes	Steam							Return	
	¾	1	1¼	1½	2	2½	3	¾	1
*Length, 200 ft.	45	90	190	290	570	930	1,650	600	1,200
*Length, 400 ft.	30	60	136	200	410	670	1,170	430	850
*Length, 600 ft.	25	50	110	165	330	530	940	340	670
*Length, 1,000 ft.	20	40	85	130	250	410	730	260	530

Springpieces, that is, connections from steam main to risers, must always be made one size larger than the riser.

Return springpieces same size as return riser.

TABLE 11. RADIATOR CONNECTIONS. RETURN AND VACUUM RETURN LINE HEATING SYSTEMS

Use Table 5 when Valve Type 105 or 145 with Regulating Plate is used

Square feet direct radiation	Supply			Return		
	Inlet valve in.	Vertical pipe to inlet valve in.	Horizontal runout to riser or spring piece to main from a first floor radiator, in.	Trap No.	Stub to trap and size of trap	Horizontal runout to riser or first floor radiator
1– 25	½	½	¾	1A	½	¾
26– 80	¾	¾	1	1A	½	¾
81–100	¾	¾	1¼	1A	½	¾
101–140	1	1	1¼	2B	½	¾
141–180	1	1	1½	2B	½	¾
181–300	1¼	1¼	1½	2B	½	¾
*301–450	1½	1½	2	3A	*¾	¾
451–700	2	2	2½	3A	¾	¾

*No. 2B trap up to 350 sq. ft. ½ in. stub and size.

Use pipes one size larger for horizontal connections over 8 ft. 0 in. long. Grade with a fall not less than ½ in. per foot.

Piping and Method of Dripping Steam Mains

The piping is of vital importance. It should be designed to meet the needs of each particular job, and sized accordingly. It must be carefully installed, properly and well graded, and entirely free from sags or pockets. Provision must be made for expansion so that it will not destroy the proper grade of the piping. The ends of the steam mains in a Dunham Return Heating System may be dripped and freed from air in two distinct ways. The first way is described and illustrated in Fig. 844A.

This method is not to be followed when a reducing valve is used and the pressure in the steam mains is less than that in the boiler. This method is recommended whenever applicable because it admits of the return piping being installed higher up than would otherwise be the case. The air is vented into the return main, and the water is returned direct to the boiler through the drip piping. No two drips should be connected above the water line.

The second method consists in the installation of a Dunham Float and Thermostatic Trap of proper capacity at the drip points of the steam main to drip directly into the return main from radiation as shown in Figs. 924B and 925B. The condensate as well as the air in this case passes into the return main, and the water is returned to the boiler by the return trap or condensation pump. This method must always be used when a reducing valve is used, and whenever building construction prevents using method shown in Fig. 844A.

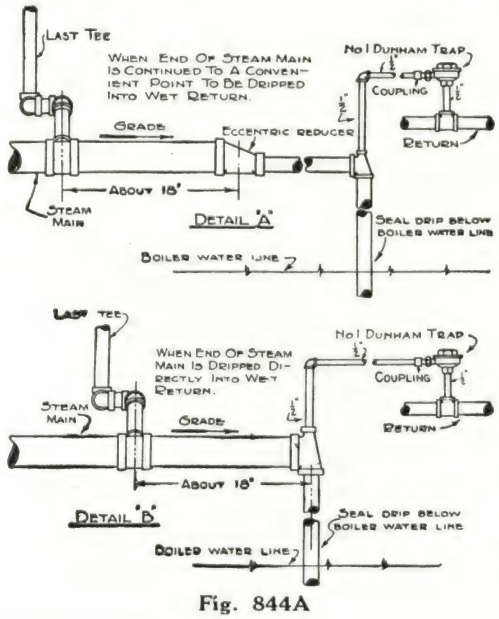


Fig. 844A

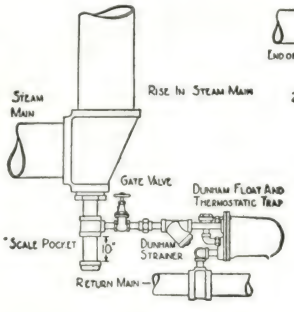


Fig. 924B. Method of Dripping Rise in Steam Main

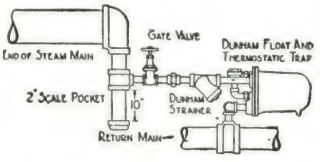


Fig. 925B. Method of Dripping End of Steam Main

Equalizer Connections

The steam and return mains on the Return Trap System are cross connected as shown in illustrations. This connection equalizes the system when a natural partial vacuum is formed on a declining fire. At such times there is a tendency for a higher vacuum to be formed on the steam side of the system than on the return side. The equalizer prevents this disadvantage to circulation.

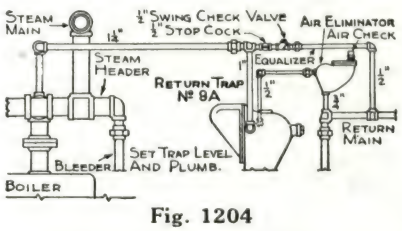


Fig. 1204

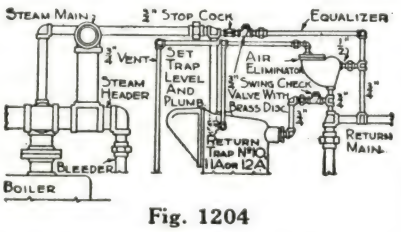


Fig. 1204

THE DUNHAM HOME HEATING SYSTEM

This is a vapor system (using steam at very low pressure, like that in a teakettle) giving an even, easily controlled and economical distribution of heat throughout the entire home.

It is simple and unfailing in operation. The small amount of steam is quickly developed and uniformly distributed through all the radiators. The radiators operate silently. The clanging and hissing commonly heard with old type steam heating systems is absent. The sputtering, smelly air valves and leaky control valves are replaced by Dunham Packless Radiator Valves and the famous Dunham Radiator Traps. Every Radiator may be kept hot from end to end. No steam is wasted.

How a Dunham Heating System Operates

The economical use of low pressure steam is possible because *two* pipes are used; one to carry steam *to* the radiator and one to carry air and condensate (steam turned to water in cooling) *from* the radiator. The use of two pipes was impractical prior to the invention of the Dunham Radiator Trap and Valve, illustrations and description of which are to be found further on in this catalogue.

With the Dunham System there is no opportunity for a collision between steam and water. Each has its respective pipes, and steam cannot enter the outlet pipe until it condenses and becomes water. The Dunham System makes absolutely unnecessary any air valves on the radiators. It uses every bit of steam within the radiators, allowing none to pass out and go to waste. It keeps the radiators free from air and water and permits quick and rapid circulation of steam. The radiators are easily controlled by non-leakable, quick opening radiator valves placed in a convenient position where they can be reached without stooping.

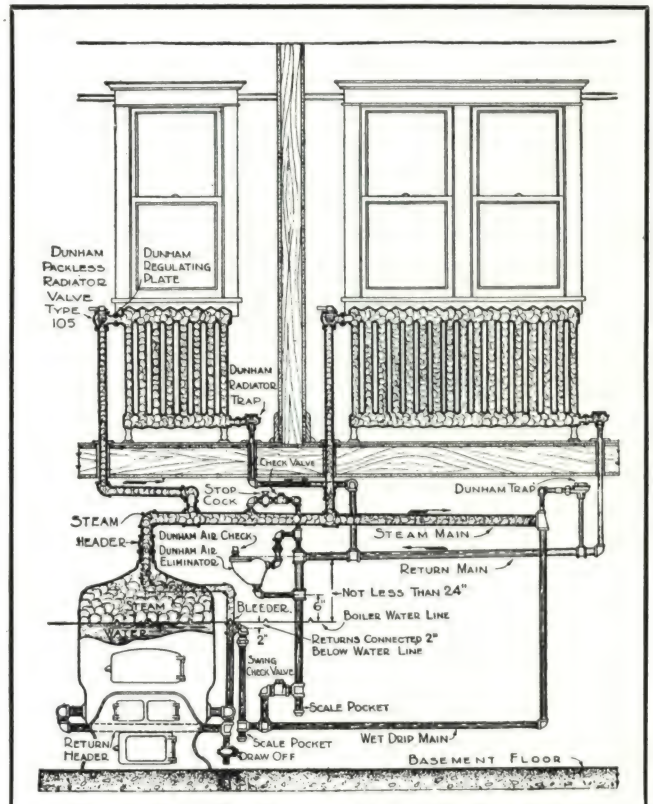


Fig. 907D. The Dunham Home Heating System

What Makes Up a Dunham Home Heating System

In its physical parts the system consists principally of a steam boiler, radiators, piping to and from the radiators, the Dunham Packless Radiator Valves with Regulating Plates, and the Dunham Radiator Traps. Any good reputable make of boiler of proper capacity for the radiation may be used. The radiators may be of any good recognized make. The Dunham Company does not sell boilers, radiators, or pipe; it supplies only the Dunham appliances. The Company also furnishes information covering the preferable methods of installing the entire plant to make possible a successful heating system.

For complete description of Dunham appliances used on this system, see pages following.

Installation

The Dunham Home Heating System may be installed by any competent and experienced steam heating contractor. The Dunham products are sold only through the responsible steam heating trade.

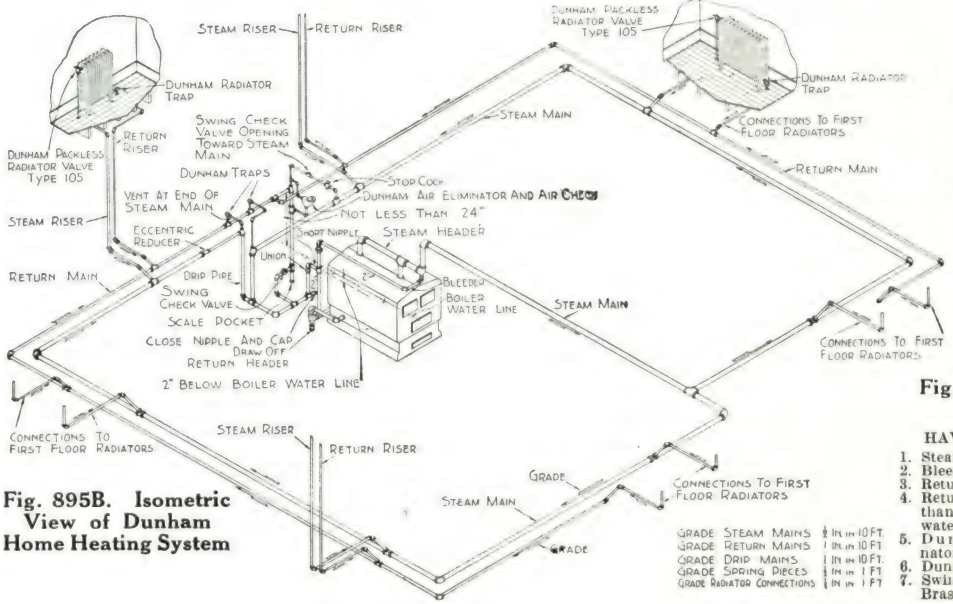


Fig. 895B. Isometric View of Dunham Home Heating System

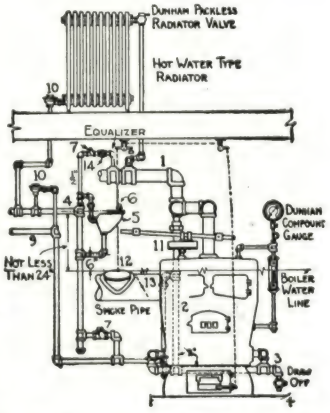


Fig. 960C. Typical Connections to Boiler

HAVING TWO OR MORE STEAM TAPPINGS

1. Steam Main.
2. Bleeder, 2 in. size
3. Return Header, 2 in.
4. Return Main, not less than 24 in. above water line.
5. Dunham Air Eliminator.
6. Dunham Air Check.
7. Swing Check Valve with Brass Disc.
8. Return Connection to Boiler 2 in. below water line.
9. End of Steam Main.
10. Dunham Trap No. 1A.
11. 10-in. Dunham Regulator Type 351.
12. Dunham Check Damper.
13. Hand Stop Damper.
14. Stop Cock.

Continued on next page

THE DUNHAM HOME HEATING SYSTEM (Continued)

TABLE 1. STEAM MAINS

Pipe sizes, in.	Capacities in square feet of direct cast iron radiation for each length				
	Length in feet				
	200	300	400	500	600
2	320	282	248	218	200
2½	560	456	400	352	320
3	1000	810	710	625	570
3½	1500	1180	1035	910	830
4	2000	1640	1440	1270	1150
5	3600	2940	2580	2260	2060
6	5780	4700	4130	3640	3300

TABLE 2. RETURN MAINS

Pipe sizes	1 in.	1¼ in.	1½ in.	2 in.	2½ in.
Capacity in sq. ft	300	1000	1700	3300	5400

TABLE 3. STEAM MAIN DRIPS

Pipe sizes	1¼ in.	1½ in.	2 in.	2½ in.
Capacity in sq. ft	1000	2000	4000	6000

TABLE 4. RISER SIZES

Pipe sizes	Steam					Return
	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	¾ in.
*Length, 100 ft	40	80	160	250	400	500
*Length, 200 ft	25	55	115	175	320	320
*Length, 400 ft	20	40	80	125	240	250

*The *length* equals the distance along piping from boiler to top of each riser plus allowance for elbows (Table 6) and plus 25 ft. allowance for last, or top, radiator connection.

Spring pieces, that is, connections from steam main to risers supplying second floor and up must always be made one size larger than the riser. Return spring pieces make same size as return riser.

TABLE 5. RADIATOR CONNECTIONS
Valves Type 105 or Type 145 with Regulating Plate—Top Inlet

Sq. ft. radiation	Supply			Return		
	Inlet valve, in.	Vertical pipe to inlet valve, in.	Horizontal runout from valve to riser or spring piece to steam main from first floor radiator, in.	Trap No.	Stub to trap in.	Horizontal runout to return riser, in.
1– 25	½	½	¾	1A	½	¾
26– 80	¾	¾	1	1A	½	¾
81–100	¾	¾	1¼	1A	½	¾
101–140	¾	¾	1¼	2B	½	¾
141–170	¾	¾	1½	2B	½	¾

Use pipes one size larger for horizontal steam connections, spring pieces and runouts, over 8 ft. long.

Grade horizontal connections, both steam and return, with a fall not less than ½ in. per foot.

TABLE 6. ALLOWANCES FOR RESISTANCE TO FLOW
In feet of pipe

Size	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14OD	16OD
For elbows	2	2	2	3	5	6	9	10	14	19	24	35	47	59	70	82
For globe Valves	2	3	3	5	7	9	14	15	21	28	36	53	70	88	106	124

In sizing the piping for any system of heating the length of the piping must be ascertained, and the frictional resistance of fittings and valves considered. It is customary to reduce these resistances to equivalent lengths of straight pipe which must be added to the actual length. In Table 6 these resistances are given in feet of pipe. An additional allowance of 25 ft. must be made for resistance to entrance to the radiator.

Specifications for Dunham Home Heating System

Articles 1 to 3 inclusive same as for Dunham Vacuum Return Line System, see Dunham Page 30.

(4) **Boiler**—The steam boiler shall be a.....with guaranteed rating for.....sq. ft. of direct radiation installed upon suitable foundation and in accordance with manufacturer's setting instructions. It shall be equipped with all necessary connections and trimmings including a safety valve set to blow at 10 lb. pressure, a Dunham Compound Gauge 10 lb. x 20 in. vacuum and a 10-in. Dunham Damper Regulator. (Omit Regulator on gas fired and automatic oil fired installations.) The boiler must be so installed that the distance between the normal boiler water line and the lowest return pipe shall *be not less than 24 in.* Furnish boiler pit if necessary to obtain this minimum distance.

(5) **Smoke Pipe**—Connect boiler to chimney with suitable iron smoke pipe same size as boiler smoke outlet. Smoke pipe must be provided with approved Dunham Check Damper and hand stop damper between check damper and boiler. (On gas and automatic oil fired installations omit Dunham Check Damper, omit hand stop damper on gas fired installations.)

(6) **Pipe and Fittings**—Furnish and erect with tight connections all necessary piping of sizes shown on plans and run as indicated, supported and properly graded to insure free and noiseless circulation. Use fittings of cast iron of standard quality. The ends of all pipes shall be reamed or filed. Proper provision must be made for expansion. Use graphite and oil for making up all pipe joints applied to male thread only.

(7) All steam tappings in boiler shall be connected full size of tapping into a steam header which shall be dripped to the return header through a bleeder. All spring pieces to steam and return mains shall be taken off the top of mains at 45 deg.

(8) The end of each steam main shall be dripped as indicated on the plans by means of a drip line to boiler, properly vented through Dunham Trap in accord with details furnished by manufacturer.

(9) Grade steam mains ½ in. in 10 ft. Grade return mains and drip mains 1 in. in 10 ft. All steam supply branches such as spring pieces, offsets in steam risers and runouts to radiators shall in each case be installed one size larger than the vertical pipes to which they connect and shall be given as much grade as possible. ½ in. per ft. is preferable.

(10) Furnish and install on return main in accordance with manufacturer's instructions a Dunham Air Eliminator. Install a Dunham Air Check on vent opening of Eliminator.

(11) Risers are to be run concealed or in the open as directed by the architect. All concealed piping must be tested and made tight at 15-lb. water pressure before being concealed and covered.

Articles 12 and 13, same as Dunham Page 30.

(14) **Thermostatic Control**—Contractor shall furnish and install according to manufacturer's instructions where shown on plans. Thermostat and Damper Motor of approved make.

Articles 15 and 16, same as Dunham Page 30.

(17) **Radiator Traps and Valves**—Each radiator shall be provided with a Dunham Radiator Trap of suitable capacity. A Dunham Packless Radiator Valve with Dunham Regulating Plate shall be installed at inlet connection according to manufacturer's instructions. The plates shall not be inserted in the valves until after the system has been cleaned.

Articles 18, 19 and 20, same as Dunham Page 30.

(21) **Test**—The System when finished and cleaned shall be tested for tightness by filling it with water to its very top. The water shall be left standing in the system untill all leaks have been made tight. The contractor must take precaution to guard against damage from freezing during test.

(22) **Guarantee**—The Heating Contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise, under a steam pressure on the heating mains not to exceed ½-lb. gauge. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season, and that defect is due to faulty material or poor workmanship, the Heating Contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

(23) **Finally**—Nothing herein contained can be construed to relieve the Heating Contractor from making good and perfect work in all usual details of construction and he will be held responsible to provide and furnish necessary material and to perform all necessary labor and to bear all expenses incidental to the satisfactory completion of the work.

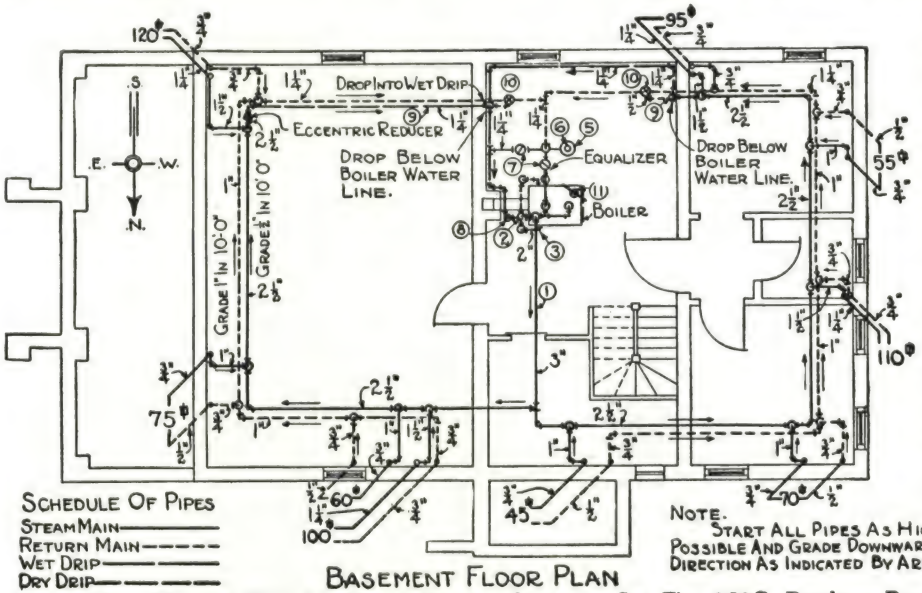


Fig. 873B. Heating Plan for Home Heating System. See Fig. 960C, Dunham Page 33, for Parts Indicated by Number

Continued on next page

"DUNHAMIZING" RADIATORS FOR ANY TYPE OF STEAM HEATING SYSTEM

The Dunham Packless Radiator Valve and the Dunham Radiator Trap

Any system of steam heating can be made more efficient by installing Dunham Radiator Traps and Dunham Packless Valves with Regulating Plates on the radiators. The Dunham Packless Valve assures unfailing control of the supply of incoming steam and the Dunham Trap insures free exit of air and water but retention of the steam. Noise, air fouling and leakage are unknown on a "Dunhamized" radiator.

Look for the name DUNHAM

Only the best of materials are used. Both types are neat in appearance, and are quick opening and closing valves. The valve is made packless by means of the bellows construction, consisting of a series of corrugated phosphor bronze diaphragms which permit the free up and down movement of the spindle and valve disc. This construction obviates the use of springs, packing or stuffing boxes of any kind and entirely prevents the leakage of steam, air or water. The prevention of leakage of air into the radiators is an important factor, for leakage will destroy the vacuum when operating on a declining fire. The holding of vacuum is an important factor in economical operation because it prolongs the heating period between firings. It has the advantage that no steam, water or dirt can come in contact with the thread of the valve spindle. The importance of this will be appreciated. It assures easy turning of handle at all times. The construction prevents leakage of steam and water into the room, marring the walls, furnishings or floors.

Complete specifications are given on Dunham Pages 39, 40, 41 and 42.

The Dunham Packless Radiator Valve

This valve is really "packless." Neither packing of any kind nor any springs are used in its construction. It is built in two specific styles. All valves meet the roughing-in requirements of the Heating & Piping Contractors National Association.

The lever handle valve is furnished in angle pattern only and recommended for radiators with top inlet connection in keeping with the most approved modern steam heating practice. The low bonnet is an attractive feature of this valve. The wheel handle valve can be used on any steam system and is furnished in angle pattern, straightway pattern, right hand pattern and left hand pattern.

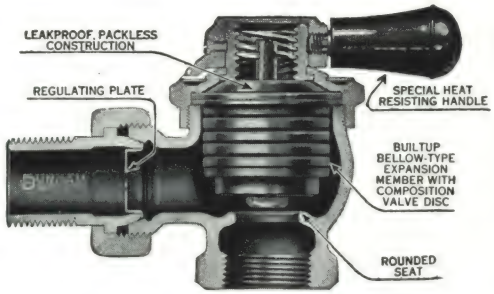
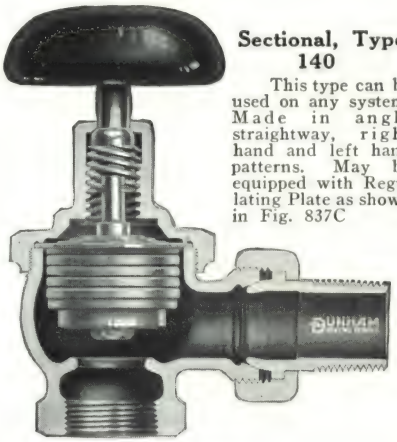


Fig. 837C.

Sectional Type 100

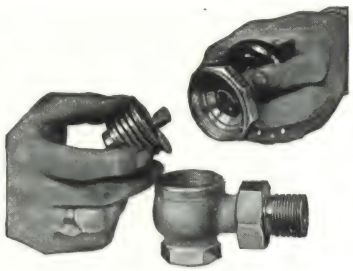
Made only in angle pattern
Regulating Plates are shipped separately



Sectional, Type 140

This type can be used on any system. Made in angle straightway, right hand and left hand patterns. May be equipped with Regulating Plate as shown in Fig. 837C

Fig. 877B



Showing Simplicity of Assembly of Type 140 Valve

Wearing qualities and interchangeability of parts are most vital. Interchangeable parts combine long life, with final renewals of the working part at a minimum cost and inconvenience

The Dunham Regulating Plate

By means of the Dunham Regulating Plate (Type 192) the correct proportion of vapor necessary to properly heat each radiator is provided.

It is particularly advantageous on the Dunham Differential System and the Dunham Home Heating System and wherever vapor is used as heating medium.

The plate is inserted in the union of the valve, the plate orifice being calibrated to the number of square feet of radiation in each radiator.

The use of the Dunham Regulating Plate simplifies many things which have been serious barriers to progress in the art of heating, *for without this plate* the resistance which vapor encounters in flowing from the boiler to the radiator cannot be the same for each radiator.

The resistance opposing the flow of condensate and air from the radiator to the boiler is not uniform for each radiator without this plate because the opening through which the vapor flows to each radiator is not closely proportioned to the supply required by the radiator.

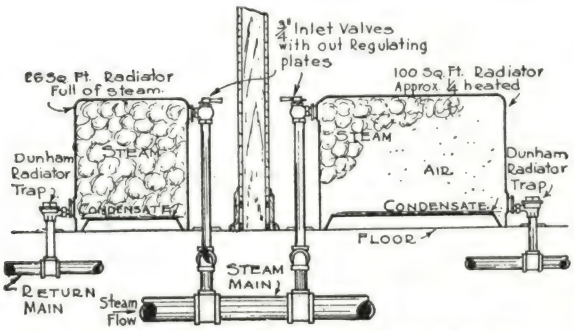


Fig. 893. Inlet Valve Without Regulating Plate

Type 192 Regulating Plate

The regulating plate can be furnished (without additional charge) for any valve listed in the following pages

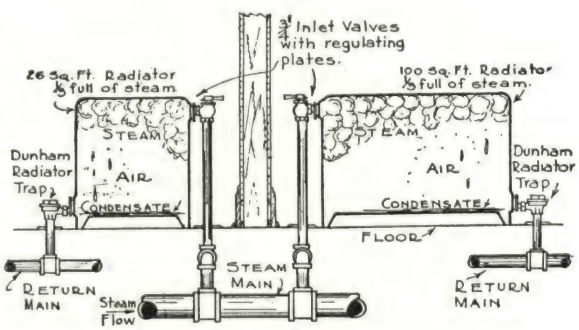


Fig. 894. Inlet Valve with Regulating Plate

Under either pressure or vacuum conditions, a 26 sq. ft. radiator should heat no more rapidly than a 100 sq. ft. radiator irrespective of the relative location of the two with reference to the boiler. In actual practice, and with no provision for interposing resistance to the steam flow, there will be irregularity in heating each respective radiator.

During the milder days of the heating season, there are times when a radiator should give off only a fraction of the heat required under cold weather conditions. To secure this result, a lower vapor pressure is often carried on the steam main; but the tendency in such cases in the ordinary system (as shown in Fig. 893, Dunham Page 35) is for the radiators closest to the boiler to take more than their proportion of the vapor, and thus prevent sufficient vapor from reaching radiators in parts of the building remote from the boiler.

Interposing the regulating plates evens up this inequality of flow to each radiator when starting up the system.

With the regulating plate in use, the radiators of the system will fill with vapor evenly and make possible the correction of unbalanced condition in the piping system. See Fig. 894. The regulating plate will *distribute the vapor uniformly under every pressure condition.* There will be an increased operating economy and tendency to uniform regulation of the temperature by variation of steam pressure.

The radiators closest to the boiler will take only a fraction of what they would receive with the regulating plate omitted, and the steam will be uniformly distributed throughout the piping without noticeable friction except at the orifice opening. Because of this there will be less trouble arising should there happen to be a slight discrepancy in the steam pipe sizes. The steam main functions with the steam space of the boiler as a reservoir.

The Dunham Radiator Trap

The Dunham Trap for over twenty-five years has led in quality and in service. Its function is to conserve heat, and thus fuel, by keeping radiation and piping at the point of maximum efficiency by automatically permitting air and water to pass from the radiator without passing steam.

The Dunham Thermostatic Trap consists of two major parts—a body, and a cover. In the cover the operating member, the Dunham Thermostatic Disc, is securely placed. It has an exceptionally large valve opening. There are no detached loose parts in the path of flow, no sliding contacts to gum up, and no guide or pin to obstruct the valve opening or cause the valve to wear unevenly. The position and design of the valve are such that it is self-cleaning, and the closing of the trap will be tight even where the water is high in incrustants which deposit on the interior of the piping. The action of the disc is positive and the floating valve seats squarely, like a globe valve, the tightest of all types of valves. All of its working parts are made of non-corrosive material, of the best quality and kind, which gives the best service.

The wearing qualities of the Dunham Trap are further insured because of its construction. The Thermostatic Disc is constructed of two corrugated members made of special composition phosphor bronze, formed under pressure. The curves of the corrugations are designed to distribute the motion of the disc uniformly and to secure maximum movement with minimum stress in each portion of the disc. The disc contains a volatile fluid compounded to insure uniform operation over a wide range of temperatures. This fluid is hermetically sealed in the disc. The disc is permanently adjusted in the cover at our factory and its setting should not be changed since it adjusts itself to all temperatures and pressures.

Look for the name DUNHAM

DUNHAM Radiator Traps bear the name Dunham

The Dunham Thermostatic Trap saves fuel by eliminating the air from the radiators and by holding the steam therein until it has given up all its heat.

The disc is subject to the same conditions of pressure and temperature that exist within the radiator, and its operation is controlled by these conditions.

As steam enters a cold radiator it forces the cool air which is in the radiator out through the trap into the return piping. In warming the radiator, the steam gives off heat and in doing so condenses to water. The water which is heavier than steam falls to the bottom of the radiator and flows to the trap through which it also passes into the return piping. After forcing out the air the steam fills the radiator and follows the water to the trap which, in the presence of steam, automatically closes because the steam is hotter than either the air or water. The heat of the steam vaporizes the fluid within the disc and creates a vapor which expands the disc, closing and holding the valve against its seat with a positive pressure, thus trapping the steam within the radiator.

The radiator now thoroughly filled with steam gives off heat, condensing the steam at a uniform rate, and the water of condensation which is cooler than the steam flows in a steady stream to the trap, which it slightly cools, causing it to open, allowing the water to pass out.

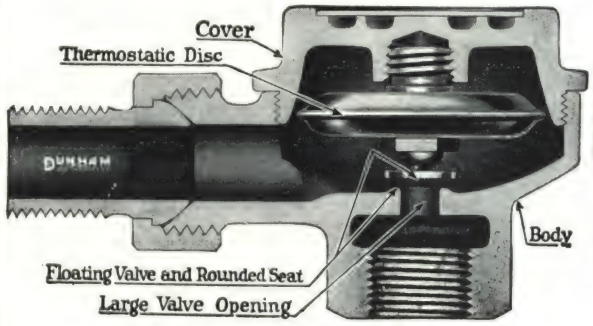
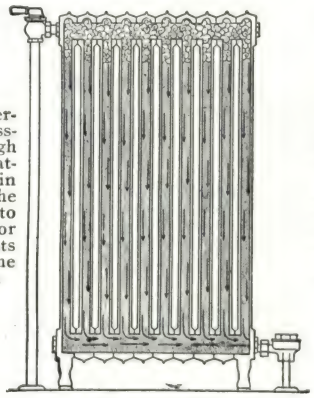


Fig. 819. Sectional View of Trap, Showing Simplicity of Construction

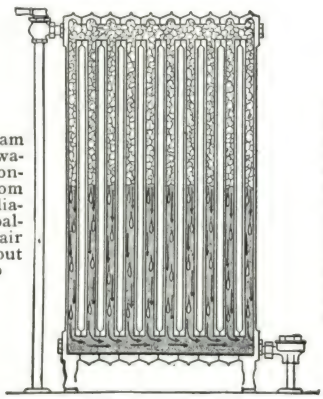
Fig. 800A. The Two Parts of the Radiator Trap

A simplicity of construction that combines long life without maintenance or trouble



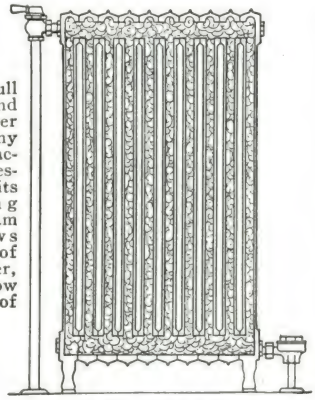
Steam entering—air passing out through trap. Regulating Plate in valve allots the steam evenly to each radiator so each heats alike over the entire system

Fig. 802A



More steam entering — water (steam condensed from chill of radiator) and balance of air passing out through trap

Fig. 803A



Radiator full of steam and hot all over and under any degree of vacuum or pressure within its operating range. Dunham Trap allows free passage of air and water, does not allow the escape of steam

Fig. 804A

Continued on next page

TYPICAL RADIATOR CONNECTIONS

Any type of radiation may be used. The return connection may be made at either end as shown. The Dunham Radiator Trap may be obtained in angle, straightway, right hand and left hand patterns for convenience in piping. Give all runouts plenty of grade—½ in. per ft. insures good flow. Full provision for riser expansion must be made and allowed for in the grading of runouts. Spring piece connections must be given especially good grade. See Figs. 872 and 900 on Dunham page 29.

In applying Dunham Traps to pipe coils they should be installed as indicated. A scale pocket is provided at the bottom of the return header and in front of the trap.

When a Dunham Thermostatic Trap is used for dripping steam piping it should be installed with at least 4 ft. of connecting piping between it and the point dripped. A liberal scale pocket should be provided, also a gate valve and strainer in the connection to any drip trap. Scale pockets should never be smaller than a 2 in. pipe, with 3 in. (pipe) on large and long mains. Pockets should be 10 in. or more deep, as large space is necessary for collection of dirt.

When used for dripping the end of a steam main, the main should extend not less than 18 in. beyond the last riser connection and be provided with a scale pocket.

Down-feed risers require individual drips and traps. The trap should be installed as illustrated. The No. 3 Dunham Trap is preferable for this service within its capacity.

Nos. 1A and 2B Traps conform to the standard dimension "A," (3¼ in.) adopted by the Heating and Piping Contractors' National Association for ½-in. traps.

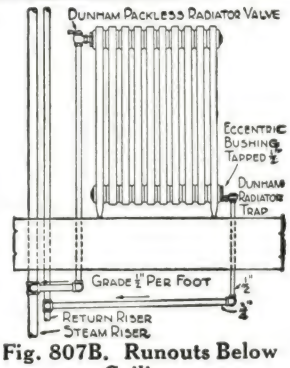


Fig. 807B. Runouts Below Ceiling

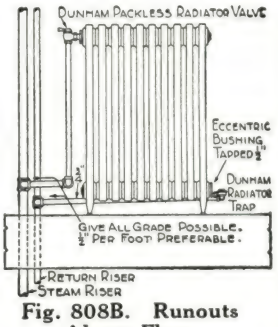


Fig. 808B. Runouts Above Floor

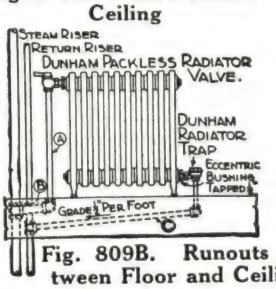


Fig. 809B. Runouts Between Floor and Ceiling

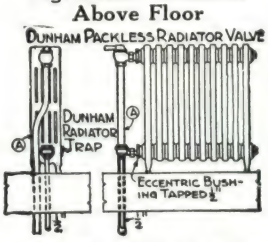


Fig. 810B. Trap and Valve at Same End of Radiator

Column radiators only, not to exceed 15 sections. Recommended for upper floors in small buildings to simplify piping

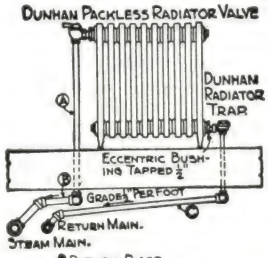


Fig. 813A. Spring Pieces and Radiator Connections for First Floor Radiator

General Note: Grade all horizontal spring pieces and runouts not less than ½ in. per ft.

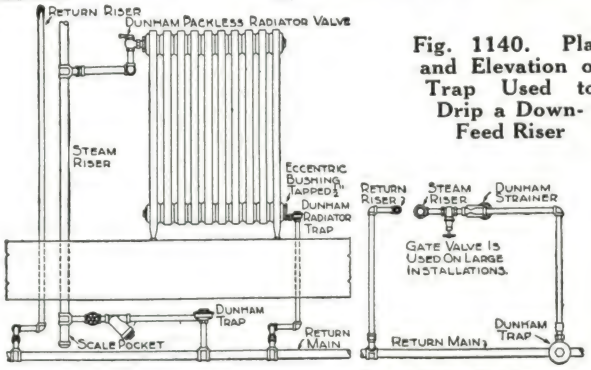


Fig. 1140. Plan and Elevation of Trap Used to Drip a Down-Feed Riser

Fig. 969. Method of Dripping Short Down-feed Risers Through a Dunham Trap Into the Radiator

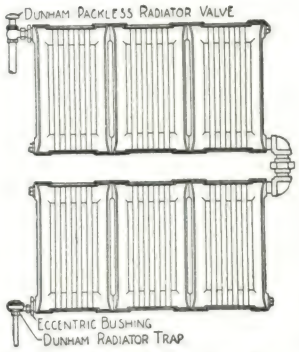


Fig. 946. Method of Connecting Wall Radiators When Installed in Tiers

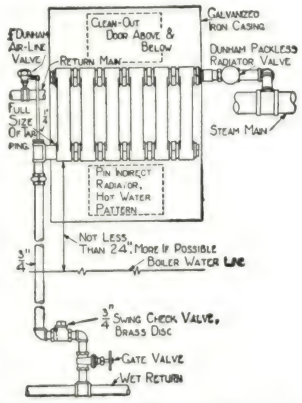


Fig. 902B. Connections to Indirect Radiator Located Below Return Main Using Dunham Air Line Valve

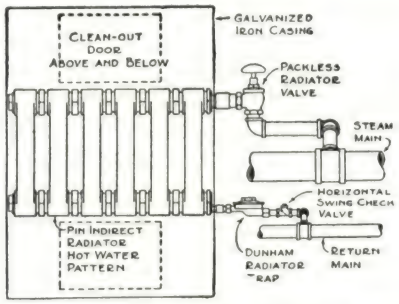


Fig. 903. Trap and Valve on Indirect Radiator

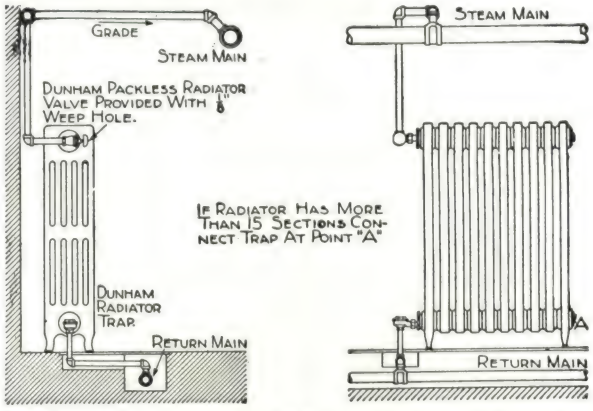


Fig. 839A. Overhead Supply, Valve Horizontal

The valve when used on above installation will be provided with an ⅛-in. weep-hole through the valve seat in order to provide drainage of condensate through valve when it is closed

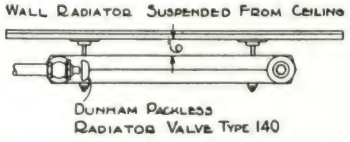
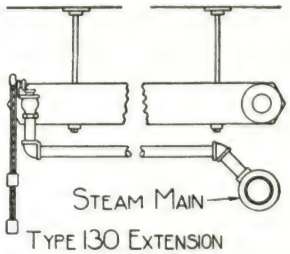


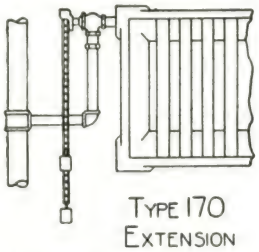
Fig. 841A. Typical for Wall Radiator Suspended from Ceiling

Continued on next page

TYPICAL RADIATOR CONNECTIONS (Continued)



TYPE 130 EXTENSION RADIATOR OR COIL ON CEILING



TYPE 170 EXTENSION RADIATOR SUPPORTED HIGH ON WALL OR IN SKYLIGHT

Typical Wall Coil Connections

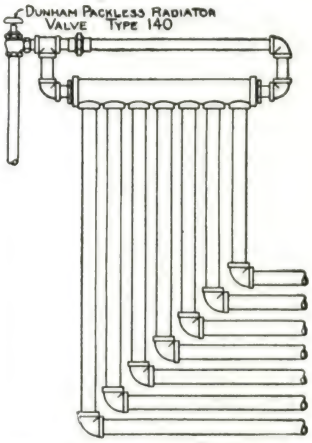


Fig. 816A. Supply Connections to Coils of Seven Pipes or More

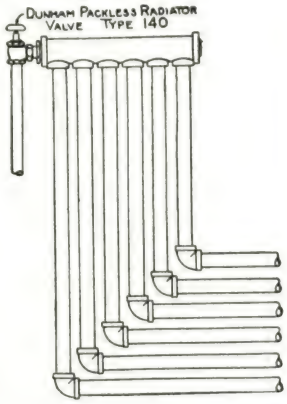


Fig. 817A. Supply Connections to Coils of Six Pipes or Less

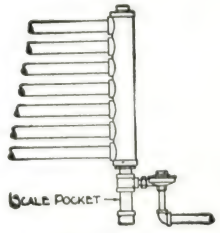
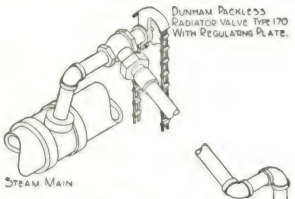


Fig. 811. Trap Used on Wall Coil



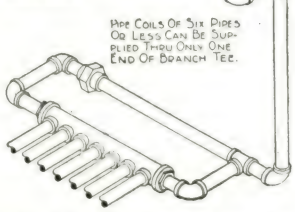


Fig. 1123. Connections to Pipe Coil on Ceiling with Swing Connection and Valve Permitting Operation from Floor

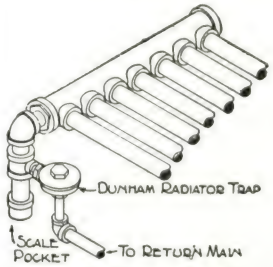


Fig. 812. Trap Used on Ceiling Coil

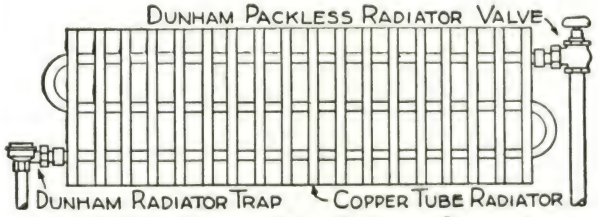


Fig. 1207. Copper Tube Radiator Connections

Radiator Bottom Inlet

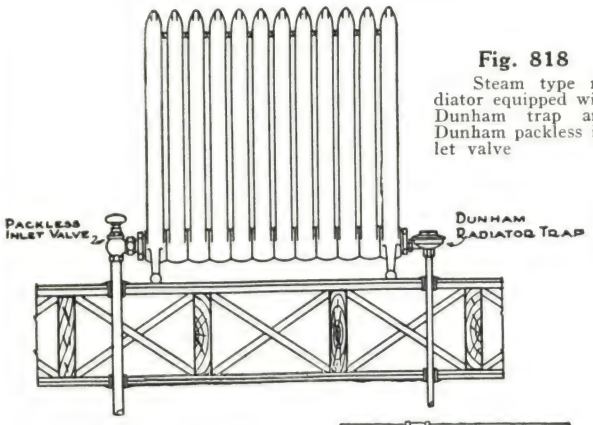


Fig. 818
Steam type radiator equipped with Dunham trap and Dunham packless inlet valve

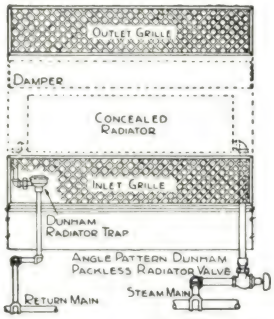


Fig. 1208A. Concealed Radiator Unit Connections

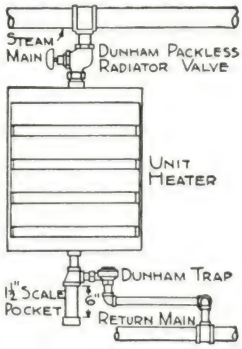


Fig. 1209. Suspended Unit Heater Connections

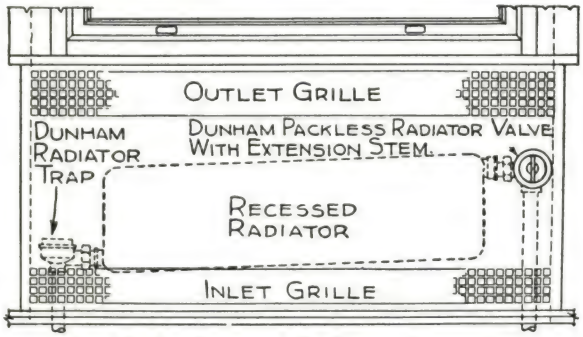
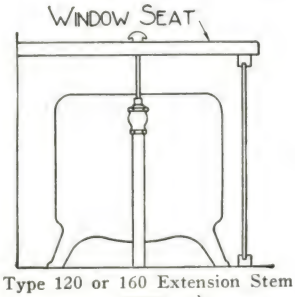
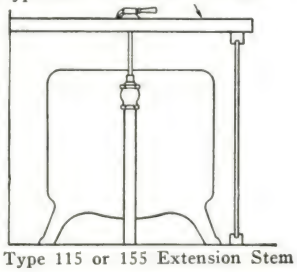


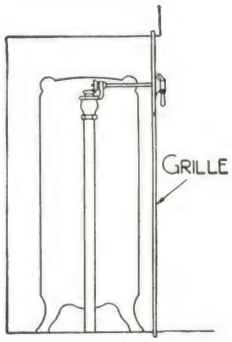
Fig. 1206. Recessed Radiator Connections



Type 120 or 160 Extension Stem



Type 115 or 155 Extension Stem



TYPE 125 EXTENSION STEM

Dunham extension stem packless radiator valves for enclosed window type radiators

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CAPACITIES AND DIMENSIONS OF DUNHAM PACKLESS RADIATOR VALVES

Any Dunham Packless Radiator Valve Listed in This Catalogue Can Be Supplied with Regulating Plate Type 192 Without Extra Charge, See Dunham Pages 35 and 36

Capacities and Radiator Connections Where Regulating Plates Are NOT Used

On two-pipe systems, the following schedule is recommended. *(Where Regulating Plates are used see tables under Types 105 and 145.)*

Square feet direct radiation	Supply		
	Inlet valve, in.	Vertical pipe to inlet valve, in.	Horizontal runout to riser, or the springpiece to main from a first floor radiator Inches
1– 25	½	½	¾
26– 80	¾	¾	1
81–100	¾	¾	1¼
101–140	1	1	1¼
141–180	1	1	1½
181–300	1¼	1¼	1½
301–450	1½	1½	2
451–700	2	2	2½

Use pipes one size larger for horizontal connections over 8 ft. long. Grade horizontal connections with a fall not less than ½ in. per ft.

General Notes

For capacities and size of radiator connections when Regulating Plate is used, see tables beneath Fig. R838B at left and Fig. R915A page 41 for Types 105 and 145.

For convenience in ordering we have assigned Type 105 to Type 100 ½-in. and ¾-in. valves and Type 145 to Type 140 ½-in. and ¾-in. valves when Regulating Plate is to be included. For all other valves of any type give regular type number, size of valve and state that Regulating Plate is desired.

When ordering Regulating Plates, in addition to giving valve sizes always give a list of the radiator sizes.

Use pipes one size larger for horizontal connections over 8 ft. 0 in. long. Grade horizontal connections with a fall not less than ½ in. per foot.

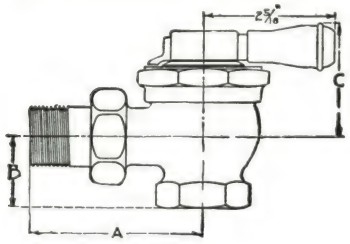


Fig. 838B

Type 100, Lever Handle

This valve, stocked in angle pattern only, is designed for use on radiation having top inlet connection for steam heating work on pressures not exceeding 25 lb. gauge.

Shorter handle for wall type radiators furnished upon request.

Size, in.	Net wt., lb.	Dimensions in inches			List price	Code
		A	B	C		
½	1½	3	1⅛	1 15/16	$ 6.30	Trapeze
¾	1¾	2⅞	1¼	1 15/16	7.20	Trapezoid
1	2¼	3⅛	1½	2⅛	9.00	Trapezium
1¼	3	3½	1⅝	2 5/16	11.00	Travail
1½	4	3¾	1⅞	2¾	13.50	Trave

Rough body, nickelplated, with polished trimmings.

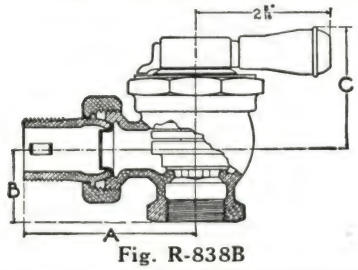


Fig. R-838B

Type 105, Lever Handle, and Regulating Plate

Rough body nickel plated with polished trimmings stocked in angle pattern only. Shorter handle for wall type radiators furnished upon request.

Size, in.	Cap. Sq. ft. direct rad.	Net wt., lb.	Dimensions, in.			List price inc. reg. plate	Code
			A	B	C		
½	1–25	1½	3	1⅛	1 15/16	$6.30	Trapan
¾	26–170	1¾	2⅞	1¼	1 15/16	7.20	Trapereg

FOR RADIATORS WITH TOP INLET ONLY—USE THESE PIPE AND VALVE SIZES

Square feet direct radiation	Supply		
	Inlet valve, in.	Vertical pipe to inlet valve, in.	Horizontal runout to riser, or the springpiece to main from a first floor radiator, in.
1– 25	½	½	¾
26– 80	¾	¾	1
81–140	¾	¾	1¼
141–170	¾	¾	1½

Type 110, Lock and Shield

This valve, stocked in angle pattern only, is designed for use on radiation having top inlet connection for steam heating work.

Key for opening valve, 30 cents net. When ordering, specify valve type number.

Rough body, nickelplated, with polished trimmings.

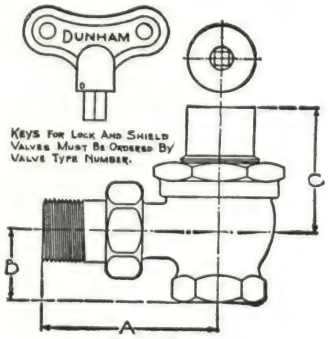


Fig. 910A

Size, in.	Net wt., lb.	Dimensions in inches			List price	Code
		A	B	C		
½	1½	3	1⅛	2⅛	$ 7.30	Twattle
¾	1¾	2⅞	1¼	2⅛	8.20	Tweak
1	2¼	3⅛	1½	2 5/16	10.00	Tween
1¼	3	3½	1⅝	2½	12.00	Twig
1½	4	3¾	1⅞	2 15/16	14.50	Tweeze

Type 115, Lever Handle, Plain Extension Stem

This valve, stocked in angle pattern only, is designed for use on radiation having top inlet connection for steam heating work, for radiators behind grilles or under seats of such design that valve handle can be placed directly above the valve. Fasten the plate (under handle) to woodwork or grille with three ⅛-in. flat-head screws or bolts. Screws or bolts not included in price.

A standard extension stem of 12 in. is furnished. Stem may be cut on installation for shorter lengths. Greater length than 12 in. will be supplied at no extra charge, upon order.

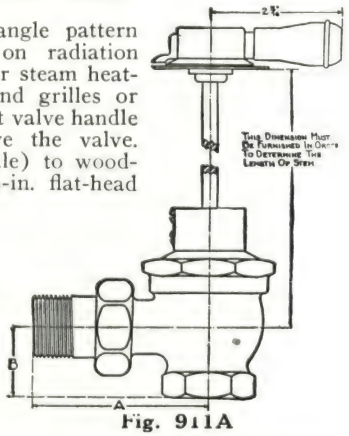


Fig. 911A

Size, in.	Net wt., lb.	Dimensions in inches		List price	Code
		A	B		
½	2	3	1⅛	$ 8.70	Twins
¾	2¼	2⅞	1¼	9.60	Twinkle
1	2¾	3⅛	1½	11.40	Twirl
1¼	3½	3½	1⅝	13.40	Twist
1½	4½	3¾	1⅞	15.90	Twitch

Rough body, nickelplated, with polished trimmings.

Continued on next page

CAPACITIES AND DIMENSIONS OF DUNHAM PACKLESS RADIATOR VALVES (Continued)

Type 120, Flush Type Handle, Extension Stem

This valve, stocked in angle pattern only, is designed for use on radiation having top inlet connection for steam heating work and for radiators under seats. The low bonnet permits a very short extension in cases where room for installation is limited. The cup (beneath handle) is to be countersunk level with top of seat. Fasten it to seat with No. 4 wood screws. Screws not included in price.

A standard extension stem of 12 in. is furnished. Stem may be cut on installation for shorter lengths. Greater length than 12 in. will be supplied at no extra charge, upon order.

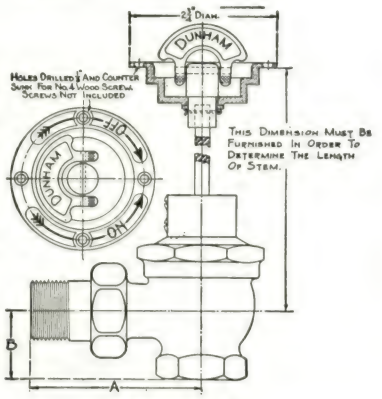


Fig. 912B

Size in.	Net wt. lb.	Dimensions in inches A	Dimensions in inches B	List price	Code
½	2	3	1 1/8	$ 8.70	Tybalt
¾	2 1/4	2 7/8	1 1/4	9.60	Tyburn
1	2 3/4	3 1/8	1 1/2	11.40	Tycoon
1 1/4	3 1/2	3 1/2	1 5/8	13.40	Tying
1 1/2	4 1/2	3 3/4	1 7/8	15.90	Tyler

Rough body, nickel plated, with polished trimmings.

TYPE 130

Size in.	Net wt. lb.	Dimensions in inches A	Dimensions in inches B	Dimensions in inches C	List price	Code
½	2 3/4	3	1 1/8	3 13/16	$12.90	Udder
¾	3	2 7/8	1 1/4	3 13/16	13.80	Ugly
1	3 1/4	3 1/8	1 1/2	4	15.60	Ugric
1 1/4	4 1/4	3 1/2	1 5/8	4 3/16	17.60	Uhlan
1 1/2	5 1/4	3 3/4	1 7/8	4 7/8	20.10	Ukase

Type 125, Lever Handle, Geared Extension Stem

This valve, stocked in angle pattern only, can be used on radiation having top inlet connection for steam heating work, for radiators behind grilles or under seats with the handle located on front of grille or seat.

Fasten the plate (under handle) to wood-work or grille with three ⅛-in. flat-head screws or bolts. Screws and bolts not included in price.

A standard extension stem of 12 in. is furnished. Stem may be cut on installation for shorter lengths. Greater length than 12 in. will be supplied at no extra charge, upon order.

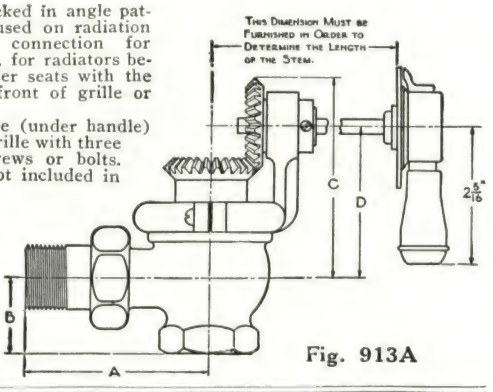


Fig. 913A

Size in.	Net wt. lb.	Dimensions in inches A	Dimensions in inches B	Dimensions in inches C	Dimensions in inches D	List price	Code
½	2 1/4	3	1 1/8	3 3/8	2 9/16	$12.90	Typhoid
¾	2 1/2	2 7/8	1 1/4	3 3/8	2 9/16	13.80	Typhoon
1	3	3 1/8	1 1/2	3 9/16	2 3/4	15.60	Typist
1 1/4	3 3/4	3 1/2	1 5/8	3 3/4	2 15/16	17.60	Typog
1 1/2	4 3/4	3 3/4	1 7/8	4 3/16	3 3/4	20.10	Tyrant

Rough body, nickel plated, with polished trimmings.

TYPE 170

Size in.	Net wt. lb.	Dimensions in inches A	Dimensions in inches B	Dimensions in inches C	List price	Code
½	2 1/2	3	1 1/8	3 5/16	$12.90	Unborn
¾	2 5/8	2 7/8	1 1/4	3 1/2	13.80	Unbraid
1	3 1/8	3 1/8	1 1/2	3 3/8	15.60	Uncage
1 1/4	4 1/8	3 1/2	1 5/8	3 7/8	17.60	Uncanny
1 1/2	4 7/8	3 3/4	1 7/8	4 7/8	20.10	Uncap
2	6 3/8	4 3/8	2 1/4	5 1/8	25.70	Unchain

Type 130, Gear and Chain Valve

This valve, stocked in angle pattern only, is for use on ceiling radiators or radiators located high up on walls. It is operated from the floor by means of a chain. Length of chain to reach 5 ft. is furnished. No extra charge for longer chain. For steam heating work.

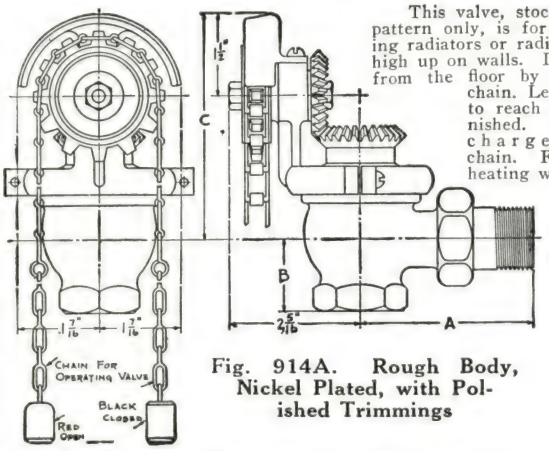


Fig. 914A. Rough Body, Nickel Plated, with Polished Trimmings

(See Dimensions Table in Column 1)

Type 170, Wheel and Chain Valve

The valve, stocked in angle pattern only, is designed for use on ceiling radiation or radiators located high up on walls. It is operated from the floor by means of chain. Standard length of chain to reach 5 ft. below valve is furnished; if longer chain is desired, state additional length required. No extra charge for longer chain.

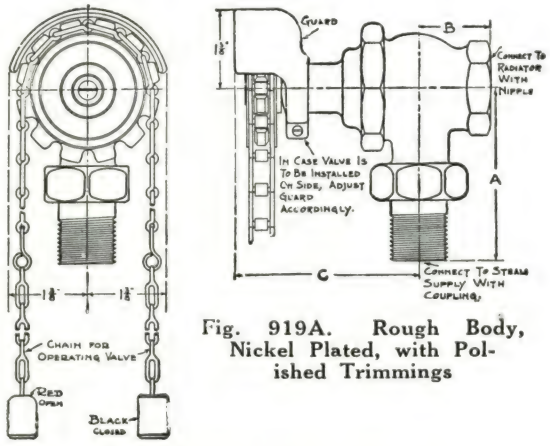


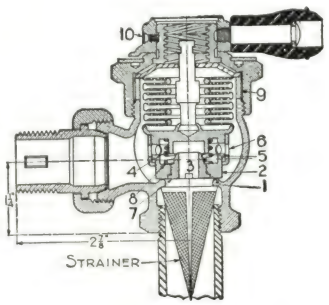
Fig. 919A. Rough Body, Nickel Plated, with Polished Trimmings

(See Dimensions Table in Column 1)

Type 180, Heat Control Valve

This valve is stocked in ¾ in. size angle pattern only. Its net weight is 1¾ lbs. It is peculiarly suited for use with the Dunham Differential Heating System, and gives precise control of the individual radiators. It gives the room occupant the opportunity of reducing or increasing room temperatures to suit individual taste.

In the "cooler," "normal" and "warmer" positions the valve disc (2) is in contact with seat (1). The steam flows through the port (3) in regulating bushing (7), the governing flow area being that between seating surface (5) of regulating bushing and regulating valve seating surface (4). After passing this point the steam enters the radiator through openings in sleeve (6) and valve outlet. Spring (8) serves to hold the valve disc (2) in contact with seat (1), against the frictions of the parts, in each of these positions. In "Off" position the valve is in contact with seat owing to the thrust of the regulating valve.



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DUNHAM PACKLESS RADIATOR VALVES (Continued)

Types 140, 141, 142, 143 Wheel Handle

This valve can be used on one-pipe or two-pipe steam heating work and for either hot water type or steam type radiation. The valve will be supplied, at no extra cost, with a ⅛-in. weep hole through valve seat in cases where short down weed risers are dripped through the valve into the radiator as shown in Fig. 839A, page 37.

Any size can be supplied with Regulating Plate but for convenience in ordering Type 140, ½-in. and ¾-in. valves with Regulating Plate, it is assigned Type No. 145 as shown in opposite column.

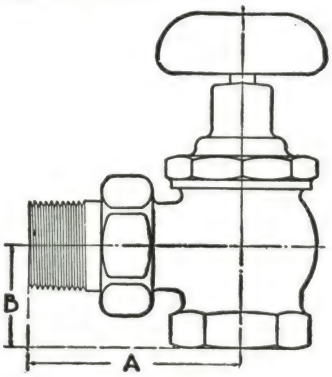


Fig. 921A
Angle Pattern

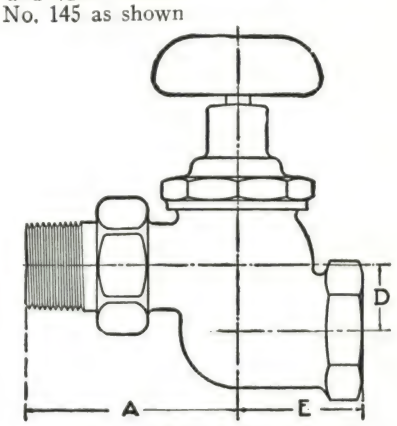


Fig. 922A
For S. W., R. H., L. H.

For R. H. and L. H. pattern valve, use same dimensions as straightway except inlet is located at right angles to outlet

Size, in.	Net weight, lb.		Dimensions in inches				List price
	Angle	SW.—RH. LH.	A	B	D	E	
½	1 5/8	1 3/4	3	1 1/8	5/8	1 3/8	$ 6.30
¾	1 3/4	2 1/4	2 7/8	1 1/4	¾	1 5/8	7.20
1	2 1/4	2 3/4	3 1/8	1 1/2	1	1 7/8	9.00
1 1/4	3 1/4	3 3/4	3 1/2	1 5/8	1 1/8	2 1/16	11.00
1 1/2	4	5	3 3/4	1 7/8	1 1/4	2 5/16	13.50
2	5 3/4	6 1/4	4 3/8	2 1/4	1 1/2	2 11/16	19.10

Rough body, nickel plated, with polished trimmings.
Can be supplied with regulating plate without additional charge.
In ordering it is necessary to specify pattern.

Size, in.	Code			
	Angle type 140	Straightway type 141	Right hand type 142	Left hand type 143
½	Antawny	Sytawny	Ritawny	Letawny
¾	Antepid	Sytepid	Ritepid	Letepid
1	Antidal	Sytidal	Ritidal	Letidal
1 1/4	Antoast	Sytoast	Ritoast	Letoast
1 1/2	Antunic	Sytunic	Ritunic	Letunic
2	Antwang	Sytwang	Ritwang	Letwang

Type 145, Wheel Handle and Regulating Plate

This is the ½ in. and ¾-in. Type 140 valve (shown in opposite column) but supplied with Regulating Plate when ordered under Type No. 145. Stocked only in angle pattern.

It is identically the same valve with the above exception and can be used on two-pipe steam heating work and for either hot water type or steam type radiation.

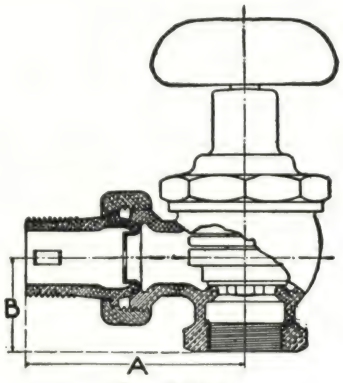


Fig. R915A

Size, in.	Capacity sq. ft. direct rad.	Net wt., lb.	Dimensions in inches		List price	Code
			A	B		
½	1-25	1 5/8	3	1 1/8	$6.30	Antawnreg
¾	26-170	1 3/4	2 7/8	1 1/4	7.20	Antepreg

When ordering, give list of radiator sizes in square feet so that correct regulating plate may be shipped. *Regulating plate should not be installed in valve until after heating system has been blown off and is clean.*

For Valve Type 145 use following pipe sizes.

Square feet direct radiation	Supply		
	Inlet valve, in.	Vertical pipe to inlet valve, in.	Horizontal runout to riser, or the spring-piece to main from a first floor radiator, in.
1– 25	½	½	¾
26– 80	¾	¾	1
81–140	¾	¾	1 1/4
141–170	¾	¾	1 1/2

Use pipes one size larger for horizontal connections over 8 ft. 0 in. long.
Grade horizontal connection with a fall not less than ½-in. per foot.

Types 150, 151, 152, 153 Lock and Shield

This valve can be used on one-pipe or two-pipe steam heating work and for either hot water type or steam type radiation.

Key for opening valve, 30 cents net. When ordering, specify valve type number and also state which size key is required.

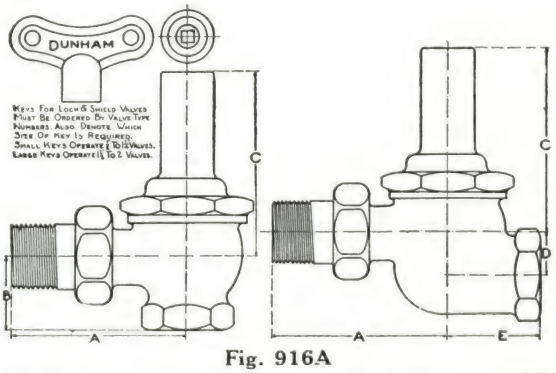


Fig. 916A

For R. H. and L. H. Patterns, use same dimensions as straightway except inlet is located at right angles to outlet

Small keys operate ½-in. to 1¼-in. valves. Large keys operate 1½-in. to 2-in. valves.

Size, in.	Net wt., lb.		Dimensions in inches					List price
	Angle	SW. RH. LH.	A	B	C	D	E	
½	1 3/8	1 3/4	3	1 1/2	3 3/16	5/8	1 3/8	$ 7.30
¾	1 5/8	2	2 7/8	1 1/4	3 3/16	¾	1 5/8	8.20
1	2 1/8	2 3/4	3 1/8	1 1/2	3 13/32	1	1 7/8	10.00
1 1/4	3	3 1/2	3 1/2	1 5/8	3 19/32	1 1/8	2 1/16	12.00
1 1/2	4 1/4	5 1/4	3 3/4	1 7/8	4 5/16	1 1/4	2 5/16	14.50
2	6	6 3/4	4 3/8	2 1/4	4 7/8	1 1/2	2 11/16	20.10

Rough body, nickel plated, with polished trimmings.
Can be supplied with regulating plate without additional charge.
In ordering it is necessary to specify pattern.

Size, in.	Code			
	Angle type 150	Straightway type 151	Right hand type 152	Left hand type 153
½	Anulcer	Syulcer	Riulcer	Leulcer
¾	Anultimo	Syultimo	Riultimo	Leultimo
1	Anultra	Syultra	Riultra	Leultra
1 1/4	Anumbel	Syumbel	Riumbel	Leumbel
1 1/2	Anumberry	Syumberry	Riumberry	Leumberry
2	Anumbrage	Syumbrage	Riumbrage	Leumbrage

Continued on next page

DUNHAM PACKLESS RADIATOR VALVES (Continued)

Types 155, 156, 157, 158, Wheel Handle, Plain Extension Stem

Recommended for radiators behind grilles or under seats of such design that valve handle can be placed directly above the valve. Fasten the plate (under handle) to woodwork or grille with three ⅛ in. flat head screws or bolts. Screws and bolts not included in price.

Types 160. 161, 162, 163, Flush Handle, Extension Stem

Recommended for radiators under seats. The cup (beneath handle) is to be counter-sunk level with top of seat. Fasten it to seat with No. 4 wood screws. Screws not included in price.

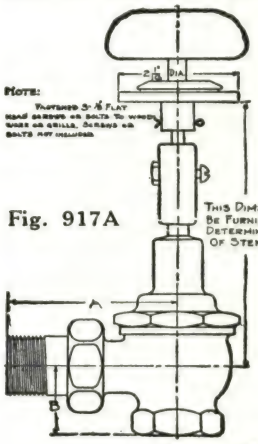
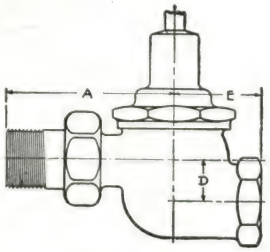


Fig. 917A

These valves can be used on one-pipe or two-pipe steam heating work and for either hot water or steam type radiation. A standard extension of 12 in. is furnished. Steam may be cut on installation for shorter lengths. Greater lengths than 12 in. supplied on order at no extra charge. Rough body, nickel plated with polished trimmings. Supplied with Type 192 regulating plate at no additional charge. In ordering specify pattern.

DIMENSIONS OF TYPES 155, 156, 157, 158, 160, 161, 162 AND 163

Size, in.	Dimensions in inches A	B	D	E
½	3	1⅛	⅝	1⅜
¾	2⅞	1¼	¾	1⅝
1	3⅛	1½	1	1⅞
1¼	3½	1⅝	1⅛	2 1/16
1½	3¾	1⅞	1¼	2⅝
2	4⅜	2¼	1½	2 11/16



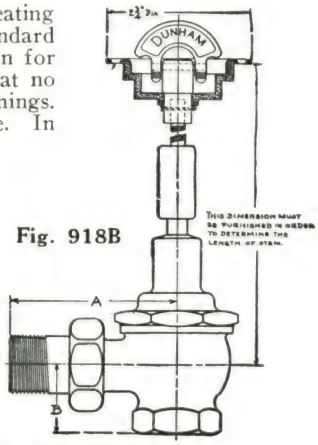


Fig. 918B

SIZES, WEIGHTS, LIST PRICES AND CODE FOR TYPES 155, 156, 157, 158, 160, 161, 162 AND 163

Size, in.	Net weight in lbs. Types 155, 156, 157 and 158 Angle	S.W. R.H. L.H.	Types 160, 161, 162 and 163 Angle	S.W. R.H. L.H.	List price	Code for Types 155, 156, 157, 158 Angle Type 155	Straightway Type 156	Right hand Type 157	Left hand Type 158	Code for Types 160, 161, 162, 163 Angle Type 160	Straightway Type 161	Right hand Type 162	Left hand Type 163
½	2⅛	2¼	1 15/16	2 1/16	$ 8.70	Anumbrella	Syumbrella	Riumbrella	Leumbrella	Anunback	Syunback	Riunback	Leunback
¾	2¼	2¾	2 1/16	2 9/16	9.60	Anumpire	Syumpire	Riumpire	Leumpire	Anunbar	Syunbar	Riunbar	Leunbar
1	2¾	3¼	2 9/16	3 1/16	11.40	Anunable	Syunable	Riunable	Leunable	Anunbated	Syunbated	Riunbated	Leunbated
1¼	3¾	4¼	3 9/16	4 1/16	13.40	Anunadvise	Syunadvise	Riunadvise	Leunadvise	Anunbelt	Syunbelt	Riunbelt	Leunbelt
1½	4½	5½	4¼	5¼	15.90	Anunapt	Syunapt	Riunapt	Leunapt	Anunbind	Syunbind	Riunbind	Leunbind
2	6	6¾	5¾	6½	21.50	Anunarmed	Syunarmed	Riunarmed	Leunarmed	Anunblest	Syunblest	Riunblest	Leunblest

DUNHAM THERMOSTATIC RADIATOR TRAPS

For Maximum Pressures of 15-lb. Gauge

Used principally in steam heating work. Installed on all forms and types of radiation and to risers for dripping purposes.

Maximum operating pressure is 15 pounds gauge, corresponding to limit set on low pressure heating boilers by the A.S.M.E. code. Must not be used on pressures exceeding 15 pounds.

Made in five sizes; are automatic in action within the fixed range of pressures and corresponding temperatures for which they are made. Need no adjusting upon installation. Each trap tested and adjusted before leaving factory. Adjustment must not be tampered with. Thermostatic disc must never, for any reason, be removed from the trap cover.

Angle Pattern | Straightway Pattern | Right Hand Pattern | Left Hand Pattern

Fig. 867

SPECIFICATIONS AND PRICE LIST

(For pressures not exceeding 15 pounds gauge)

Size	Style	Tapping	Capacity direct radiation sq. ft.	Net weight	List	Code	Dimensions in in. A	B	C	D	E
No. 1A	A.P.	½ inch	100	22 oz.	$8.00	Atom	3⅜	1⅛	...	2 7/16	...
	S.W.	½ inch	100	22 oz.	8.00	Atude	3¼	...	1¾	2 7/16	½
	R.H.	½ inch	100	22 oz.	8.00	Attos	3¼	...	1¾	2 7/16	½
	L.H.	½ inch	100	22 oz.	8.00	Atwan	3¼	...	1¾	2 7/16	½
No. 2B	A.P.	½ inch	350	27 oz.	10.00	Abhor	3¼	1⅛	...	3 1/16	...
	S.W.	½ inch	350	28 oz.	10.00	Abbey	3¼	...	1¾	3 1/16	½
	R.H.	½ inch	350	28 oz.	10.00	Abate	3¼	...	1¾	3 1/16	½
	L.H.	½ inch	350	28 oz.	10.00	Abyss	3¼	...	1¾	3 1/16	½
No. 3A	A.P.	¾ inch	800	28 oz.	12.00	Alp	3 5/16	1 3/16	...	3 1/16	...
	S.W.	¾ inch	800	30 oz.	12.00	Alper	3 5/16	...	1¾	3 1/16	½
	R.H.	¾ inch	800	30 oz.	12.00	Alpine	3 5/16	...	1¾	3 1/16	½
	L.H.	¾ inch	800	30 oz.	12.00	Alpest	3 5/16	...	1¾	3 1/16	½
No. 4A	A.P.	¾ inch	1500	5 lbs.	18.00	Drink	2¼	2 1/16	3¾	5	...
	S.W.	¾ inch	1500	5 lbs.	18.00	Drench	2¼	2 1/16	3¾	5	15/16
No. 5A	A.P.	1 inch	3000	6 lbs.	24.00	Drizzle	2 5/16	2 5/16	4	5	...
	S.W.	1 inch	3000	6 lbs.	24.00	Drift	2 5/16	2 5/16	4	5	15/16

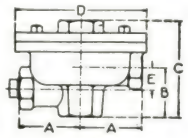
The Nos. 1A and 2B Traps are used almost exclusively on radiators. The No. 3A Trap is used for large radiators, for medium sized pipe coils, and is adaptable for dripping risers and short runs of small steam piping. The Nos. 4A and 5A Traps are used where traps of large capacity are required on large pipe coils and blast heaters.

The Nos. 1A and 2B Traps conform with the standard dimension "A" (3¼ in.) as adopted by the Heating and Piping Contractors' National Association for ½ in. radiator traps.

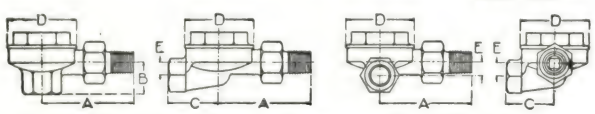
The Nos. 1A, 2B and 3A Traps are regularly furnished nickelplated, and with union nut and nipple, threaded right hand. Supplied in all patterns. Bronze body and cover.

The Nos. 4A and 5A Traps are painted battle ship gray and furnished in either angle or straightway patterns with female right hand threaded connections, both inlet and outlet. Cast iron body and cover.

When not otherwise stipulated on order the regular Angle Pattern Traps of size called for will be shipped.



Traps Nos. 4A and 5A



Angle Pattern | Straightway pattern | Right Hand Pattern

Traps Nos. 1A, 2B and 3A

(Dimensions of Left Hand Pattern are the same as those of the Right Hand Pattern)

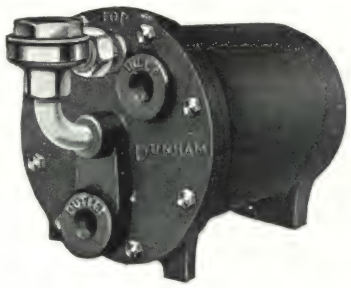
Fig. 805

Continued on next page

THE DUNHAM FLOAT AND THERMOSTATIC TRAP

For Pressures Not Exceeding 15-lb. Gauge

These traps quickly handle large volumes of water on sudden calls for maximum duty. They open automatically for water and air and close for steam. They are suitable for either gravity or vacuum return line heating systems. The water is handled by the float valve, so constructed that the opening is always sealed with water with no opportunity for steam leakage. The air is handled by the thermostatic valve. They combine the Dunham Thermostatic Principle with the float. The thermostatic valve adjusts itself slowly like a thermometer to the temperature conditions present, while the float valve permits a continuous flow of water at a rate within its capacity limits, to keep the heaters or mains free from air and water, without waste of steam.



They may be applied to any type or make of cast iron or pipe coil blast heater. They are unsurpassed for dripping low-pressure steam mains and risers, vento heaters, unit heaters, blast coils, domestic hot water heaters, dry kilns, milk condensers, evaporators, paper machines and any industrial heater in which low pressure steam (not exceeding 15-lb. gauge) is used as a heating medium.

This type of trap not only drains the heater of its water of condensation but automatically releases the air, thus the highest possible heating efficiency is obtained, which results in the operation of the equipment at its maximum potential output.

In many industrial processes it is desirable to operate on a vacuum in the return line, a condition this is fully met in this type of trap.

Specifications and Price List

For Pressures Not Exceeding 15-lb. Gauge

Capacities given are based upon a condensation rate of ¼ lb. per sq. ft. of cast iron direct radiation per hour at a present difference of 1 lb. per sq. in. These capacities are maximum on heating installations, as the majority of these operate on small pressure differences. However, in connection with installation where the difference is constantly maintained greater, the capacity can be increased, as shown on Fig. 947D.

All traps have right-hand female tappings.

Trap No.	Size of tappings, in.	Cap. sq. ft. equi. dir. rad.	Net wt. lb.	Dimensions, inches							List price	Code
				A	B	C	D	E	F	G		
22C	¾	3000	14	11¼	6⅜	9⅛	1⅝	3¼	¾	5½	$32.00	Bloater
23C	1	4000	15	11¼	6⅜	9⅛	1⅝	3¼	¾	5½	36.00	Blockade
16C	¾	6000	24	14⅛	7⅞	10½	1⅜	4¼	1½	7⅞	48.00	Blare
17C	1	7000	24	14⅛	7⅞	10½	1⅜	4¼	1½	7⅞	52.00	Blazon
18C	1¼	9000	33	15½	9⅝	12⅛	2		1¾	9½	64.00	Blest
19C	1½	11000	33	15½	9⅝	12⅛	2		1¾	9½	68.00	Blithe
20C	2	16000	42	19¾	11⅞	15½	2¼	6⅞	1⅞	9⅝	80.00	Blink

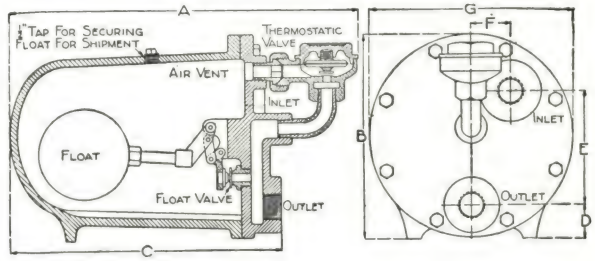


Fig. 1161A. Traps Nos. 16C, 17C, 18C, 19C and 20C

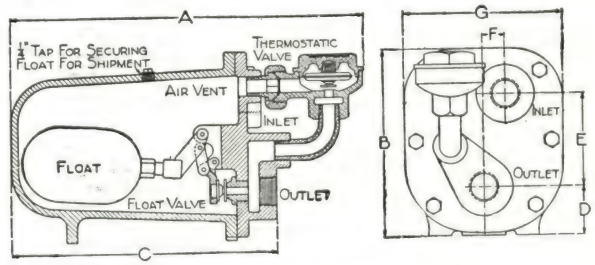


Fig. 1162A. Traps Nos. 22C and 23C

Capacities of Vento or Blast Heaters

The condensing capacities of blast heaters vary greatly with the service, the quantity and temperature of air to be handled, the velocity through the heater, etc. Each individual stack has a different rate of condensation, according to its position in the heater, subject also to the various conditions of service mentioned. It is therefore necessary that the condensing capacity of any heater, or in the case of individual stack connections, of any stack be carefully determined for each condition of service, and that the work done be reduced to units of equivalent square feet of direct radiation in order to select the proper trap and boiler capacity as well as steam and return pipe sizes. Considering a four-stack vento heater as a unit operating under average velocity conditions with inlet air at zero, its average rate of condensation per foot of heating surface will be from 6 to 8 times that of a direct radiator. Thus a superficial guide in selecting trap capacity would be to multiply the actual surface of the total heater by 6 or 8 and obtain an approximate of the equivalent heating surface in terms of square feet of direct radiation.

The manufacturers of the several commercial types of blast heaters give information as to how to determine the condensing rate in pounds of water per sq. ft. of their heaters under varying conditions.

The accompanying illustrations will show the proper methods of installation for vento heaters, and give the general idea of how the piping must be installed. Special details will gladly be furnished upon application showing connections to any other heater.

In applying these traps to vento heaters the supply and return connections must be at opposite ends of each stack. Where stacks are made up of 17 or more sections take an additional vent out of center vento section of each stack in heater using Dunham No. 1A Trap as shown. The Float and Thermostatic Traps may be installed in battery, or individually to each vento stack and connected as shown on following pages. When used individually the condensing rate of each stack must be independently determined in terms of equivalent direct radiation and ample trap capacity furnished. It must be remembered that the condensation rate in the first stack receiving the cold air is very high. When used in battery connection the trap capacity is determined for the entire heater as a unit. For heaters installed in two or more tiers, each tier is to be independently equipped with Float and Thermostatic Traps and connections made in similar manner for both tiers. The same applies when two or more groups of heaters are used.

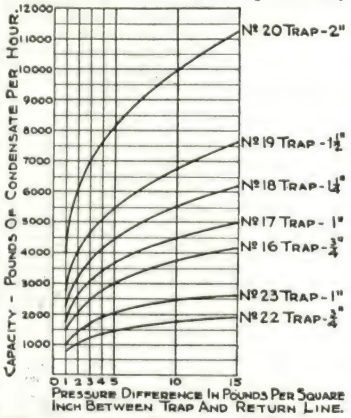


Fig. 947D. Float and Thermostatic Trap Capacities at Various Pressure Differences

To find square feet direct radiation, multiply pounds of condensation per hour by 4

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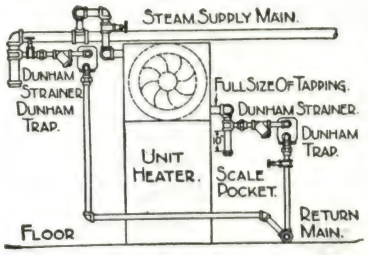


Fig. 982A

Methods of draining a Unit Heating System using Dunham Traps of sizes required

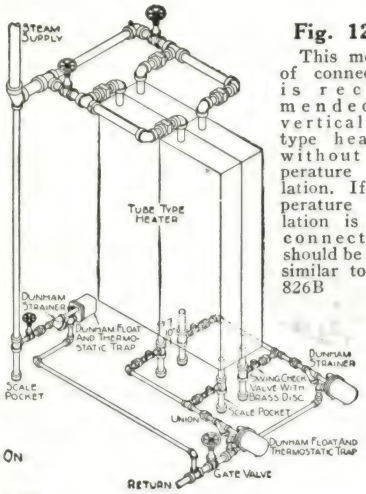


Fig. 1200

This method of connection, is recommended for vertical tube type heaters without temperature regulation. If temperature regulation is used connections should be made similar to Fig. 826B

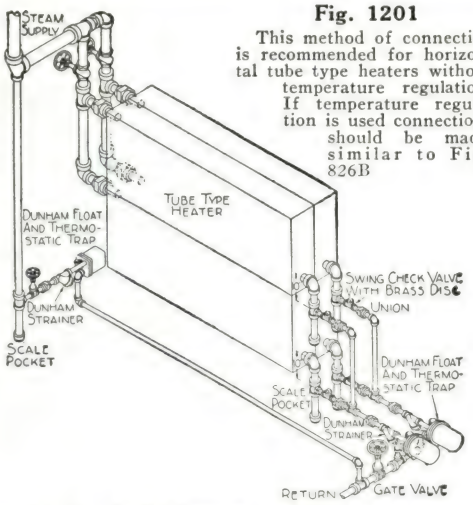


Fig. 1201

This method of connection is recommended for horizontal tube type heaters without temperature regulation. If temperature regulation is used connections should be made similar to Fig. 826B

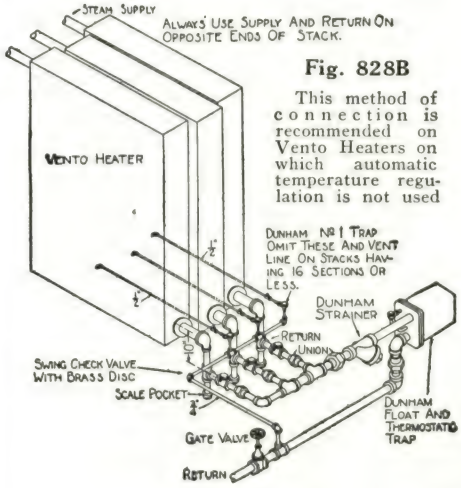


Fig. 828B

This method of connection is recommended on Vento Heaters on which automatic temperature regulation is not used

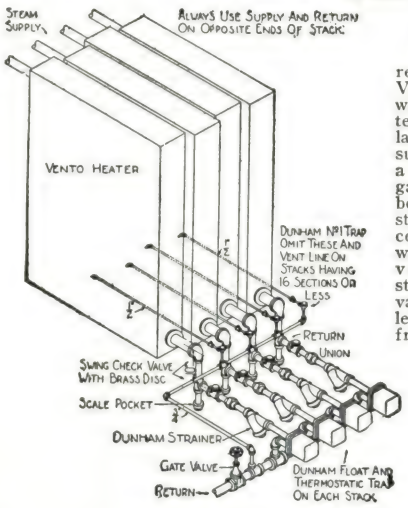


Fig. 826B

This method is recommended on Vento Heaters on which automatic temperature regulation is used. On such installations a hand controlled gate valve should be used on inlet of stack closest to the cold air intake, with no automatic valve on this stack. The gate valve should be left open during freezing weather

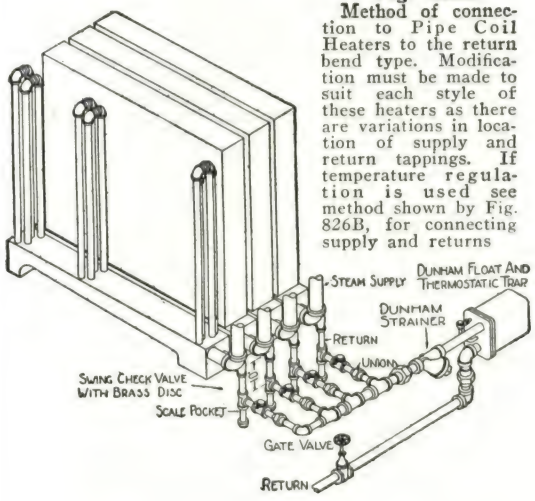


Fig. 822B

Method of connection to Pipe Coil Heaters to the return bend type. Modification must be made to suit each style of these heaters as there are variations in location of supply and return tappings. If temperature regulation is used see method shown by Fig. 826B, for connecting supply and returns

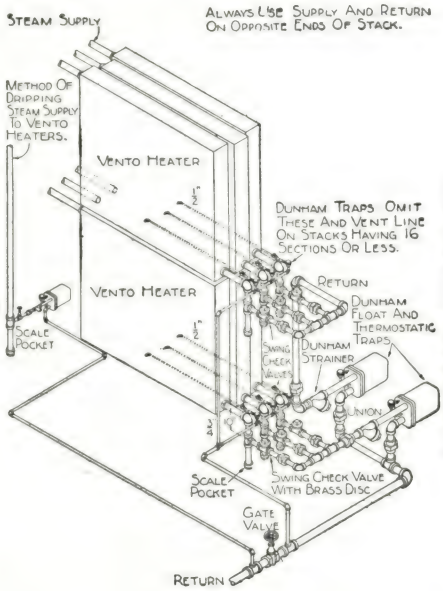
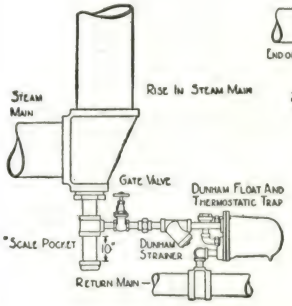


Fig. 1164A

Method shown in Fig. 1164A is recommended on double tiered Vento Heaters. If temperature regulation is used, a gate valve should be used on the inlet of the tier closest to the cold air intake, no automatic valves on this tier. This gate valve should be left open during freezing weather, also the return connection for each tier, to be made as shown in Fig. 826B



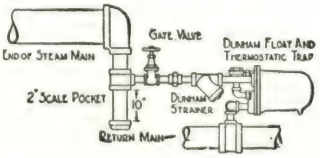


Fig. 925B

Method of dripping end of steam main

Fig. 924B

Method of dripping rise in steam main

Scale Pockets

Figs. 925B and 924B

When a Dunham Trap is used for dripping steam piping it should be installed with at least four feet of connecting pipe between it and the point dripped. A liberal scale pocket should be provided, also a gate valve and strainer in the connection to the trap. Scale pockets should never be smaller than a 2-in. pipe, with 3-in. pipe on large and long mains. Pockets should be 10 in. or more deep, as large space is necessary for collection of dirt.

When used for dripping the end of a steam main, the main should extend not less than 18 in. beyond the last riser connection and be provided with a scale pocket

Continued on next page

THE DUNHAM MEDIUM PRESSURE TRAP

For Pressures from Zero to 60-lb. Gauge

This Trap is designed for service where pressures are higher than those used in low pressure steam heating. It is the outgrowth of a universal demand for a trap using the Dunham thermostatic principle, which will produce good results in medium pressure service. Its field of usefulness is in connection with hospital steam equipment, kitchen fixtures, laundry equipment, and other similar steam apparatus used in industrial process work.

Description

This trap is made in three sizes: ½-in., ¾-in. and 1-in., respectively. It is a thermostatic trap made for pressures from zero to 60-lb. gauge, and the temperatures corresponding within those pressure limits. Like a thermometer, it is suitable for use within the temperature limits for which it is manufactured, and not suitable for use under other conditions.

Trap No. 13B

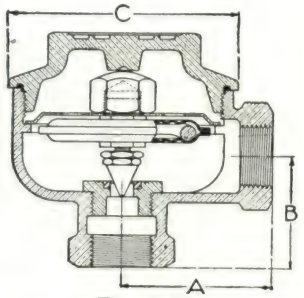


Fig. 1293
Dimension Diagram for 13B, 14B and 15B Medium Pressure Traps

FOR PRESSURES FROM ZERO TO 60-LB. GAUGE

Trap No.	Pipe tapping size, in.	Capacity lbs. water per hr.	Net wt., lb.	Finish	List price	Code	Dimensions inches A	B	C
13B	½	100	2	Nickel Plated	$18.00	Irat	2	1½	3 1/16
14B	¾	200	6	Painted	27.00	Iren	2 3/8	1 9/16	5½
15B	1	400	6¼	Grey	36.00	Irish	2 7/16	1 5/8	5½

Above list subject to prevailing discounts.
When ordering, state the pressure under which each trap is to operate.

Construction

The ½-in. size body and cover is constructed of bronze, the ¾-in. and 1-in. sizes have cast iron bodies and covers. All sizes are fitted with removable valves and seats made of very hard special steam metal, reducing the effect of wire drawing or cutting to a minimum. The reinforced Disc is made of very special phosphor bronze metal formed under pressure. It contains a volatile fluid hermetically sealed within. These traps are non-adjustable. They are tested and adjusted at the factory. The position of the disc in the cover must not be readjusted.

Hotel Kitchens and Restaurants

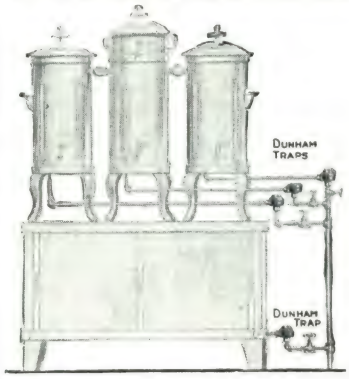


Fig. 833A
This trap is especially well adapted for dripping coffee urns, plate warmers, steam tables, soup kettles and other similar fixtures where medium pressure steam is used

Hospital Fixtures

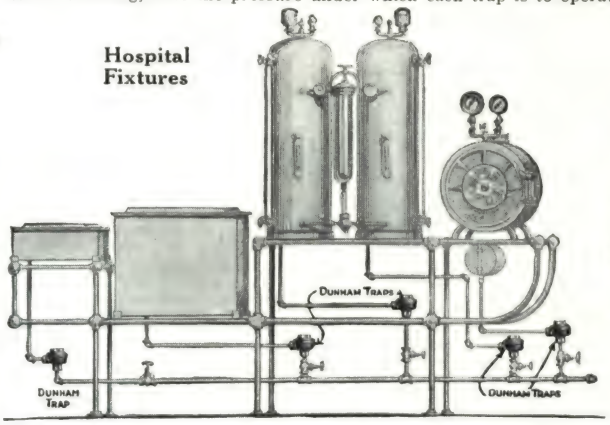


Fig. 834A
When used on hospital fixtures for the operating room, such as sterilizers and distilling apparatus, or in diet kitchens on the steam table, plate warmer, coffee and hot water urns, etc., a saving in the quantity of steam used can be effected since no steam will be wasted into the return line, and the fixtures will be effectively heated

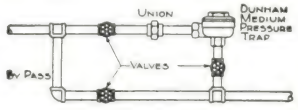


Fig. 836A
Sometimes it is advisable, when dripping medium pressure steam lines, to install the trap with by-pass as shown

Kettles

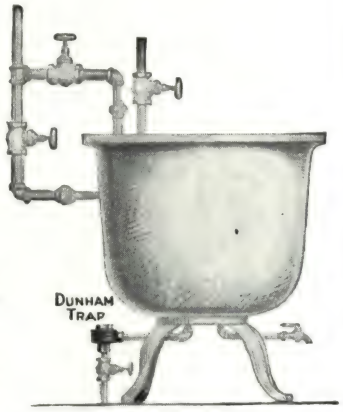


Fig. 835A
As used on an open jacketed steam kettle—candy, soup, or similar cooker

Process Work—Both Quality and Quantity May Be Increased by the Use of Dunham Traps

In many industrial processes, steam is the heat carrying medium. The product being heated or processed is brought into contact with a metal wall, the other side of which is in contact with the steam. In such cases the heat is transmitted principally by conduction. At the surface of the metal wall through which the heat flows there is a film of indefinite thickness. This film offers considerable resistance to the transmission of heat, which may be measured by the temperature difference between the exterior edge of the fluid film, as t_1 and t_2 in Fig. 974. The amount of heat flowing through a unit of the heating surface depends greatly on the character of the film surface. Where the film is a hot gas the resistance is very high and a large portion of the available temperature difference is required to force the heat flow through the film. If the fluid film is liquid, as of condensing steam, the resistance to heat flow is relatively low and the rate of heat transmission through the surface is very high. See Fig. 975. The Dunham Radiator, Medium Pressure, and Float and Thermostatic Traps release the air from the heating surface, thus permitting the interior surface film to be liquid (such as condensed steam) rather than gaseous (such as air), with consequent high rate of heat flow. As a result of the maximum heat head being available at the surface of the metal, high efficiency of the equipment is obtained.

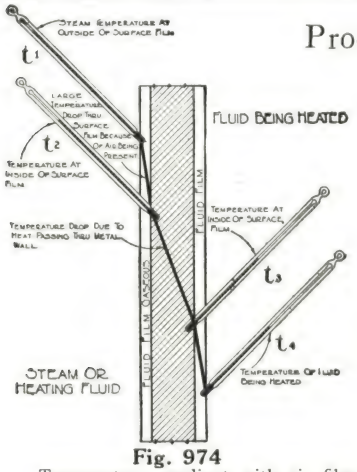


Fig. 974
Temperature gradient with air film on heating medium side. Shows loss of heat head due to presence of air

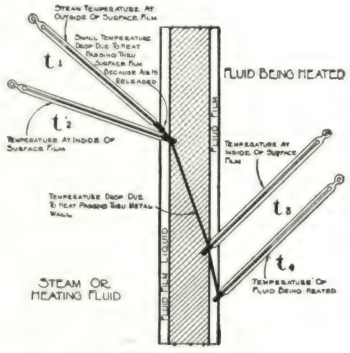


Fig. 975
Temperature gradient with no air film on heating medium side. Shows no loss in heat head on account of presence of air

Continued on next page

THE DUNHAM AIR LINE VALVE

For Pressures Not Exceeding 15-lb. Gauge

The air line valve is an automatic air valve for use on radiators but only in connection with air line piping into which it must discharge. It is positive in action, opening for the passage of air, closing against the passage of steam. It is non-adjustable. Its principle of operation is identical with the Dunham Radiator Trap. It is neat in appearance. It is particularly applicable where an automatic valve that cannot be easily tampered with is desired. It cannot discharge the bad smelling radiator air into the room, or blow steam on the wall paper, or leak water on the floor.

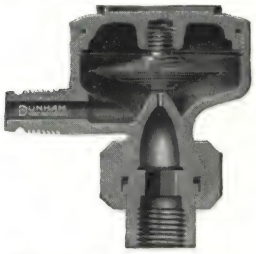


Fig. 843A. Sectional Drawing Showing Main Parts

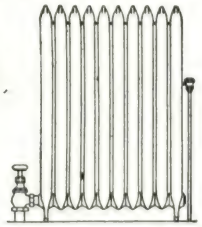


Fig. 845. Method of Attaching to Radiator on Air Line System

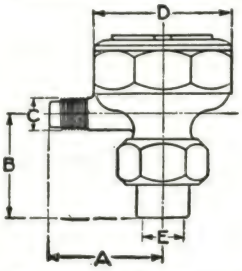


Fig. 846A. Dimension Diagram

DIMENSIONS IN INCHES

Size	Net wt.	List	Code	A	B	C	D	E
⅛x¼	8 oz.	$4.00	Turkey	1½ in.	15/16 in.	⅛ in.*	¾ in.	¼ in.**
¼x¼	10 oz.	4.00	Tokio	1½ in.	15/16 in.	¼ in *	¾ in.	¼ in.**

*Pipe Thread. **Pipe Tap.

These valves are furnished rough body, nickel-plated with union nut and nipple. The ⅛x¼ size will be supplied on all orders unless otherwise stipulated.

Special length of union nipples can be supplied, where required to replace other makes of air line valves. Estimates furnished on receipt of particulars.

THE DUNHAM AIR CHECK

⅜-in. Pipe Thread

Type 222

The Dunham air check is applied in the vent opening of Air Eliminator Type 220B on Return and Home Heating Systems. (See pages 31 and 33.) It releases the air at the slightest pressure, but prevents its re-entrance into the system under a receding fire.

Made also for venting accumulator tanks on Dunham Vacuum Return Line Systems and Dunham Differential Vacuum Heating Systems. See pages 18, 53 and 54.

List price—$2.00 subject to prevailing discount.

Code—Vascheck.

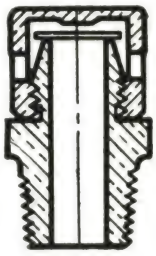


Fig. 981

THE DUNHAM AIR ELIMINATOR

Type 220B for Dunham Home Heating and Return Heating Systems

Used to vent the air from the return piping in the Dunham Home Heating and Return Heating Systems. It prevents water from escaping. It is always open to atmosphere except when pressure on the boiler causes the water to close the mechanism.

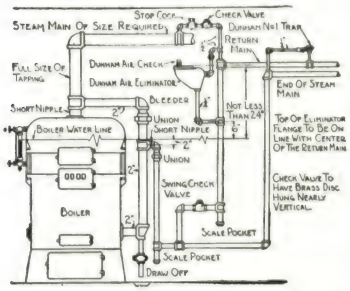


Fig. 860D. Method of Installing Eliminator Type 220B on Installations Using Boiler with One Supply Tapping

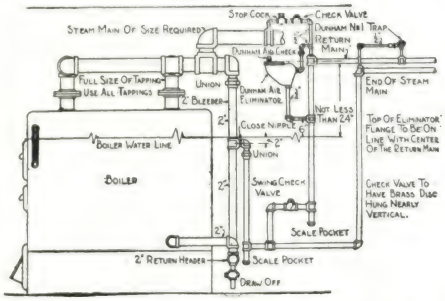


Fig. 937C. Method of Installing Eliminator Type 220B on Installations Using Boiler with Two or More Supply Tappings

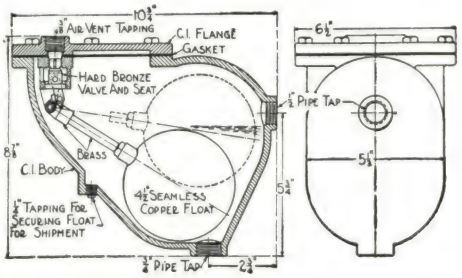


Fig. 1205

Type No.	Tappings, in. Bottom	Side	Air vent (top)	Cap. sq. ft. direct rad.	List price	Net wt., lb.	Code
220B	¾	½	⅜	2,000	$30.00	21¾	Vasold

Includes Dunham Air Check (Type 222) above to be placed in ⅜-in. vent tapping.

Type 221A for Vapor Installations Having More Than 2,000 Sq. Ft. Direct Radiation

It is open to atmosphere except when pressure on boiler causes the float to rise thus closing the air vent. The detail, Fig. 938A, illustrates typical method of installing this eliminator.

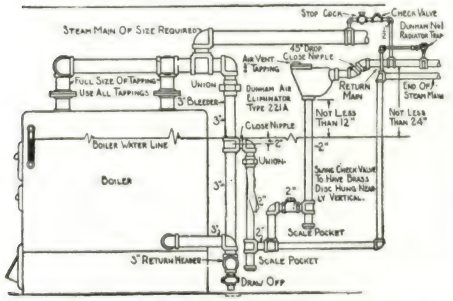
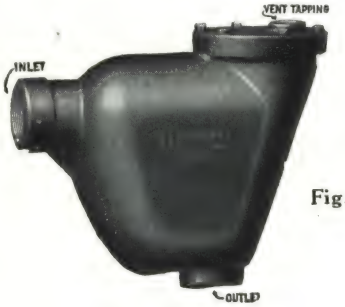


Fig. 938A. Method of Installing Eliminator Type 221A



Type 221A

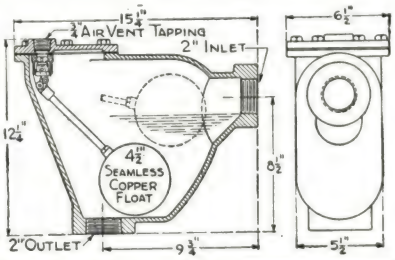


Fig. 961A

Type No.	Tappings, in. Inlet	Outlet	Air vent	Cap. sq. ft. direct rad.	List price	Net wt., lb.	Code
221A	2	2	¾	6,000	$42.00	33	Vascomb

Continued on next page

CHECK VALVES FOR HEATING SYSTEMS

Most check valves on the market have been especially designed for high pressure service, and the main consideration in connection with the design of the disc was that it should withstand the high forces to which it would be subjected. Check valves for application to a steam heating system must be selected from among those which are least objectionable from the standpoint of design, operation and service.

Check valves of type shown in Figs. 941 and 942 offer the least resistance to minimum flow, and will give satisfactory service on heating installations.

Check valves should have both the lugs and hinge pin (A) on disc holder, and the groove in which they rest, properly machined, so the disc (B) is free to move without the tendency to "hang-up."

Check valves of the vertical lift type shown in Fig. 943 should never be used on low pressure heating systems.

The larger the size of check valves, the greater the head of condensate required to open them, consequently check valves should not be installed of larger size nor of heavier construction than required.

It is very important that swing check valves have light weight brass disc. Check valves equipped with composition disc should not be used, because this kind of valve disc is too heavy and there is a possibility of the hot water swelling the composition, which will cause the valve to leak and thus cause difficulty with the heating system.

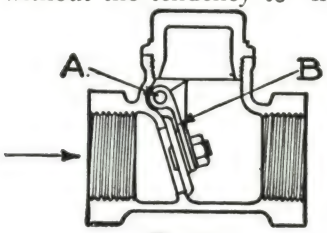


Fig. 941

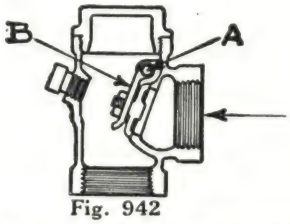


Fig. 942

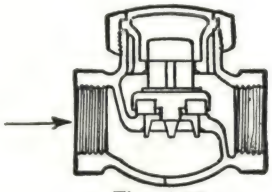


Fig. 943

DUNHAM LIFT FITTINGS

It is of course best practice to design a Vacuum Return Line Heating System without lifts or pick-ups, but sometimes the fitter is confronted with a job where the returns cannot be brought to the vacuum pump in any other way. Type 780 is scientifically designed and will eliminate guess work as to design and uncertainty of operation.

Type 780

These fittings however must never be used on a Differential Vacuum Heating System. They must not be used on a vacuum return line system where steam pressure will not be maintained continuously on the heating mains throughout the entire heating season. They therefore must not be used on the end of steam mains, or where the main rises and drips on the ordinary low pressure vacuum return line system because on these installations the system is allowed to cool down completely during mild days, and water hammer might develop when the system is fired up, before sufficient differential in pressure has been created so as to lift the water out of the steam main.

In most cases by giving careful study to the run of piping the system can be so designed that the apparent need of a lift fitting will disappear.

Avoid lift connections in return main, except right at the vacuum pump, and if needed at this point, arrange it so that all the returns pass through the lift connection.

If it becomes necessary to use lift connections in overcoming obstacles the Dunham Lift Fitting will simplify the connection and eliminate mistakes often made in assembling such connections from standard pipe and fittings.

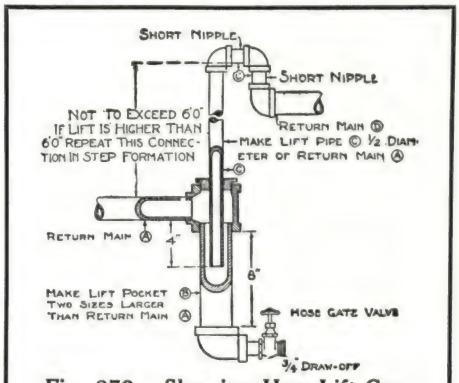


Fig. 879. Showing How Lift Connection in Vacuum Return Main Larger Than 2-in. May Be Built of Pipe and Fittings

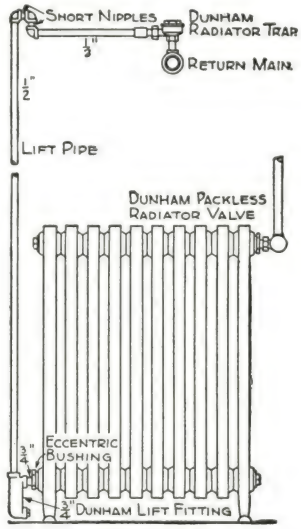


Fig. 958A

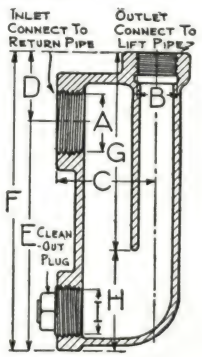


Fig. 954

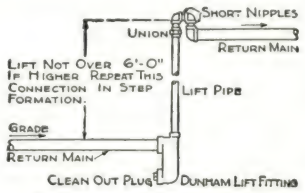


Fig. 957A. Lift Connection for the Return Main of Vacuum Return Line System Located Lower Than Pump Inlet

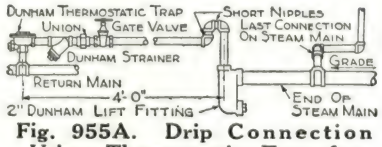


Fig. 955A. Drip Connection Using Thermostatic Trap for Draining a Small Steam Main with Drip Point Below Return. Applies to Vacuum Return Line Systems Only

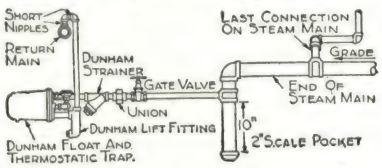


Fig. 956A. Drip Connection Using Float and Thermostatic Trap for Draining Steam Main with Drip Point Below Return. Applies to Vacuum Return Line Systems Only

SPECIFICATIONS AND LIST PRICES OF LIFT FITTINGS

Type	Size, in	Net wt., lb.	Roughing in dimensions in inches									List price	Code
			A	B	C	D	E	F	G	H	I		
780	¾	2½	¾	½	1¾	1⅜	4¾	6⅛	3¾	2⅜	¾	$2.40	Litang
781	1	3	1	½	2⅛	1½	5¼	6¾	4⅛	2⅝	1	2.80	Literal
782	1¼	4	1¼	¾	2½	1¾	6	7¾	5	2¾	1	3.60	Lithium
783	1½	5½	1½	¾	2⅞	2	6⅝	8⅝	5⅝	3	1	4.40	Litigant
784	2	8	2	1	3⅝	2¼	7½	9¾	6¾	3	1	5.60	Litmus

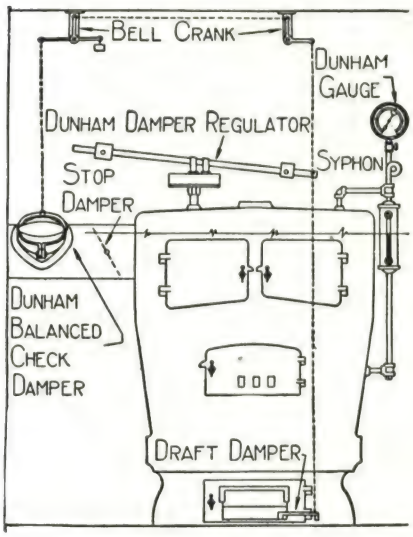
Continued on next page

DUNHAM DAMPER REGULATOR

Types 350 and 351

The Diaphragm Damper Regulator is furnished in two sizes, and is made with a large diameter all metal diaphragm, sensitive for the regulation of pressure in ounces.

Type	Diam., in.	Length of arm, in.	Shipping weight boxed, lb.	Connection, in.	List	Code
350	7	48	30	1	$20.00	Vasing
351	10	48	45	1	27.00	Vasamp



The Type No. 350 7-in. Regulator is for use on the Dunham Return System and is supplied with pulleys. Type No. 351 10-in. Regulator is for use on the Dunham Home Heating System and is supplied with bell cranks as illustrated.

Fig. 859A. Method of Installing Dunham Damper Regulator, Dunham Check Damper to Be Placed at 45° Angle on Smoke Pipe

The pressure within the boiler acts directly on the large diaphragm, causing it to expand or contract as the pressure increases or decreases, and draft and check dampers are closed or opened as required.

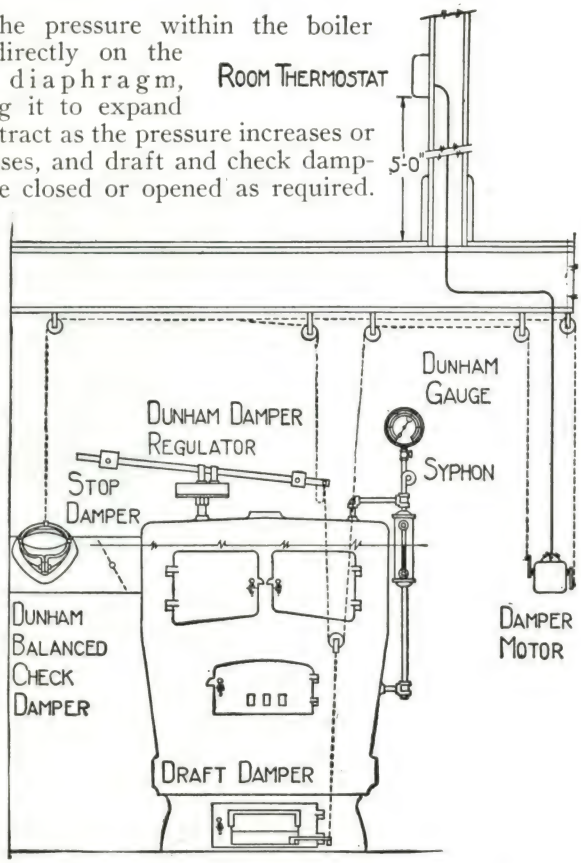


Fig. 1154. Typical Method of Installing Dunham Damper Regulator and Dunham Check Damper in Conjunction with an Electric Damper Motor Operated by a Room Thermostat

THE DUNHAM BALANCED CHECK DAMPER

Type 340. Balanced Check Damper Complete

Saddle

Damper and Ring

This Check Damper is designed with a large opening so that the fire may be checked quickly when the damper is operated, a very important feature for steam heating systems operating on low pressures. It should be installed at an angle of 45° on the horizontal smoke pipe, see Fig. 859A and Fig. 1154.

Type	Description	Ship. wt., lb.	List price	Code
340	9 in. Damper and Ring and 9 in. Saddle*	22	$7.20	Vasupe
341	9 in. Damper and Ring and 10 in. Saddle*	22	7.20	Vasapa
342	9 in. Damper and Ring and 11 in. Saddle*	22	7.60	Vasipi
343	12 in. Damper and Ring and 12 in. Saddle*	30	9.20	Vasoon
345	12 in. Damper and Ring and 14 in. Saddle*	30	9.60	Vasbin
346	12 in. Damper and Ring and 15 in. Saddle*	30	9.60	Vasblu
347	12 in. Damper and Ring and 16 in. Saddle*	30	10.40	Vascot
348	9 in. Damper and Ring only	6½†	4.80	Vascra
349	12 in. Damper and Ring only	15†	5.60	Vasord

*Size of Saddle indicates diameter of smoke pipe it will fit.

†Net weight.

When the smoke pipe is larger than 16 in., the customer must supply a steel saddle, as a part of the smoke pipe, made to fit Check Damper and Ring supplied.

DUNHAM TEMPORARY CAPS

A Temporary Cap is a Trap Cover without the thermostatic disc. These caps permit steam to blow into return to waste, thereby blowing out or cleaning the entire system. They are loaned to the heating contractor and used as a method for clean-out purposes. The permanent cap and disc is removed from the trap body and replaced by a temporary cap which remains there until the entire system has been thoroughly cleaned, when it is removed, the bodies wiped out with a cloth and the permanent cap and disc put back.

Fig. 900 Temporary Cap

Code—Nos. 1A, D1, Capo; Nos. 2B, D2, Capot; Nos. 3A, D3, Capom; Nos. 4A, D4, Capor; Nos. 5A, D5, Capov.

Temporary Caps when supplied to the customer for temporary use will be billed at $1.00 each net. Credit of $1.00 each net will be issued upon receipt of the cap at our factory in good condition.

Customer to pay transportation charges each way.

Continued on next page

THE DUNHAM RETURN TRAP

For Pressures Not Exceeding 15-lb. Gauge

This trap is designed especially for low pressure heating service. It is self-contained and positive in action, having large connections for its capacity and liberal valve areas. It is operated by the raising and lowering of the water which accumulates in and is discharged from the trap. The air port valve remains wide open as the trap is filling and is closed when boiler steam pressure is admitted and the trap is discharging. All its working parts are protected from dust and dirt yet are accessible without removing any piping, Its function is to separate the air and water discharged into the dry return piping by the Dunham Radiator Traps, to release the air, and to return the water to the boiler regardless of the pressure carried in boiler or system within the limit of 15-lb. gauge.

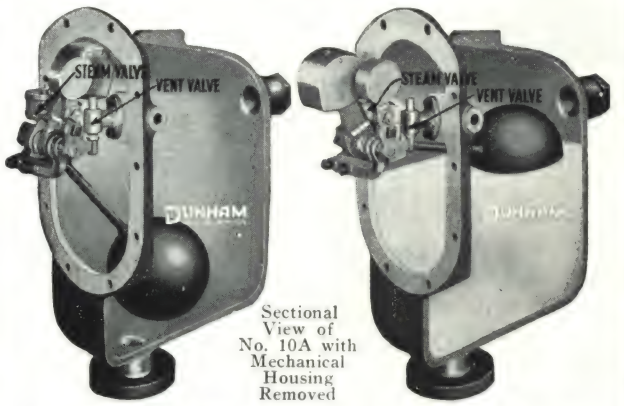
Operation

As boiler pressure increases above the point at which condensate will not return to the boiler by gravity, it collects in the body of the trap, lifting the float as the waterline in the trap rises. Float arm engages with large weight bracket, moving it upward. As large weight moves past center it falls, tripping small weight which closes vent valve. Large weight continues its arc, opening steam valve admitting boiler pressure into trap causing condensate in trap to flow to boiler. The float lowers with the waterline in the trap thus bringing the weights to their original position, closing steam valve and opening vent valve.

Installation

The trap must be installed near the boiler in a level and plumb position with its bottom as high above the boiler waterline as possible.

The capacities are based upon the trap being installed with its bottom at a minimum height of not less than 6 in. above the normal boiler waterline. The piping connections are to be made as shown in the installation illustrations in Dunham Data under Return Heating system (Dunham Pages 31 and 32), using check valves of the horizontal swing type with light weight brass disc.



Sectional View of No. 10A with Mechanical Housing Removed

Fig. 933A. Return Trap Ready to Fill

Steam valve closed, vent valve open

Fig. 934A. Return Trap Ready to Discharge Condensate to Boiler

Steam valve open, vent valve closed

SIZES AND CAPACITIES DUNHAM RETURN TRAPS

These capacities are standard when distance between boiler waterline and bottom of trap is as given. It is possible to increase the capacity with increase in height of trap above waterline.

Return trap Size No.	Distance between boiler water line and bottom trap in inches	Rated capacities sq. ft. direct radiation
9A	6	3000
9A	10	3400
9A	18	3600
9A	24	3800
9A	36	4000
10A	6	5000
10A	10	5400
10A	18	5600
10A	24	5800
10A	36	6000
11A	6	8000
11A	10	8500
11A	18	9000
11A	24	9500
11A	36	10000
12A	6	13000
12A	10	17000
12A	18	18000
12A	24	19000
12A	36	20000

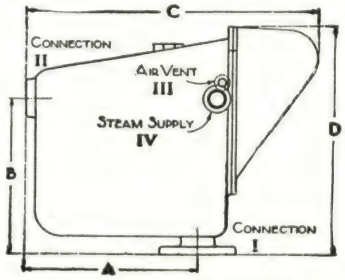


Fig. 863A. For Pressures Not Exceeding 15-lb. Gauge

Note: Prices include Air Eliminator, also Companion Flanges, Bolts, Gaskets, on traps Nos. 10A, 11A, and 12A. Trap 9A has screwed connections, traps Nos. 10A, 11A and 12A have flanged bottom connection. I. Air check is included in price of 9A.

Size No.	Ship. wt., lb.	Conn. sizes. in. I	II	III	IV	Dimensions, in. A	B	C	D	Width overall	List price	Code
9A	120	2	1½	½	1	11¼	13⅜	22⅜	20	9	$90.00	Renine
10A	155	3	2	½	1	12¾	14½	24¼	21¼	9⅜	150.00	Reten
11A	220	3	2½	¾	1½	16	14½	27⅜	21¼	13	200.00	Releven
12A	400	4	3	¾	2	23	14½	34½	21¼	19	300.00	Rewelv

⅜ in. Gauge Glass Set furnished on special order only. $6.00 List, in which case return trap is tapped for gauge glass at no extra charge. Return traps are furnished with connections as listed in Dimension Table. However trap 9A is equipped with 1½ in. bushing and traps 10A, 11A and 12A with reducing flanges making connections 2 in., 2½ in. and 3 in. respectively. Connection II on Trap 9A plugged. Traps 10A, 11A and 12A furnished bushed to ¾ in.

Gauges for Pressures to 200 Lb. and Vacuum to 30-in.

Furnished with steel case, nickelplated ring, silvered dial, male connection, threaded ¼ in. Figures and graduations on pressure side of dial are shown in black, on vacuum side in red.

Size, in.	Type 520 30 lb. steam		Type 530 200 lb.		Type 540 30 in. vacuum	
	List price	Code	List price	Code	List price	Code
5	$ 8.20	Gamedfi	$ 8.20	Gahifi	$ 8.20	Gavafi
6	13.50	Gamedox	13.50	Gahix	13.50	Gavax
8	22.75	Gamedat	22.75	Gahiat	22.75	Gavaat

Size, in.	Type 550 30 in. vacuum 15 lb. pressure		Type 560 30 in. vacuum 30 lb. pressure	
	List price	Code	List price	Code
5	$14.25	Gacofi	$14.25	Gatefi
6	16.50	Gacox	16.50	Gateox
8	30.75	Gacoat	30.75	Gateat

The above prices are for gauges separate from boards.

Low Pressure Gauge

Furnished with black enameled steel case, nickelplated ring and silvered dial, male connections threaded ¼ in.

Type 551

Size	Type	List price	Code
5 in.	551	$12.00	Galovan

This Dunham compound gauge registering 10-lb. pressure and 20-in. vacuum is graduated in ½ lb. divisions on the pressure side of gauge. Figures and graduations on pressure side of dial are shown in black, on vacuum side in red. This gauge is specially designed for the Dunham Home Heating System.

Syphon and Cock

Iron pipe syphon (¼ in.) and brass gauge cock are not included in above prices but will be furnished for $2.00 list. Code word "Sygaco." Install syphon or its equivalent under any steam gauge so that only water can enter the tube.

Continued on next page

DUNHAM PRESSURE REDUCING VALVES

For Reduced Gauge Pressure of 10 Lb. Where Initial Pressure Is from 125 to 40 Lb.

Application—This valve is so designed that pressure does not build up on the low side even with a considerable variation on the high pressure side, except on dead end service when this type of valve is not recommended. Where the initial pressure is greater than 125 lb. it is advisable to first reduce to a medium pressure.

Construction—The body, yoke and diaphragm casing are soft grey iron (except in ¾-in. size in which the body is made of bronze) the balanced valve and seats are a special bronze steam metal; the diaphragm is special para rubber reinforced with heavy weight fabric; the stuffing box, nut, gland, and valve stem are phosphor bronze. In the design and in the selection of its material a reliable and durable device is supplied for the service it must perform.

Sizes and Prices—The Reducing Valves are made in both straight and expanded outlet patterns. In all regular expanded outlet patterns the diameter of the outlet is standardized at twice the diameter of the inlet. An outlet of other diameter as listed is special and not carried in stock, but can be supplied on short delivery.

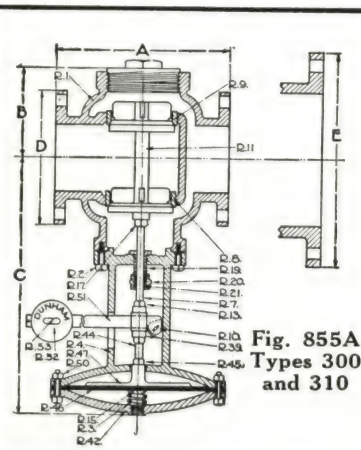


Fig. 855A Types 300 and 310

Installation—Install the reducing valve in a horizontal steam main as shown in Figs. 854 and 1178. The ½-in. pressure balancing pipe from low pressure main to bottom of diaphragm casing, should be connected into the side or top of the low pressure main at a distance not less than 20 ft. from the reducing valve. A globe valve must be installed in this pipe. *Precaution:* It is good practice to install a 2-in. pop safety valve on the low pressure heating main, a few feet away from the reducing valve, as a safeguard against inadvertent handling. The pop safety valve to blow at 15 lb. pressure.

Sizing Pressure Reducing Valves—The Reducing Valve Chart (Fig. 1199A) has been prepared to guide in the choice of the proper size reducing valve for heating installations. With heating service in mind, the curves have been put in terms of square feet of equivalent radiation, initial pressure, and final or service pressure. Knowing these three factors the correct valve size may be read directly.

SIZES, WEIGHTS AND PRICES OF TYPE 300 (STRAIGHT PATTERN) AND TYPE 310 (EXPANDED OUTLET) PRESSURE REDUCING VALVES

List prices are subject to prevailing discounts. Prices do not include companion flanges or bolts.

When ordering, the initial and reduced pressures for which each valve is to be used must be given together with the amount of steam the valve is to supply in square feet of equivalent direct radiation or in pounds of steam per hour.

Straight Pattern Type 300

	Size	Connection	Wght., lb. boxed	List price	Code	Dimensions in inches (See Fig. 855A) A	B	C	D
Regular Sizes Carried in Stock	¾	Screwed	37	$44.00	Antelope	4 1/8	2¾	12	. . . .
	1	Screwed	41	48.00	Anthem	4 7/8	4	15 5/8	. . . .
	1¼	Screwed	110	50.00	Antic	6 3/8	4	15 5/8	. . . .
	1½	Screwed	128	54.00	Antidote	7	4 3/8	16½	. . . .
	2	Flanged	139	60.00	Antipathy	8 3/8	5 3/8	16¾	6
	2½	Flanged	166	74.00	Antipode	9	6	17	7
	3	Flanged	186	88.00	Antler	11 3/8	6 1/8	18½	7½
	3½	Flanged	200	96.00	Aonian	11¼	7¼	17½	8½
	4	Flanged	251	106.00	Aorta	14	7 1/8	19 1/8	9
	5	Flanged	312	130.00	Ape	15¼	8¾	20¾	10
	6	Flanged	435	160.00	Apostle	17 5/8	9	21 1/8	11
	8	Flanged	606	248.00	Apparel	19	12 1/8	24 1/8	13½

Expanded Outlet Pattern Type 310

	Size	Connection	Wght., lb. boxed	List price	Code	Dimensions in inches A	B	C	D	E
Regular Sizes Carried in Stock	1½x3	Screwed	130	$64.00	Shire	7 3/8	4 3/8	16¼	. . . .	. . . .
	2 x3	Screwed	149	76.00	Stag	8½	5 3/8	16¾	. . . .	. . . .
	2 x4	Flanged	160	76.00	Sirrah	9	5 3/8	16¾	6	9
	2½x5	Flanged	170	90.00	Sliver	9¼	5 7/8	17	7	10
	3 x6	Flanged	200	106.00	Slotch	11¼	6¾	17¾	7½	11
	4 x6	Flanged	234	144.00	Stanza	12½	6 5/8	18¾	9	11
	4 x8	Flanged	251	146.00	Sooth	12¾	6 5/8	18¾	9	13½
Special Sizes Not Carried in Stock	1½x2	Screwed	129	$64.00	Squab	7 1/8	4 3/8	16¼	. . . .	. . . .
	1½x2½	Screwed	132	64.00	Squall	7¼	4 3/8	16¼	. . . .	. . . .
	2 x2½	Screwed	144	76.00	Stable	8½	5 3/8	16¾	. . . .	. . . .
	2 x3½	Screwed	152	76.00	Stalk	8 5/8	5 3/8	16¾	. . . .	. . . .
	2 x3½	Flanged	157	76.00	Squawk	8¾	5 3/8	16¾	6	8½
	2 x4	Screwed	154	76.00	Stalker	9	5 3/8	16¾	. . . .	. . . .
	2½x4	Flanged	168	90.00	Staves	10	5 7/8	17	7	9
	3 x5	Flanged	191	106.00	Steenbok	11¼	6¾	17¾	7½	10
	4 x5	Flanged	223	144.00	Sough	12½	6 5/8	18¾	9	10
	5 x8	Flanged	298	174.00	Starch	13½	7¾	19¾	10	13½
	5 x10	Flanged	325	176.00	Slue	14 1/8	7¾	19¾	10	16
	6 x12	Flanged	438	218.00	Steak	14¾	8¾	20 7/8	11	19

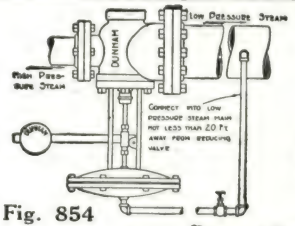


Fig. 854

Fig 854. Typical Connection for a Single Reducing Pressure Valve Installation

If by-pass is required, install this as recommended in Fig. 1178

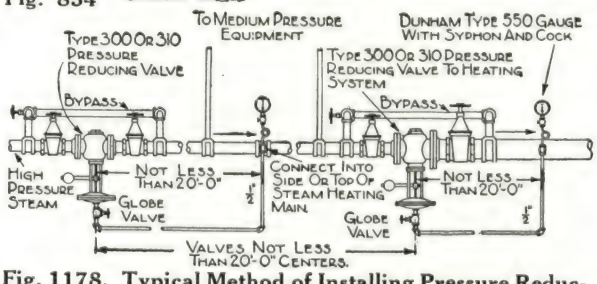


Fig. 1178. Typical Method of Installing Pressure Reducing Valves on an Installation on Which High Pressure Is Reduced to Low Heating Pressure in Two Steps

The medium pressure, in this case, servicing laundry and cooking equipment. A medium pressure of 50 to 60 lb. is ample for this purpose.

The by-pass should be made two sizes smaller in size than the high pressure side of the reducing valve. For example: a 4x6-in. valve requires a 3-in. by-pass. The by-pass is used when the reducing valve is out of service. The gate valve in the by-pass is often used for throttling the steam flow until the required reduced pressure is obtained on the gauge. Install a 2-in. pop safety valve on heating system main, as a safeguard against letting full head of steam into system. The pop valve set to blow at 15 lb. pressure

Chart for Sizing Pressure Reducing Valves

Follow the diagonal dash-line corresponding to the sq. ft. of equivalent cast iron radiation to its intersection with the heavy horizontal line corresponding to the final or service pressure. Go vertically up or down from this intersection to the horizontal line corresponding to the initial or boiler pressure. The nearest solid diagonal line gives the size of the reducing valve that should be used, that is, the nominal inlet diameter.

The following example clearly shows the simplicity of application to sizing problems. Example: A building to be heated with steam at 5 lb. gauge pressure, with a boiler pressure of 75 lb. The equivalent cast iron radiation is 48,000 square feet. What size pressure reducing valve is needed?

Solution: On the bottom scale of chart the point representing 48,000 sq. ft. radiation is found at "A." Following the diagonal dash-line to the intersection with the heavy horizontal line representing 5 lb. service pressure brings us to point "B." On the line representing an initial pressure of 75 lb. vertically above point "B" we arrive at point "C." Point "C" lies very close to the heavy diagonal line representing a 4-in. pipe size, hence a Dunham Pressure Reducing Valve with 4-in. inlet diameter would be used and if a standard expanded outlet pattern valve could not be obtained on account of size of heating main, a straight pattern valve would be used and a reducer specified for the low pressure side of the reducing valve to increase the outlet side to the size of the low pressure main.

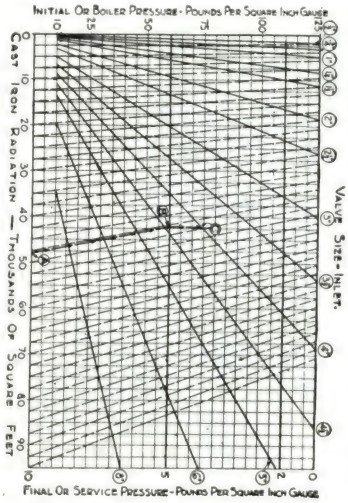


Fig. 1199A. Chart for Sizing Pressure Reducing Valves

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DUNHAM VACUUM PUMP GOVERNOR

The function of this vacuum pump governor is to regulate the speed of a steam driven vacuum pump to maintain a fixed partial vacuum condition in the return piping of a Vacuum Return Line Heating System, in which a definite condition of vacuum is required.

The governor is made of the highest grade materials, similar to those used in the Dunham Pressure Reducing Valve. It is sensitive yet durable and can be depended upon with a minimum amount of attention.

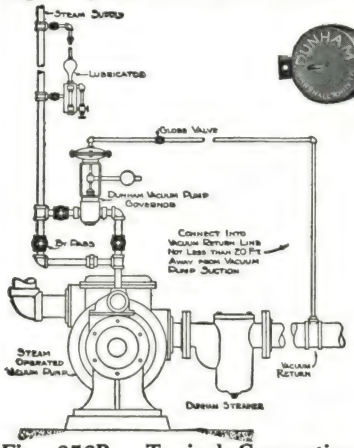
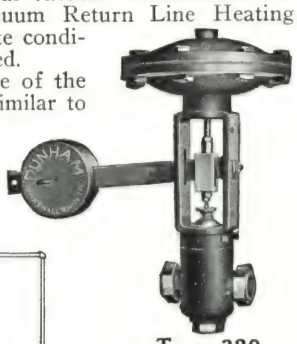


Fig. 856B. Typical Connection for Vacuum Pump Governor



Type 320

Installation

It should always be installed in a horizontal line of piping, plumb and true. A typical installation is illustrated in Fig. 856B on this page. It should be noted that the balancing pipe, which is the pipe connecting the top diaphragm casing of the governor with the vacuum return line, should be connected not less than 20 ft. away from the governor. The balancing pipe to be ½-in. pipe. A globe valve must be placed in this pipe.

Screwed connection size	Body style	Wt. lb. boxed	Dimensions in inches (See fig. 857B on this page) A	B	C	List price	Code
½	Bronze	37	4¼	2⅜	11⅞	$46.00	Spern
¾	Bronze	40	4¼	2⅜	11⅞	48.00	Spew
1	Cast Iron	70	5⅞	4	15⅛	52.00	Splum
1¼	Cast Iron	78	6⅜	4	15⅛	54.00	Spider
1½	Cast Iron	90	7	4⅜	16¼	60.00	Spier
2	Cast Iron	100	8	5½	17	66.00	Spine

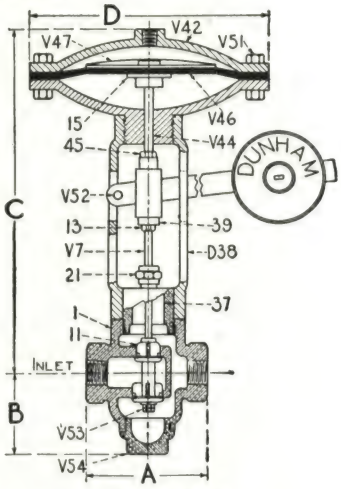
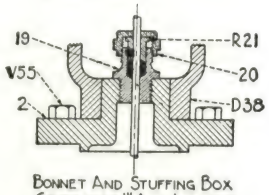


Fig. 857B



Bonnet And Stuffing Box Governors 1" And Larger

Fig. 858B

THE DUNHAM STRAINER

The Dunham Strainer is simple in design, of liberal area and free from an internal water seal. There is a free passage to the vacuum pump, or point of release.

In both types the basket can be easily removed for cleaning.

Construction

This strainer is built of the best soft gray iron casting, heavy and durable, with easily removable cover and sediment basket. The strainer basket is of 22 gauge brass sheet having .079-in. diameter holes, 81 holes to the square inch. The basket for Type 210A has a cast base and top rim. When in position in the strainer the top rim of the basket rests upon a flange in the body casting, so that the flow is into the basket which catches and holds all scale, sediment, or other foreign matter while the water passes through the perforations and out.

In Type 211 the basket is inserted from the bottom and held in position by recesses in the body casting and plug, performing the same function as Type 210A.

Location

Strainers are recommended at the drip traps, thus preventing these from being clogged with dirt, chips, etc., from the radiation and steam piping. See Fig. 925B.

Another use for a strainer is in the return main before connecting the return trap.

A strainer installed at the inlet connection of the return trap will prevent trash from the heating system working its way into the check valves, causing them to stick open.

The strainer basket should be removed at frequent intervals and the accumulated sediment removed. This is important during the first heating season during which there usually is much foreign matter to be removed before the system becomes fully efficient.

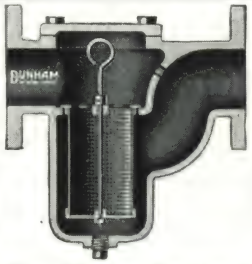


Fig. 850A. Sectional View Type 210A

Type 211. Basket of Type 211

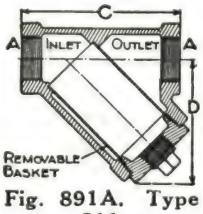


Fig. 891A. Type 211

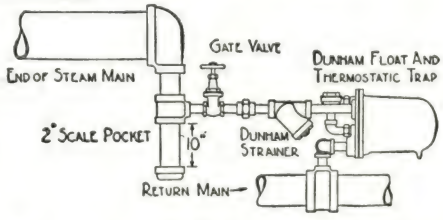


Fig. 925B. Method of Dripping Steam Main Using Strainer in the Connection

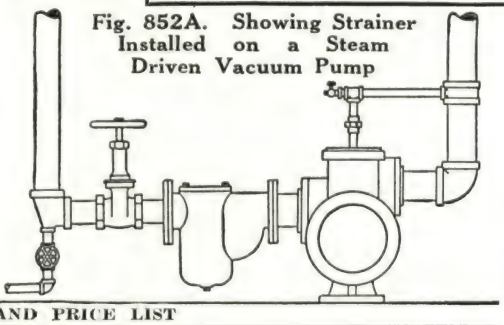


Fig. 852A. Showing Strainer Installed on a Steam Driven Vacuum Pump

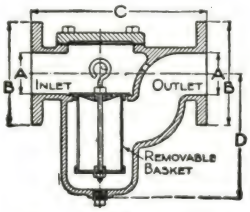


Fig. 853A. Type 210A

SPECIFICATIONS AND PRICE LIST

Type No.	Size tappings, in.	Connection	Net weight, lb.	Roughing-in dimensions, in. A	B	C	D	Overall width	List price complete	Code	For basket only List price	Code
211	¾	Screwed	3½	¾	.....	4½	4½	2¾	$4.00	Laugh	$0.80	Balaugh
211	1	Screwed	3½	1	.....	4¾	4½	2¾	4.80	Laundress	0.80	Balaund
211	1¼	Screwed	5½	1¼	.....	5½	5	3¼	6.00	Laurel	1.60	Balaurel
211	1½	Screwed	7	1½	.....	6⅝	5½	4	7.20	Laureate	1.60	Balaureate
211	2	Screwed	7	2	.....	6⅝	5½	4	9.00	Lavatory	2.40	Balavatory
210A	1½	Flanged	25	1½	5	9½	7	5⅛	21.60	Lavender	7.20	Balavender
210A	2	Flanged	28	2	6	9¾	7	6	26.00	Lavish	8.00	Balavish
210A	2½	Flanged	45	2½	7	12 1/16	9	7	30.00	Leaky	9.00	Baleaky
210A	3	Flanged	50	3	7½	12 11/16	9	7½	34.00	Lemon	11.00	Balemon
210A	4	Flanged	74	4	9	15½	10⅝	9	52.00	Legion	16.00	Balegion
210A	5	Flanged	105	5	10	17⅞	13	10	66.00	Lever	20.00	Balever
210A	6	Flanged	125	6	11	20	14¾	11	88.00	Lettuce	22.00	Balettuce

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THE DUNHAM VACUUM PUMP

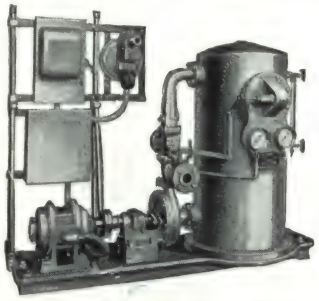
The Dunham Vacuum Pump coordinates the results of scientific research and approved engineering practice.

A vacuum pump should be chosen for its ability to handle air, condensable gases and water, the three elements to be removed from the returns of the heating system, not for its ability to handle only one of these elements. Consider then—

1. A Vacuum Pump of itself has no intrinsic value.
2. To determine its merits, it must be considered in relation to the purpose it performs.
3. Its first purpose is to accelerate circulation of steam in the heating system. Whether or not it produces a certain vacuum on cold air, drawn in from the atmosphere through a given size hole or not, is not pertinent. The orifice test is a satisfactory method for measuring air under certain conditions, under other conditions it is not satisfactory. Such a test is not a criterion on which to establish the selection of a vacuum pump.

Capacity is a measure of the ability to obtain and maintain a desired range in vacuum on the return lines of a heating system under operation. One pump may exceed in air capacity, another in water capacity, another in ability to condense vapor from the return lines, but the real test is the ability to handle the load of a heating system with the least expenditure of power.

Experience has shown that the volume of vapor to be handled is much more of a factor than is appreciated. The Dunham Exhauster operates similar to a barometric jet condenser removing easily this vapor by condensing it. The principle of operation is unique and efficient, for with one moving element we produce a powerful suction by means of the exhauster and maintain a positive pressure to discharge water to the boiler.



The Dunham Vacuum Pump

Description and Operation

The Dunham Vacuum Pump consists of an electrically driven centrifugal pump, a Dunham Exhauster, an air separating and receiving tank and an automatic discharge valve, all assembled on a rigid base with the necessary control equipment so as to make a complete compact unit.

The hurling water is stored in the separating and receiving tank from which the centrifugal pump takes its supply, under a constant positive pressure, due to the static head. (See illustration in center Fig. 1214A.) The centrifugal pump delivers water to the exhauster at a steady pressure of 20 lb. per sq. in. The water the pump delivers in flowing through the exhauster nozzles has the pressure energy converted into kinetic energy (energy due to velocity) and is directed into the delivery tubes after it has passed through the suction space in the nozzle body. In passing through the suction space the air vapor mixture and the water of condensation is entrained with the water stream (issuing from the nozzles) and forced into the delivery tube which delivers it into the tank against atmospheric pressure. In the tank the air separates from the water and is discharged from the top of it through the vent tapping, and water is retained in sufficient amount to maintain the required volume for operating the pump and exhauster. The surplus is automatically discharged to the boiler. When the water of condensation is being discharged to boiler there is no cessation or diminution of the exhausting action.

If no condensate is returning from the system no water is returned to the boiler. As condensation returns it accumulates in the tank raising the float, thereby operating its mechanism and opening the automatic discharge valve which permits its discharge to boiler under a 20 lb. effective pressure at the pump.

It is evident, therefore, that the pump may be relied upon to produce a vacuum and return the condensate, maintaining the proper boiler water line, at any boiler pressure which may obtain on a low pressure boiler conforming to the A.S.M.E. code. (The A.S.M.E. code specifies a safety valve setting of 15 lb. per sq. in.)

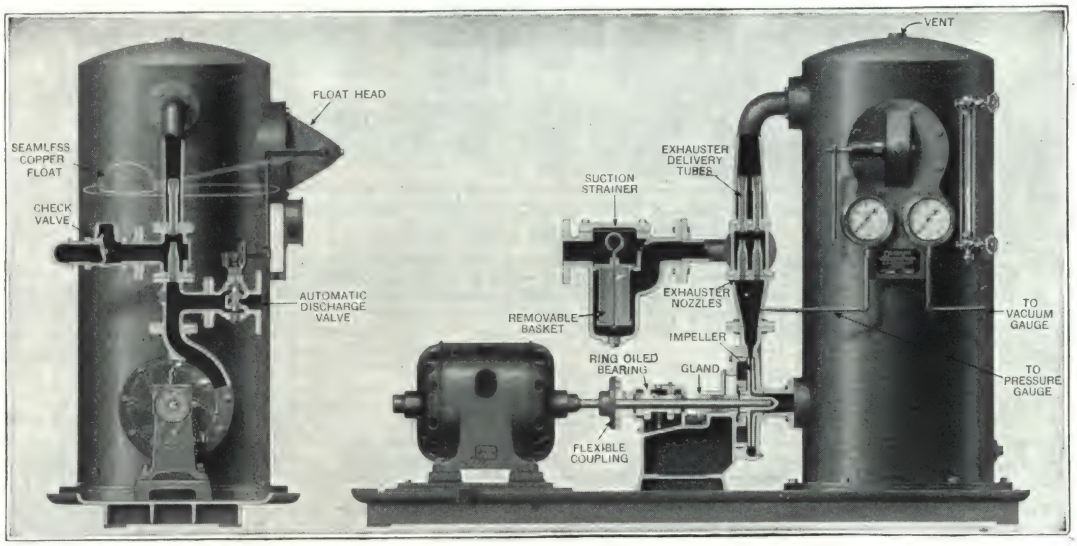


Fig. 1214A. Sectional Elevations of Dunham Vacuum Pump

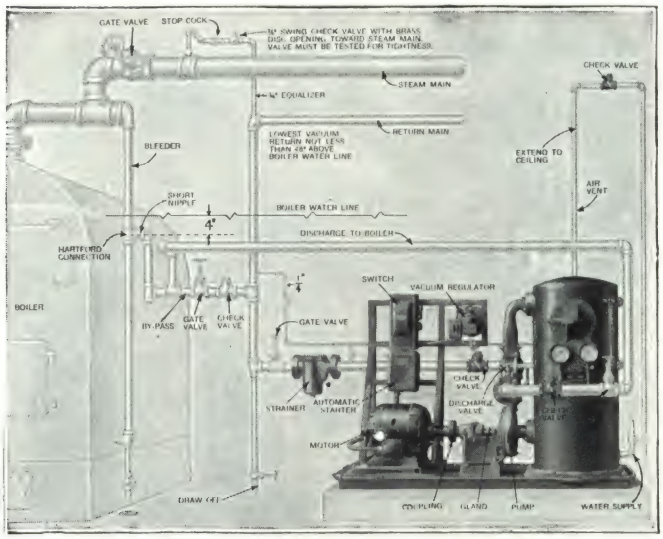


Fig. 1. Unit Completely Equipped with Automatic Vacuum Control

Piping connections made and ready for operation. Piping shown in gray tone is furnished by contractor. Suction strainer and check valves at inlet of pump, discharge of pump and in vent are furnished with unit, as well as companion flanges, bolts and gaskets

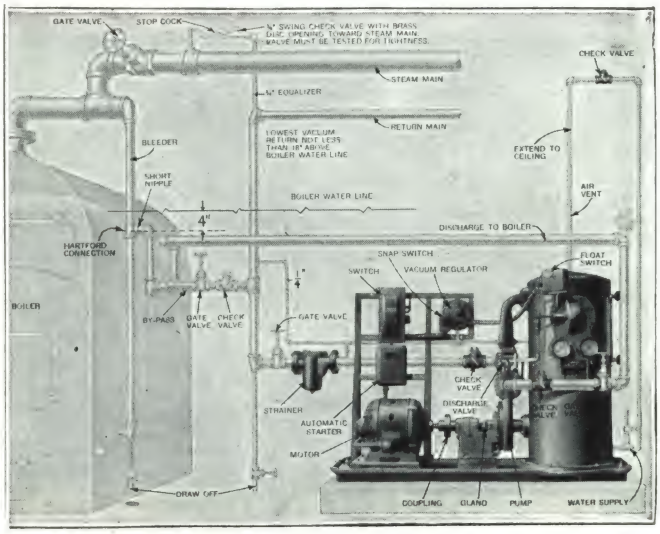


Fig. 2. Unit Equipped with Automatic Vacuum Control, also Float Control for Night Operation

Piping shown in gray tone is furnished by contractor. Suction strainer and check valves at inlet of pump, discharge of pump and in vent are furnished with unit as are companion flanges, bolts and gaskets

 Continued on next page

THE DUNHAM VACUUM PUMP (Continued)

The power consumed varies with the amount of condensate being handled, and with the pressure carried on the boiler. When little condensate is returning the power consumption decreases. Similarly when the boiler pressure is low the power consumption decreases, as shown by Fig. 715A.

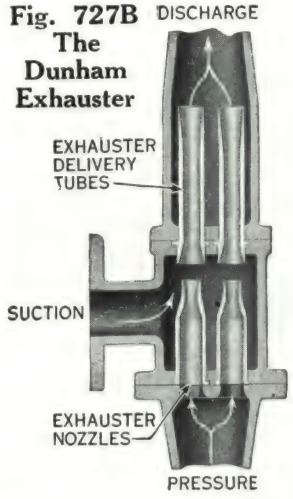
The pump automatically responds to peak loads resulting from rapid condensation, such as occurs when the system is started up cold.

The Exhauster (Fig. 727B)—Operates on the principle of kinetic ejector utilizing the energy possessed by a stream of water in motion. By the use of a special nozzle of patented design the Dunham Exhauster operates over a wide range of temperatures because of controlled expansion within the nozzle. This expansive action prevents the vapor pressure of the water from flaring the stream which would result in the energy of the stream issuing from the nozzle being dissipated. The nozzle design also divides the stream of water so as to obtain great exposure to, and trapping of, the air and vapor to be exhausted, thus securing an exhausting action of high capacity and efficiency.

A distinctive feature of this jet principle lies in its ability to draw high degrees of vacuum. Under this condition condensable vapor volumes increase more rapidly than air. Thus vapors drawn into the water stream are condensed.

In addition to having these several characteristics, the exhauster has the advantage of no moving parts or close clearances to be maintained. Obviously, it will operate over a wide range of temperatures and its performance will be uniform over long periods of time and at little or no maintenance cost.

Fig. 727B The Dunham Exhauster



The Centrifugal Pump—Is bronze fitted including a non-corrosive shaft. The impeller is hydraulically and dynamically balanced, of high efficiency and is of the enclosed type. A volute type of casing is provided. Dust-proof, ring oiled bronze sleeve bearings of liberal size provide a construction which will operate for long periods of time with minimum attention, as has been demonstrated by experience. The pumps are driven by an electric motor direct connected through flexible couplings of special design.

The Receiving Tank—Is made of heavy rust-resisting steel. It is easily accessible for cleaning and is equipped with simple mechanism which operates the automatic discharge valve. It is proportioned to effectively separate air from water and to insure certain priming of the pump and provision of ample hurling water to operate the exhauster. Power for operating the valve mechanism is supplied by a heavy seamless copper float located in the tank.

Pressure and Vacuum Gauges—For indicating conditions existing in the heating system are mounted on the tank.

The Automatic Discharge Valve—Is of special design embodying features which especially adapt it to the service. The materials it is constructed of are likewise selected so as to give long service. The valve seats are of special wear-resisting bronze. The valve is free to rotate with respect to the seat securing a grinding action. This reduces wear, keeping the valve tight. Recirculation is provided for this valve to insure against a loss of hurling water should foreign matter momentarily get between the valve and seat.

The body of the valve is of close grained cast iron of heavy section and is flanged to facilitate installation.

The Motors—The motors used are of the best standard manufacture. They are rated on 40 deg. temperature rise and provide ample margin of power.

The Control Equipment—Is mounted on the pump so as to make the unit complete. All electric wiring between the starter and motor is furnished. Each pump is given a complete test of several hours duration under its own control and power equipment before the unit leaves the plant. The control equipment provides against phase failure and gives overload protection for alternating current service.

After making the piping connections the installation is completed by connecting the line wires to the terminals of the safety disconnect switch, and in the case of installations Figs. 3 and 6 by the additional connection of float switch to the control cabinet.

Suction strainer and check valves for the suction and discharge connections with companion flanges are supplied with the pump.

The Base—Rigid and well braced, maintaining the proper alignment of the pump and motor. Leveling bosses and three point support are provided to reduce the work of installation. Base is also provided with tapping for piping drippings of oil or water to the sewer.

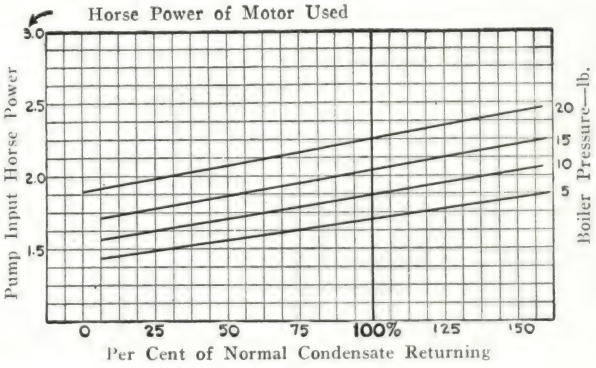


Fig. 715A

Power consumption curves for the V4A Dunham Vacuum Pump discharging to boiler against indicated boiler pressure

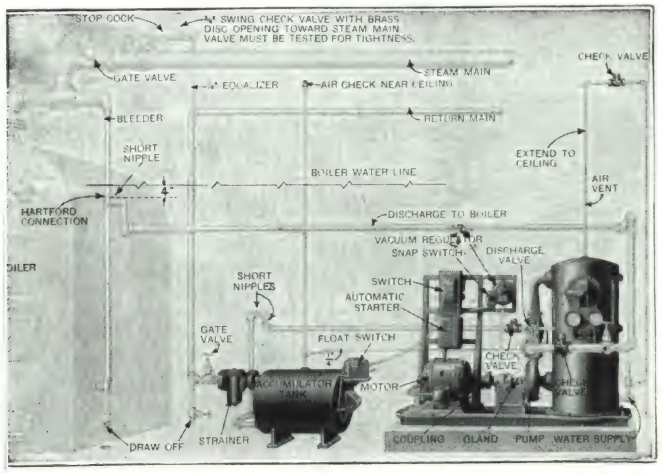


Fig. 3. Unit Equipped with Automatic Vacuum Control, also Accumulator Tank, with Float Control

Accumulator tank may be set on boiler room floor instead of in pit if returns come back at sufficiently high level. Piping shown in gray tone is furnished by contractor. Suction strainer and check valves at inlet to pump, discharge of pump and vent, as well as air check on vent of accumulator tank are furnished with unit, as are companion flanges, bolts and gaskets

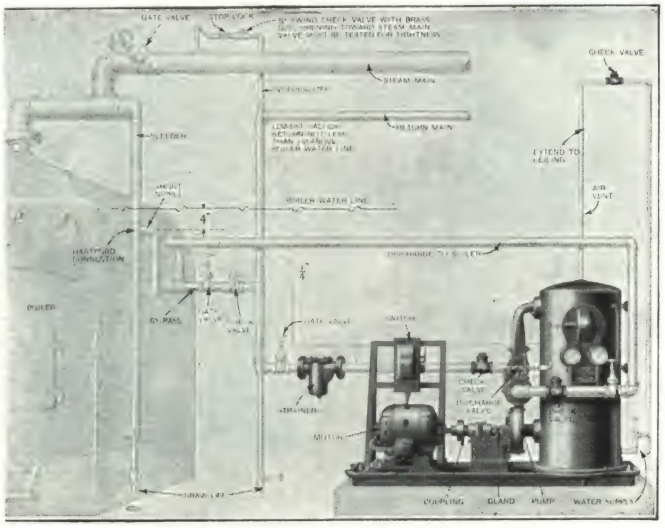


Fig. 4. Continuous Operation with Manual Controlled Switch

Piping shown in gray tone is furnished by contractor. Suction strainer and check valves at inlet of pump, discharge of pump and in vent are furnished with unit, as are companion flanges, bolts and gaskets

Continued on next page

THE DUNHAM VACUUM PUMP (Continued)

Selection of a Pump

The selection of a vacuum pump divides itself into two items. (1) the selection of the size; (2) the selection of the control. Both depend largely upon the size of the system, the kind of heating load, and the nature of the building to be heated. The capacities of the various sizes of pumps are given in the table below.

Selection of the Control—The purpose a building is to serve, as well as its construction and arrangement, influences the arrangement of the pump and the control. For the convenience of the trade Dunham Pumps are provided in several standard types of control which are designated by figure number. The method of installing is co-ordinated with the control. The various arrangements provide flexibility, most efficient adaptation to the required service and greatest operating economy. The various installation and control arrangements are clearly shown in the illustrations which are self-descriptive.

Figure 1 (Dunham Page 52) Automatic Vacuum Controlled Unit—Provides means for maintaining the vacuum within certain limits or a certain range. The unit finds its preferable application to installations where the return mains come to the pump at an elevation above the pump suction. It can also be used where condensate must be lifted to the pump. However, Fig. 3 is recommended where automatic control of the pump is desired and the condensate is to be lifted. Only vacuum control is provided on Figure 1 and is arranged to start the pump at approximately 3 in. and to stop it when approximately 7 in. of vacuum is reached. The vacuum switch is adjustable to secure other starting and stopping points.

Figure 2 (Dunham Page 52), Automatic Vacuum and Float Control—When the radiation is installed at a level well above the top of the tank on pump unit, so that water of condensation gravitates into it, the unit can be furnished with a float control mounted on the tank in addition to the vacuum control. With this float control the pump can be operated at night as an automatic condensation pump by turning the snap switch (installed between the vacuum regulator and starter), thus cutting out the vacuum control but leaving the float switch in service. In other words when vacuum is desired on the heating system vacuum control is in service as quick circulation is necessary, but when vacuum is not desired the float control alone is operative.

Figure 3 (Dunham Page 53) Automatic Vacuum and Float Control with Accumulator Tank—This unit supplies both automatic float and vacuum control and is most flexible in its adaptability to various installations. Return mains coming back at elevations below or above the boiler water line or pump suction can be easily cared for. The accumulator tank is always installed at a sufficiently low level so that the condensate may gravitate into it.

The accumulator tank is equipped with a float switch control wired to operate in conjunction with the vacuum control. A snap switch is provided so that the vacuum switch may be thrown out of operation whenever desired and the unit permitted to operate under float control only.

Condensate from the heating system enters the accumulator tank by gravity. The air flows into the tank from which it and the condensate also is withdrawn by the vacuum pump. Should the accumulator tank fill with water, the pump is started by the float control. This insures the return of the water of condensation at all times.

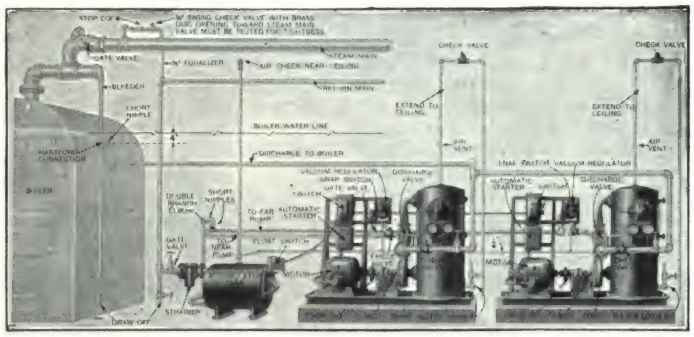


Fig. 6. Duplex Installation of Two Pumps, Each Equipped with Automatic Vacuum Control and Having Accumulator Tank with Float Control

Accumulator tank need not be placed in pit if returns come back at sufficiently high level. Piping shown in gray tone is furnished by contractor. Suction strainer and check valves at inlet to each pump, discharge of pumps and in air vents, as well as air check on vent of accumulator tank, are furnished with unit as are companion flanges, bolts and gaskets

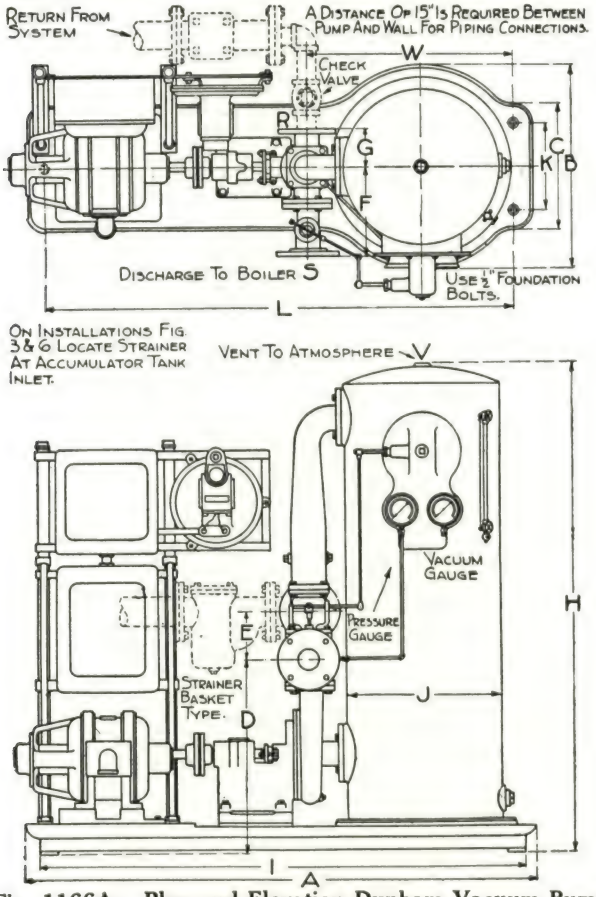


Fig. 1166A. Plan and Elevation Dunham Vacuum Pump

TABLE OF CAPACITIES AND DIMENSIONS

See Fig. 1166A

Standard Vacuum Pumps

No.		V0A	V1A	V2A		V3A		V4A		V5A	V6A
Rated sq. ft. rad.		5000	8000	16000		26000		40000		65000	100000
Kind of electric current		Any current	Any current	Single phase	2 or 3 phase or direct current	2 or 3 phase or direct current	Single phase	2 or 3 ph., 50 or 60 cy., or d.c.	2 or 3 ph., 25 cy., single ph. or 550 d.c.	Any current	Any current
H.P.		¾	1	1½	1½	2	2	3	3	5	7½
DIMENSIONS	A	57⅝	60⅜	63¾	60⅜	60⅜	63¾	60⅜	63¾	66⅞	81¼
	B	21	24	24	24	24	24	24	24	26	30
	C	14⅝	15	18½	15	15	18½	15	18½	19¾	22
	D	19⅜	21⅛	21⅛	21⅛	21 7/16	21 7/16	22¾	22¾	23 1/16	25 13/16
	E	4 7/16	5 3/16	4 13/16	4 13/16	4⅞	4⅞	5 13/16	5 13/16	5⅞	5 15/16
	F	8 5/16	8 5/16	8 5/16	8 5/16	9 15/16	9 15/16	10 11/16	10 11/16	13⅜	14⅝
	G	3¼	3¼	3¼	3¼	4	4	4½	4½	5⅛	6
	H	37¾	46	46	46	52	52	58	58	58¼	62½
	I	55	57¾	61⅜	57¾	57¾	61⅜	57¾	61⅜	64¼	79
	J	15	18	18	18	18	18	18	18	20	24
	K	10¼	10¾	14⅛	10¾	10¾	14⅛	10¾	14⅛	15¼	17
	L	52⅞	55¾	59	55¾	55¾	59	55¾	59	62	76¼
	R	1¼	1½	1½	1½	2	2	2½	2½	3	5
	S	1¼	1½	2	2	2½	2½	3	3	3	3½
	V	1	1	1	1	1	1	1½	1½	1½	1½
	W	22¾	25 15/16	25⅛	25 15/16	25 15/16	25⅛	25 15/16	25⅛	26 13/16	34⅜

Note: The above dimensions are general. For actual installation request certified print for location of base bolts.

Material furnished with Pump:

Strainer with Companion Flanges, Bolts and Gaskets.

Companion Flanges, Bolts and Gaskets for Return and Discharge Connections of Pump.

Swing Check Valve between Strainer and Pump.

Swing Check Valve for Discharge to Boiler

Swing Check Valve for Pump Vent.

Dunham Air Check for Vent from Accumulator Tank with Figure 3 and 6 installations.

Continued on next page

DUNHAM VACUUM PUMP (Continued)

If vacuum control is in service a vacuum will be maintained on the system and the pump started and stopped at intervals. During the time that the pump is out of operation, due to vacuums obtaining after cut out point of vacuum switch is reached, condensate will accumulate in the tank at the rate it is forming in the system and be returned to the boiler by the pump in response to its operation by the float switch.

Figure 4, Continuous Operating Unit—The continuously operating unit is a logical one where the total load is blast radiation or where the preponderance of the load is blast radiation. It is likewise a most logical selection where there are lifts some distance from the pump. The presence of such lifts makes it advisable to maintain a high vacuum at all times.

Figure 6, Duplex Installations—On large jobs, good engineering practice is to provide duplicate pump installation. Preferably each pump should be connected so as to operate independently of each other or together. A most satisfactory arrangement for an automatic float and vacuum controlled unit is provided in the Figure 6 installation. In operation it is the same as the Figure 3 control, both pumps being operable in conjunction, or either unit may be operated independently of the other. The pumps may be installed with either the short or long sides parallel to one another, or as may be necessary in view of the available space.

Installation Suggestions

In every case we recommend that the pump itself be set level on a suitable concrete foundation and well grouted, having its top 3 to 6 in. above the boiler room floor rather than in a pit.

If one return line comes back to the pump at a lower level than the suction connection to pump and an accumulator tank is not used it is recommended that all returns be connected to the pump through the same lift fitting. Figures 957A and 879, Dunham page 47. The advantage of this method is that suction will be produced on all returns with same intensity.

Frequently, by giving careful study of the run of piping, the heating system can be so designed that the apparent need of a lift fitting will disappear.

Avoid lift connections in return mains, except right at the vacuum pump, and if needed at this point, arrange it so that all the returns pass through the one lift connection.

Lift connections should not exceed 6 ft. in height. Preferably they should be less than this. If necessary to lift vertically a greater distance than 6 ft. use several lift connections connected in step formation.

The tank accumulator must be the low point of the system, with returns grading toward and into the inlet of tank. Wherever possible the accumulator tank should be installed so that its outlet tapping is slightly above the pump section, that is, so the condensate can flow by gravity from the accumulator tank to the pump. Where this is not possible the tank should be placed as high as possible so as to keep the lift at a minimum. It requires approximately 1 in. of vacuum for each foot of lift. By keeping the lift at a minimum the amount of vacuum used to lift the water is also kept to a minimum with a higher vacuum available for the system.

With the pump operating, the accumulator tank will be fairly free from water. The pump will then lift slugs of water between slugs of air, as the water makes and breaks the seal at the tank outlet. By using the lift connection half way up, in cases where the lift is greater than 6 ft., the vacuum necessary to lift the water into pump is reduced one-half. That is, if there was 8 ft. lift from accumulator tank outlet to pump suction with the lift connection midway it would take only 4 in. to make the lift instead of 8 if the lift connection was omitted.

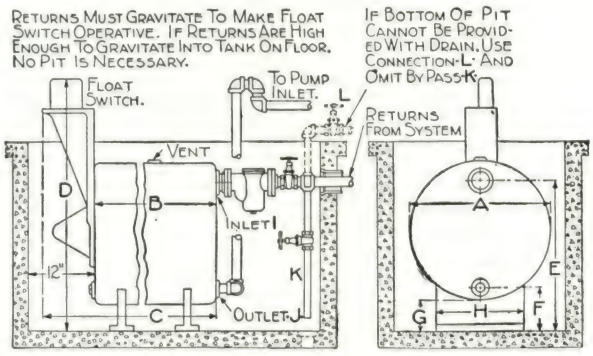


Fig. 1167. Roughing-in Dimensions, Accumulator Tank

Size vacuum pump	Size of tank, in.	Dimensions in inches								Size strainer, in.	Pipe connections, in.		Size of pit required
		A	B	C	D	E	F	G	H		Inlet I	Outlet J	
V0A & V1A	18x18	18	18	27	33	15½	5½	3½	12	2	2	1½	3′6″x5′0″
V2A & V3A	18x24	18	24	33	33	15½	5½	3½	12	3	3	2	3′6″x5′6″
V4A & V5A	18x36	18	36	45	33	15½	5½	3½	12	4	4	3	3′6″x6′8″
V6A	24x48	24	48	57	36	24	6	3	18	5	5	4	4′0″x7′8″

Typical Specifications

Furnish and install one Dunham Vacuum Pump, size ...., having a rated capacity of .... sq. ft. of direct radiation and built for *20-lb. pressure at the pump. Motor furnished shall be of 40° rating, of not greater than .... horsepower, and shall be wound for .... current available.

This unit shall consist of a welded steel tank; a bronze-fitted enclosed impeller pump with non-corrosive metal shaft, and motor, all mounted on substantial cast-iron base of the coping type, with exhauster, automatic discharge valve, pressure and vacuum gauges, water gauge glass and necessary accessories and electrical controls. It shall be installed and connected where shown on plans in accordance with manufacturer's instructions.

Base of pump shall be grouted in foundation and securely anchored with ½-in. bolts. In the suction line of pump install a gate valve, suction strainer and swing check valve, also install valved by-pass to sewer. In the discharge line to boiler install a swing check valve and gate valve, placing the check valve between pump and gate valve. Vent from tank shall be run full size of tapping to a level near ceiling of boiler room and then brought down to near floor level. Install check valve in this vent pipe.

Note: The foregoing is suggested as standard specification for continuous operation pumps, also for all specifications for automatic control regardless of type of control wanted. Sections A, B, C, to be added according to control required. Thus:

Automatic Vacuum Control—Typical Specifications and Section "A."

Automatic Vacuum and Float Control—Typical Specifications and Sections "A" and "B."

Automatic Vacuum Control with Float Control on Accumulator Tank—Typical Specifications and Sections "A" and "C."

(A) Automatic Vacuum Control (Equipment shown in Unit Figure One)—In connection with the vacuum pump there shall be furnished automatic vacuum regulator which shall maintain a range in vacuum in the return lines of heating system. This equipment to be furnished with pump and mounted on a frame bolted to base of pump and shall include an enclosed safety knife switch.

(B) Automatic Vacuum and Float Control (Equipment shown in Unit Figure Two)—A float switch shall be furnished, mounted on the air separating tank and wired so that the vacuum regulator can be cut out and the pump operated as a condensation pump and receiver when so desired. This float switch and the automatic vacuum regulator and switches are to be arranged and wired so that the vacuum regulator can be put out of service by turning a snap switch, permitting the float control alone to operate the pump.

(C) Automatic Vacuum Regulator with Float Control on Accumulator Tank (Equipment shown in Unit Figure Three)—Below the low point of return lines install an accumulator tank, size ...., equipped with float switch. All returns are to gravitate into this tank through the suction strainer and be connected to top connection on tank. From the bottom connection of tank make pipe connection to the suction of vacuum pump, which shall be set up on the boiler room floor. The float switch and the automatic vacuum regulator and switches are to be arranged and wired so that the vacuum regulator can be put out of service by turning a snap switch, permitting the float control alone to operate the pump.

*Unit V0A is built for 18-pressure at pump. Larger units are built for 20-lb. pressure at pump.

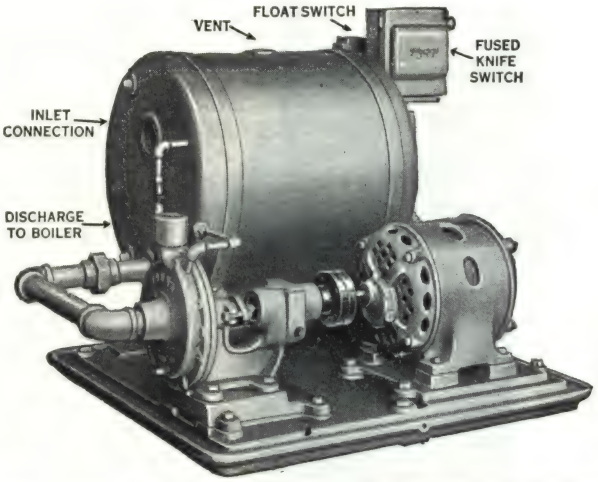
Continued on next page

DUNHAM CONDENSATION PUMP AND RECEIVER

(Horizontal Type)

Frequently it is necessary to lift condensate automatically. This pump provides an efficient, reliable and inexpensive equipment for this purpose, avoiding the need of special building arrangements such as boiler pits, etc. The radiation may be installed on the *same level as the boiler.*

The data below covers only the horizontal type condensation pump. A vertical type is described on Dunham page 57.



Outstanding Features

(1) Small first cost.

(2) Low operating cost.

(3) Positive removal of condensate from system and return at intervals to boiler.

(4) Acceleration of heating the building through improved circulation.

Construction

The pump is volute case, bronze fitted, including a non-corrosive shaft. The impeller is hydraulically and dynamically balanced, of high efficiency and is the enclosed type. Dustproof ring oiled, bronze sleeve bearings of liberal size provide a construction which will operate over long periods of time with minimum attention. The pump is driven by an electric motor direct-connected through flexible couplings of special design. It is a completely assembled unit ready for piping and wiring connections, including knife switch with fuse.

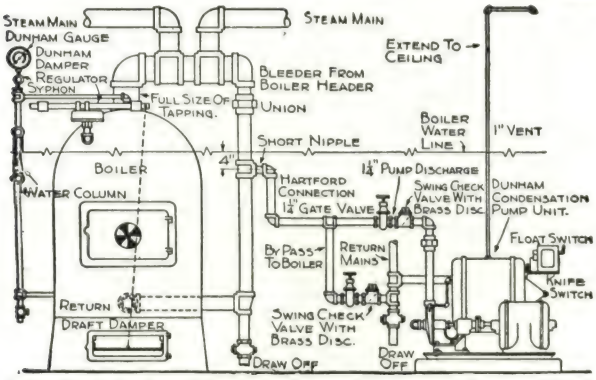


Fig. 874C. Dunham Condensation Pump Connection

The pump will discharge against the listed pressure at the pump. We show a typical connection (Fig. 874C). If the boiler is on a higher level, or some distance away from the pump, care should be exercised to select a pump of sufficient pressure to more than equal boiler pressure plus height of discharge pipe plus friction in discharge pipe.

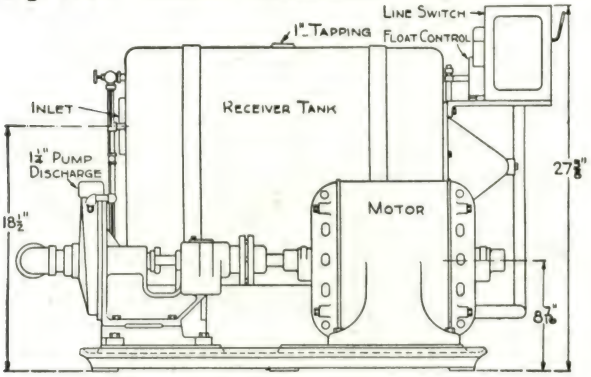
Example: Safety valve set for 15 lb., 8000 sq. ft. radiation, a pump of this capacity will discharge 16 g.p.m. Pump pit 10 ft. below boiler water line.

5—1¼-in. ells (check and gate valve considered equivalent to 2 ells).
Length of pipe between pump and boiler..... 20 ft.
Friction in straight pipe for 5—1¼-in. ells =..... 40 ft.

Total length..... 60 ft.

Friction = 4.65x0.6x0.433 =	1.2 lbs.
Boiler pressure =	15.0
Elevation = 10x.433	4.3
	20.5 Use 20 lb.* pump.

*Velocity head neglected



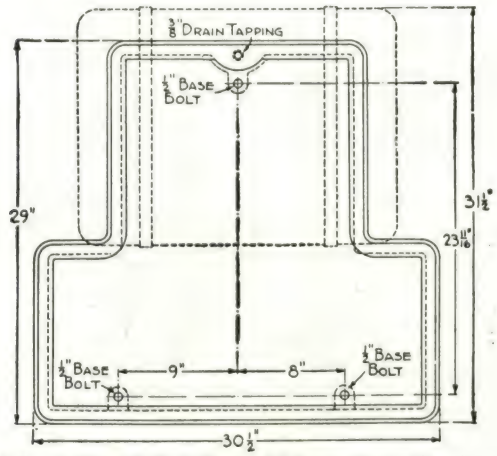


Fig. 1210. Over-all and Setting Dimensions, Dunham Condensation Pump and Receiver

10-LB. CONDENSATION PUMPS

Unit No.	Maximum square feet of direct radiation	Horse power of motor	Capacity, gal. p. m.	Inlet connection	Discharge connection	Size of receiver	Capacity of receiver	Gal. p. m. radiation will condense	Approximate floor space	Type and size of pump	Distance from bottom of base to inlet connection	Approximate shipping weight, lbs.
210A	2,000	½	4	2	1¼	18x18	20	1	32x38	¾" BA	18½"	440
410A	4,000	½	8	2	1¼	18x18	20	2	32x38	¾" BA	18½"	440
610A	6,000	½	12	2	1¼	18x18	20	3	32x38	¾" BA	18½"	440
810A	8,000	¾	16	3	1¼	18x24	26	4	32x41	¾" BA	18½"	470
1010A	10,000	¾	20	3	1¼	18x24	26	5	32x41	1" BA	18½"	470
1510A	15,000	¾	30	3½	1¼	18x36	40	7.5	32x47	1" BA	18½"	540
2010A	20,000	1	40	3½	1¼	18x36	40	10	32x47	1" SA	18½"	580
2510A	25,000	1	50	3½	1¼	18x36	40	12.5	32x47	1" SA	18½"	580

20-LB. CONDENSATION PUMPS

220A	2,000	¾	4	2	1¼	18x18	20	1	32x38	¾" BA	18½"	440
420A	4,000	¾	8	2	1¼	18x18	20	2	32x38	¾" BA	18½"	440
620A	6,000	¾	12	2	1¼	18x18	20	3	32x38	¾" BA	18½"	440
820A	8,000	1	16	3	1¼	18x24	26	4	32x41	1" BA	18½"	470
1020A	10,000	1	20	3	1¼	18x24	26	5	32x41	1" BA	18½"	470
1520A	15,000	1	30	3½	1¼	18x36	40	7.5	32x47	1" SA	18½"	540
2020A	20,000	1½	40	3½	1¼	18x36	40	10	32x47	1" SA	18½"	610
2520A	25,000	1½	50	3½	1¼	18x36	40	12.5	32x47	1" SA	18½"	610

35-LB. CONDENSATION PUMPS

235A	2,000	2	4	2	1¼	18x18	20	1	32x44	1" LA	18½"	510
435A	4,000	2	8	2	1¼	18x18	20	2	32x44	1" LA	18½"	510
635A	6,000	2	12	2	1¼	18x18	20	3	32x44	1" LA	18½"	510
835A	8,000	2	16	3	1¼	18x24	26	4	32x47	1" LA	18½"	540
1035A	10,000	2	20	3	1¼	18x24	26	5	32x47	1" LA	18½"	540
1535A	15,000	3	30	3½	1¼	18x36	40	7.5	32x53	1" LA	18½"	590
2035A	20,000	3	40	3½	1¼	18x36	40	10	32x53	1" LA	18½"	590
2535A	25,000	3	50	3½	1¼	18x36	40	12.5	32x53	1" LA	18½"	590

50-LB. CONDENSATION PUMPS

250A	2,000	3	4	2	1¼	18x18	20	1	32x44	1" LA	18½"	550
450A	4,000	3	8	2	1¼	18x18	20	2	32x44	1" LA	18½"	550
650A	6,000	3	12	2	1¼	18x18	20	3	32x44	1" LA	18½"	550
850A	8,000	3	16	3	1¼	18x24	26	4	32x47	1" LA	18½"	580
1050A	10,000	3	20	3	1¼	18x24	26	5	32x47	1" LA	18½"	580
1550A	15,000	5	30	3½	1¼	18x36	40	7.5	32x53	1" LA	18½"	605
2050A	20,000	5	40	3½	1¼	18x36	40	10	32x53	1" LA	18½"	605
2550A	25,000	5	50	3½	1¼	18x36	40	12.5	32x53	1" LA	18½"	605

Continued on next page

DUNHAM CONDENSATION PUMP AND RECEIVER

(Vertical Type)

This pump is designed to handle condensate on installations where the return mains come back at, or below, the boiler room floor, discharging it automatically direct to the low pressure heating boiler. Typical connections are shown by Fig. 1240.

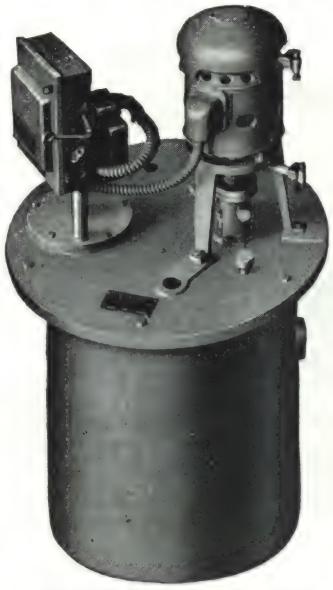
The use of this pump permits radiation to be placed on the same level as the boiler without the need of special building arrangements such as boiler pits, etc. This makes possible use of space that would otherwise be wasted.

The pump being submerged in the condensate, or return water, is self-priming and immediately when the float switch cuts in, the pump will discharge the water to the boiler until the desired level is reached and float switch stops the pump. The simplicity and reliability of this unit recommends it for water of any temperature.

Stuffing glands at the motor shaft and float rod prevent vapor from rising into the motor and electric switches.

The thrust of the pump is carried by ball thrust bearings, lubrication being easily accomplished with minimum of attention.

A cast iron strainer of ample area is provided at the pump suction to exclude foreign matter from the pump.



Dunham Vertical Condensation Pump

It is a completely assembled unit ready for piping and wiring connections; even knife switch with proper fuses are included. See Fig. 1241.

10 POUNDS PRESSURE AT PUMP

Type No.	Cap. sq. ft. radiation	H. P. of motor	Capacity G. P. M.	Inlet conn.	Disch. conn.	Size of rec. (A & B)	Diam. of cover plate (C)	Ht. above floor (D)	From top of tank to center inlet (E)	Approx. ship. wt.
700	2000	½	4	2	1¼	24x30	28″	20″	12″	1050
701	4000	½	8	2	1¼	24x30	28″	20″	12″	1050
702	6000	½	12	2	1¼	24x40	28″	20″	18″	1225
703	8000	¾	16	3	1¼	24x40	28″	20″	18″	1225
704	10000	¾	20	3	1¼	24x48	28″	20″	18″	1350
705	15000	¾	30	3½	1¼	24x48	28″	20″	18″	1350

20 POUNDS PRESSURE AT PUMP

Type No.	Cap. sq. ft. radiation	H. P. of motor	Capacity G. P. M.	Inlet conn.	Disch. conn.	Size of rec. (A & B)	Diam. of cover plate (C)	Ht. above floor (D)	From top of tank to center inlet (E)	Approx. ship. wt.
708	2000	¾	4	2	1¼	24x30	28″	20″	12″	1050
709	4000	¾	8	2	1¼	24x30	28″	20″	12″	1050
710	6000	¾	12	2	1¼	24x40	28″	20″	18″	1225
711	8000	1	16	3	1¼	24x40	28″	20″	18″	1225
712	10000	1	20	3	1¼	24x48	28″	20″	18″	1350
713	15000	1	30	3½	1¼	24x48	28″	20″	18″	1350

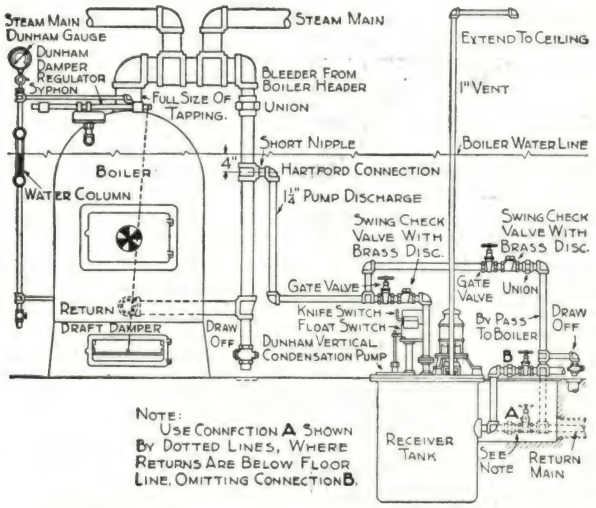


Fig. 1240. Typical Connections, Vertical Type Condensation Pump

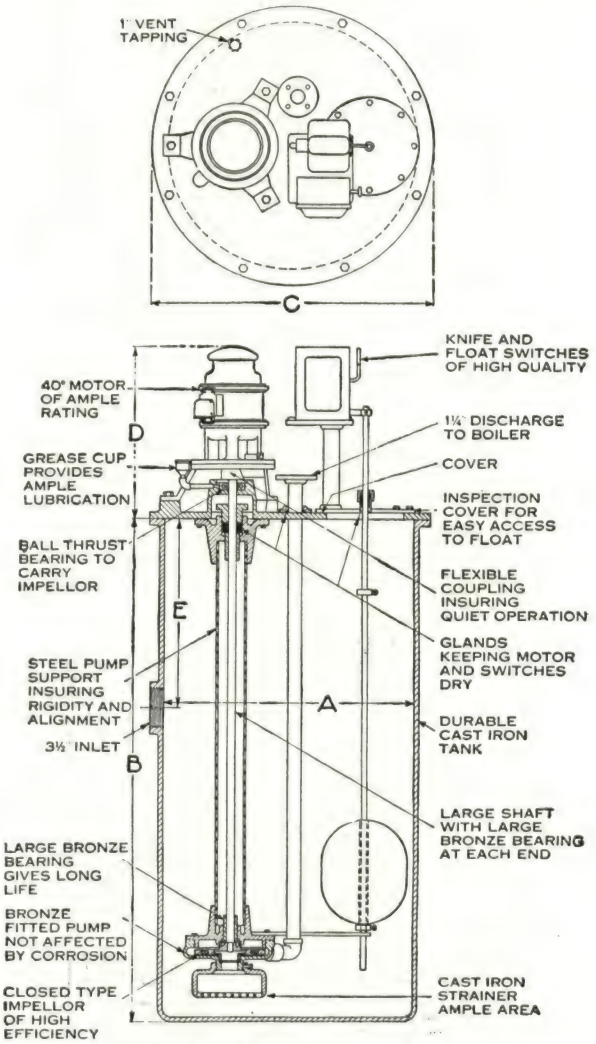


Fig. 1241. Sectional Drawing, Vertical Type Condensation Pump

Continued on next page

DWYER VOLUME TYPE UNIT HEATERS

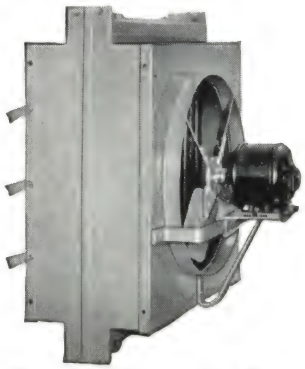
A Type and Size for Every Requirement

Type "V," Floor and Suspended Types

A simple, compact design in the smaller sizes. The fan is made entirely of aluminum, is mounted direct on the motor shaft. Cold air enters direct the back of the unit and is forced over the radiator by the fan. Separately adjustable louvres are provided at the discharge to deflect the heated air up or down as desired.

Particularly well adapted to retail stores, offices, automobile show rooms, etc. Also used extensively in small factories and public garages. The suspended type can be hung direct from the steam main line from the ceiling with band-iron hangers, or from the wall with wall brackets. The floor type unit takes up very little floor space. The floor stand is only large enough in area to admit air to the unit proper.

Type "V" Floor Type



Type "V" Suspended Type

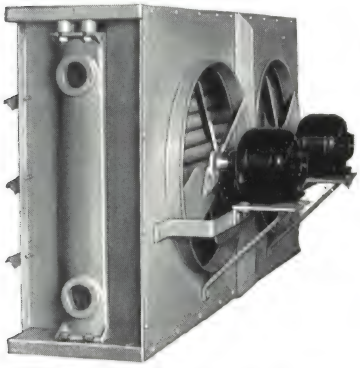
Type "D" Dwyer Unit

Much the same as the Type "V" in general design, but is available in much greater capacity. The essential difference is that although the Type "D" has only one radiator, it is equipped with two fans and two motors. It is really two Type "V" units in one.

The motors can be connected so that both are operated from one switch or they can be connected to separate switches for operation independently of each other. This makes the installation much more flexible. With only one motor in operation, the capacity of the unit is approximately 60% of the full rated capacity.

A simple, compact design, easily and inexpensively installed. The larger size requires only one steam supply and one return connection.

These heaters are usually installed in a horizontal position as pictured below. They can be used in a vertical position, which is sometimes desirable because of space limitations—as for instance—on narrow pilasters between windows.



Type "D" Suspended Type

Type "D" Floor Type

Type "F" Dwyer Unit

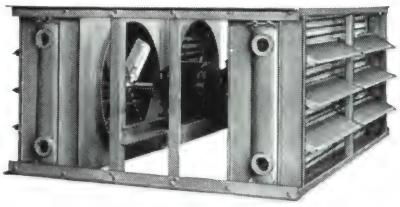
An exceptionally compact heater in the larger sizes. It is equipped with two motors and four fans—one fan mounted on each end of the motor shaft.

Like the Type "D", motors can be independently operated.

The unit delivers approximately 60% of its full capacity with one motor in operation.

The heated air is discharged in opposite directions through adjustable louvres which control the direction of the air stream.

The unit can be installed in the center of a large room or against the wall of the building discharging along the wall.



Type F

This type unit is regularly furnished in suspended type but can easily be fitted with floor supports if required.

This type of unit is particularly adapted to large multi-story industrial plants for ceiling suspension. The largest size (equal to approximately 4000 sq. ft. of direct radiation) is only 30 inches in height.

The unit can be installed tight against the ceiling of the building.

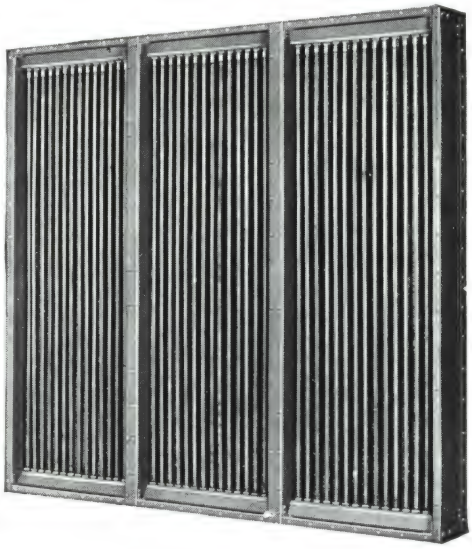
Radiators for Special Application

There are many industrial processes which involve heating or cooling of air. In many instances, Dwyer Unit Heaters can be used for this purpose. There are cases, however, where the temperature rise must be greater or less than that obtained from a standard Dwyer Heater—or where resistance to the flow of air is too great for the fan in the standard heater. For these applications, we offer the Dwyer Radiator housed in a sheet metal casing, to which sheet metal air ducts may be attached and which may be used in conjunction with any type or size of fan or blower.

Built in units, each exactly the same width and depth. Only variation is in the height. This makes it possible to assemble any required number of units of the same height in any required number of units wide and deep.

Every size radiator unit is available with one, two, or three rows of tubes. This makes possible an assembly in multiples of one row of tubes deep.

Radiators are usually installed with tubes vertical. They can be arranged for installation with tubes in horizontal position when necessary.



The DUNHAM

REG. TRADE-MARK

HEATING SERVICE

THE FULTON SYLPHON COMPANY

Manufacturers of Sylphon Automatic Temperature Controlling Instruments

KNOXVILLE, TENN.

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EUROPEAN REPRESENTATIVES: Crosby Valve & Engineering Co., Ltd., 41-42 Foley Street, LONDON, W. 1, ENGLAND
CANADIAN REPRESENTATIVES: Darling Bros., Ltd., 140 Prince Street, MONTREAL, QUE.

Communicate with Our Nearest Representative

Products

Patentees and manufacturers of Sylphon Temperature and Pressure Regulators for automatically controlling temperature of liquids, gases and air, when heated by high or low pressure steam, hot water, or cooled by circulation of calcium chloride brine; Interlocking Valve for fuel oil systems; Steam Water Mixer; Automatic Radiator Valve.

Advantages of Sylphon Devices

All Sylphon devices embody, as motor element or diaphragm, the seamless one-piece bellows of drawn metal shown at right. There is not one bit of solder throughout its length—no chance for leaks or breaks—the most sensitive flexible and durable expansion member known.

Sylphon
TRADE MARK

Sylphon Bellows
Originated, patented and manufactured solely by The Fulton Sylphon Company Knoxville, Tenn.

It is a feature found exclusively in Sylphon products.

Service and Literature

Information and engineering data on any Sylphon product and its application to specific installations will be mailed on request. National engineering service and consultation is at the disposal of all engineers and architects, without obligation. Communicate with our representative nearest you. (Listed above.)

Any or all of the following bulletins will be sent to interested parties.

Bulletin No. SEC-125 "Temperature Control of Liquids."

Bulletin No. SEC-150 "Temperature Control of Refrigeration."

Bulletin No. SEC-175 "Temperature Control of Air and Gases."

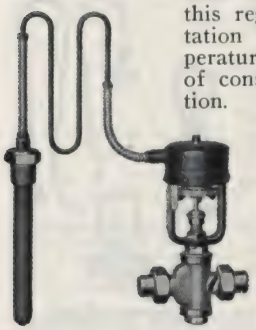
Bulletin No. SEC-225 "Pressure Control."

Operation of Regulators

Sylphon Regulators are self-contained and require no compressed air, electricity, water or other auxiliary power to operate them. They are actuated solely by changes of temperature surrounding the thermostatic element.

No. 921 Temperature Regulator

This is an extremely neat and compact temperature regulator for controlling temperature of steam tables, glue kettles, dishwashing machines, open and closed tanks, slashers, coffee urns, etc. Its small size and attractive finish make it ideal for use as standard equipment on many kinds of apparatus. Like other regulators bearing the name "Sylphon," this regulator has gained a wonderful reputation for its efficiency in controlling temperatures within close limits. Every detail of construction has been given closest attention.



Standard regulator has iron frame, all other parts brass. Regularly finished in black japan but can be furnished nickelplated all over on special order at additional cost. Made in valve sizes ¼ to 1½ in., inclusive. Sizes ¼ to 1 in., inclusive, suitable for pressures up to 150 lb. Sizes 1¼ and 1½ in. suitable for pressures up to 100 lb.

Valve size, in.	¼	⅜	½	¾	1	1¼	1½
Price	$50	50	60	65	70	75	80

No. 921-Z Temperature Regulator

For controlling temperature of cooler where brine is used. Small size and a very efficient controller. Operation unaffected by temperature fluctuations at valve end, either above or below bulb temperature. Valve sizes ½ to 1½ in., inclusive.

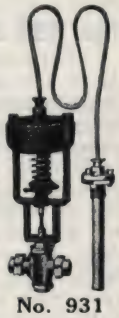
Valve size, in.	½	¾	1	1¼	1½
Price	$82	87	92	97	102

No. 930 and No. 931 Temperature Regulators

Used to automatically control temperature of liquids in open and closed tanks, vats, condensers, stills, retorts, etc. No. 930 has lever and weight adjustment, No. 931 has spring adjustment. The extreme sensitiveness, positive action and simplicity have placed these regulators in a class by themselves, and made them applicable in hundreds of ways. No. 930 is made in valve sizes from ½ to 8 in., inclusive; No. 931 in sizes from ½ to 2½ in., inclusive.

A chart will be furnished showing how to determine size of regulator needed for any given condition.

No. 930



No. 931

PRICES

Valve size, in.	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
Price 930	$60	65	70	75	80	90	95	100	110	120	175	225	275
Price 931	$60	65	70	75	80	90	95	...	...	...	...	...	...

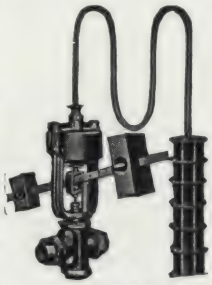
Continued on next page

No. 980 and No. 981 Temperature Regulators

Used to automatically control temperature of air in dry rooms, etc. No. 980 has lever and weight, No. 981 spring adjustment. The thermostatic bulb of our own special design is "star shaped," which gives the greatest area of exposed surface in proportion to cubical content and mass of any design known. Bulb may be placed at any point, and is connected with the operating valve by a flexible tube of any required length.

No. 980 is made in valve sizes ½ to 5 in., inclusive, and No. 981 in sizes ½ to 2½ in., inclusive.

No. 981



No. 980

Valve size, in.	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
Price 980	$70	75	80	85	90	10	110	125	140	150	225	...	...
Price 981	$70	75	80	85	90	100	110	...	..	..	...	..	..

No. 932 Sylphon Temperature Regulator

Detachable Tube Type—This regulator, for controlling temperature of liquids, is composed of three distinct and separable parts—valve, thermostatic bulb and transmission unit. Each may be separately installed, removed or replaced.

Power to valve is transmitted by liquid pressure acting between two small Sylphon bellows and is frictionless. Liquid is non-freezing. These features are patented and possessed by no other regulator on the market.

This regulator is particularly flexible in installation as only one part has to be handled at a time. One transmission unit fits all regulators having valve sizes ½ to 1¼ in. Another unit for valve sizes 1½ to 4 in.

Valves—Double seated balanced type, with bronze discs and seats. Bronze bodies fitted with bronze unions in sizes ½ to 1½ in., inclusive. Sizes 2 in. and above have iron bodies, bodies flanged and drilled standard. Companion flanges furnished extra.

Flexible Metal Tubes—8 ft. long. Longer on order.

No. 932 Assembled

No. 932 Unassembled

Valve size, in.	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$75	80	85	90	95	110	120	130	140	150

No. 932-Z for Control of Drinking Water

When used for control of calcium chloride brine, valves are balanced piston type, entirely of bronze and fitted with bronze unions in sizes ½ to 1½ in., inclusive. Sizes 2 in. and above have iron bodies with bronze working parts, flanged, flanges drilled manufacturers' standard. Temperature ranges: 20° to 60°; 20° to 80°, and 30° to 70° F.

Valve size, in.	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$97	102	107	112	117	132	142	152	162	172

No. 935 Sylphon Temperature Regulator

For control of liquids or air. Made in valve sizes ¼ to 2½ in., inclusive. (Sizes ¼ and ⅜ in. are for steam pressures under 100 lb. only.) For controlling temperatures of open liquor vats, tanks, dryers, dry rooms, warming ovens, proofing rooms, etc. May be installed in any position. Extension stem is regularly furnished 12 in. long, but can be made any length on special order.

Valves are double seated balanced type with bronze discs and seats and fitted with unions, except ¼ and ⅜-in. sizes, which are all-bronze single seated, needle type, with screw ends. Regularly furnished to close valve with rising temperature.

No. 935

Valve size, in.	¼	⅜	½	¾	1	1¼	1½	2	2½
Price	$45	45	50	55	60	65	70	80	90

No. 935-Z for Control of Cold Storage Rooms and Boxes or Drinking Water

When used for control of calcium chloride brine, valves are balanced piston type made entirely of bronze and fitted with bronze unions. Temperature ranges: 10° to 50°; 10° to 70°; 20° to 60°; 20° to 80°; 40° to 80° F.

Valve size, in.	½	¾	1	1¼	1½	2	2½
Price	$72	77	82	87	92	102	112

No. 936 Sylphon Temperature Regulator

For controlling the temperature of water cooled engines of the internal combustion type and water cooled air compressors.

The valve is connected into city water supply with waste water passing through thermostatic head of regulator, so that as temperature of waste water increases, the valve gradually opens, allowing more cooling water to pass through jackets, and as temperature of motor decreases the valve closes permitting less water to pass through. In actual service, the regulator assumes practically a fixed position, allowing only sufficient water to pass through jackets to keep cylinder at desired temperature.

Made in valve sizes from ½ to 1½ in., inclusive. All valves are double seated balanced type, with bronze discs and seats. Bronze bodies fitted with bronze unions.

No. 936

Valve size, in.	½	¾	1	1¼	1½
Price	$60	65	70	75	80

No. 936-Z for Control of Drinking Water

When used for control of calcium chloride brine, valves are balanced piston type, entirely of bronze and fitted with bronze unions. Temperature ranges: 10° to 50°; 10° to 70°; 20° to 60°; 20° to 80°; 40° to 80° F.

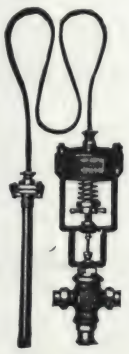
Valve size, in.	½	¾	1	1¼	1½
Price	$82	87	92	97	102

No. 941 Sylphon Temperature Regulator

For controlling temperature of liquids heated by high pressure steam. Has a self-contained, pilot operated, single-seated valve and is suitable for steam pressures up to 250 lb. Can not be used on steam pressures less than 15 lb. A dirt strainer must be installed ahead of regulator to prevent dirt and scale interference.

Made in valve sizes ½ to 3 in., inclusive.

Valves—Single seated, pilot operated. Valves ½ to 2 in., inclusive, are entirely of bronze with union connections. Sizes 2½ and 3 in. have extra heavy iron bodies, bronze working parts, flanged connections, flanges drilled extra heavy, unless ordered otherwise. Fitted with companion flanges on special order at additional cost.



No. 941

Valve size, in.	½	¾	1	1¼	1½	2	2½	3
Price	$80	80	95	105	120	145	155	170

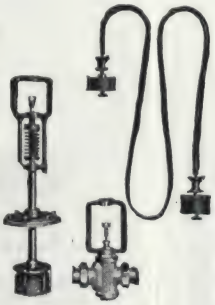
No. 942 Sylphon Temperature Regulator

For control of air temperatures in ducts or chambers when valve must be at some distance from thermostatic head. Easily installed, as valve, transmission unit and thermostatic head are separable parts.

Regulator may be installed in any position—either from top, bottom or side of duct. Thermostatic head removable from stem, so that hole cut through duct wall need be only large enough to pass a ¾-in. pipe. Made in valve sizes ½ to 4 in., inclusive.

Valves—Double seated balanced type, with discs and seats. Bronze bodies fitted with bronze unions in sizes

Assembled



Unassembled

Valve size, in.	½	¾	1	1¼	1½	2	2½	3	3½	4
Price	$75	80	85	90	95	110	120	130	140	150

Continued on next page

½ to 1½ in., inclusive. Sizes 2 in. and above have iron bodies, bodies flanged. Fitted with companion flanges on order at additional cost.

No. 942-Z for Control of Cold Storage Boxes, Rooms, etc.

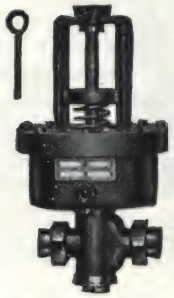
When used for control of calcium chloride brine, valves are balanced piston type made entirely of bronze and fitted with bronze unions from ½ to 1½ in., inclusive. Valves 2 in. and above have iron bodies with bronze working parts, flanged, flanges drilled standard. Temperature ranges: 20° to 60°; 20° to 80°; 30° to 70° F.

Valve size, in...	½	¾	1	1¼	1½	2	2½	3	3½	4
Price.....	$97	102	107	112	117	132	142	152	162	172

Nos. 950, 951 and 952 Sylphon Pressure Regulators

For controlling pressure of steam, water and air. May be used as pressure reducing valves to reduce from high to low pressure, or used in a line where pressure fluctuates to insure the delivery of uniform pressure.

Types Nos. 950 and 951 are all-metal construction—not even the customary valve stem packing is required.



No. 951 Regulator
Dimensions 4-in. size: height, 26 in.; diam. body, 8¼ in.

No. 950 Regulator
Dimensions 4-in. size: height, 22 in.; diam. body, 8¼ in.; length bar, 40 in.

No. 952 Regulator
Dimensions 4-in. size: height, 26 in.; width, 7⅜ in.

Note: 950 and 951 not furnished in sizes ¼ and ⅜ in.

PRICE NOS. 950, 951 AND 952 REGULATORS

Valve size, in.	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Price.....	$30	30	35	36	40	45	50	60	75	90	100	120

No. 955 Sylphon Interlocking Valve

A safety appliance designed to protect oil fired boilers or furnaces by automatically shutting off the oil supply when the atomizing pressure fails, or is reduced below the required minimum.

Valve is installed in fuel line and pressure of atomizing supply is admitted to Sylphon bellows chamber through a ¼-in. pipe connection at top, so that under normal condition atomizing pressure is on the bellows. Pressure acting upon bellows or diaphragm holds valve open. Should pressure drop to predetermined minimum, the latch holding valve open will be immediately released, allowing weighted lever to close valve, thus shutting off fuel supply to burners.

No. 955

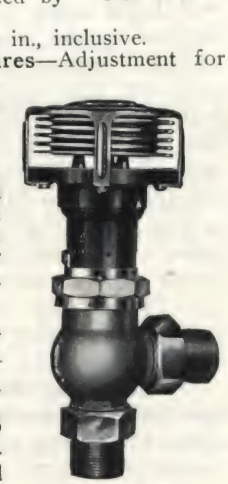
Regardless of return of atomizing pressure the valve will remain closed until opened by hand.

Made in valve sizes from ½ to 2½ in., inclusive.

Adjustment for Different Pressures—Adjustment for different pressures is obtained by rotating the spanner nut upward to increase the atomizing pressure—downward to lessen the pressure.

Valves—Globe pattern, single seated, with bronze bodies and discs, screwed ends, with Briggs standard right-hand pipe tapping in both ends. Valves from ½ to 1½ in., inclusive, are suitable for 125-lb. oil pressure. Valves 2 and 2½ in. are suitable for 100-lb. oil pressure.

Valve size, in..	½	¾	1	1¼	1½	2	2½
Price.....	$49	50	55	60	65	75	95

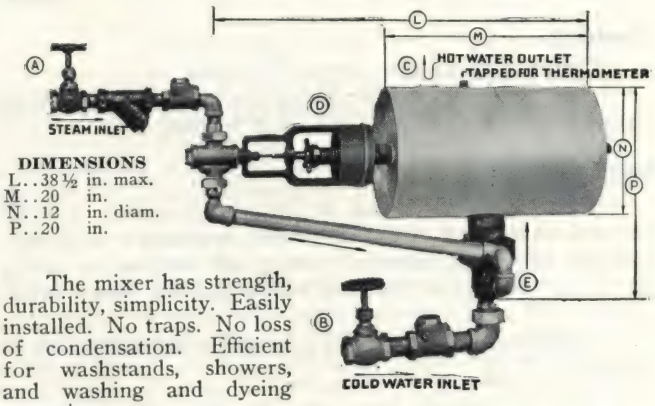


Automatic Radiator Valve No. 875

The Sylphon Radiator Valve is a combination of packless radiator valve and temperature control unit. It is suitable for any two-pipe steam heating system utilizing either floor or ceiling radiators. The Sylphon Automatic Radiator Valve operates automatically when there is a variation in the room temperature and automatically regulates the flow of steam to the radiator to which it is attached.

No. 910 Sylphon Steam Water Mixer

Injects steam directly into the water heating it to the required temperature. No waste of heat energy. Steam controlled by Sylphon Temperature Regulator.



DIMENSIONS
L..38½ in. max.
M..20 in.
N..12 in. diam.
P..20 in.

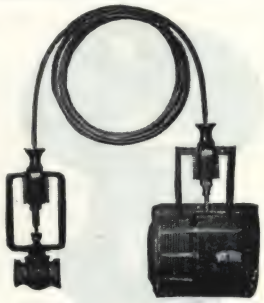
The mixer has strength, durability, simplicity. Easily installed. No traps. No loss of condensation. Efficient for washstands, showers, and washing and dyeing operations.

Affords accurate, unfailing and troubleproof flow of hot water at just the right temperature. Temperature ranges from 40° F. to 275° F. Shipping weights, 195 to 211 lb. When ordering give size of steam and water connections, steam and water pressures, temperature range and quantity of water to be heated in gallons per minute. Price $125.00 to $180.00 according to size.

No. 11 Sylphon Liquid Transmission Regitherm

The latest development in automatic control of air temperatures for industrial uses. A simple, self-contained, sturdy instrument without complicated mechanism to continually get out of order.

Valve is mounted in steam line, Regitherm placed on wall or column 5 ft. above floor, power transmission unit is joined by means of T-slot connections.



Regitherm Assembled

The power transmission unit consists of two Sylphon bellows joined together by flexible tubing of the desired length, completely filled with a non-freezing liquid. Tubing regularly furnished 25 ft. in length, but can be made any length required. This particular feature is covered by patents of recent date and possessed by no other temperature control instrument on the market. Made in valve sizes ½ to 2½ in., inclusive. Regularly furnished to operate from 60° to 80° F. Other ranges on application.

Power Transmission Unit

Valves—Double seated balanced type, bronze discs and seats. Bronze bodies fitted with bronze unions in sizes ½ to 1½ in., inclusive. Sizes 2 and 2½ in. have iron bodies; bodies flanged, and drilled standard. Companion flanges furnished at extra cost.

LIST PRICES AND SHIPPING WEIGHTS

Valve size, in.....	½	¾	1	1¼	1½	2	2½
Price.....	$70	75	80	85	90	100	110

No. 11-Z for Control of Cold Storage Rooms

When used for control of calcium chloride brine it is furnished with following temperature ranges: 20° to 40°; 25° to 45°; 30° to 50°; 35° to 55°; 40° to 60°; 45° to 65°; 50° to 70;° 55° to 75°; 60° to 80° F.

Valve size, in.....	½	¾	1	1¼	1½	2	2½
Price.....	$92	97	102	107	112	122	132

D. G. C. TRAP & VALVE CO., INC.

ESTABLISHED 1898

Manufacturers of Cryer Radiator Control Valves, Steam Traps, etc.

TELEPHONE
MURRAY HILL 2-7320

1 East 43rd Street
NEW YORK, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

Products

CRYER RADIATOR CONTROL VALVES.

Also Cryer Radiator Steam Traps, J-M Ball Steam Traps for industrial use, Blow-off Valves, etc.

Services

The D. G. C. TRAP & VALVE CO., INC. will be pleased to confer with architects, engineers and contractors as to the most advantageous method of using the Cryer Radiator Control Valve and its other products.

The service is rendered gratis, and no obligation is incurred.

The Cryer Organization

Cryer heating systems and devices have been installed in thousands of buildings all over the world. Established in 1898, the Cryer Organization has pioneered in many advances in heating, but believes the development of the Cryer Radiator Control Valve to be its most important achievement.

This valve has been tested in actual operation in numerous buildings for the past five years. As a result of this experience, Cryer engineers state that the Cryer Radiator Control Valve of itself gives *complete* control of steam input, plus remarkable savings in fuel consumption—and it costs no more than ordinary radiator valves.

Cryer Radiator Control Valves Cut Steam Consumption by Giving Steam Heating Systems the Advantages and Economies of Hot Water Heating

The Relative Advantages of Steam and Hot Water Heating

Although heating with hot water is healthful and economical in operation, because the low temperatures in the radiators provide a range of heating applicable to mild days as well as to the cold days of winter, the high initial cost of hot water heating and difficulties in its installation and circulation have prevented its use in large buildings. Steam heating has become almost universal for such purposes, because of its lower first cost, smaller radiators, speed of circulation, flexibility, and ease of control.

Cryer Radiator Control Valve with Connecting Coupling
All exterior parts are nickelplated with polished trimmings

Nevertheless, many attempts have been made to give steam heating systems the advantages inherent in hot water heating of using lower temperatures and pressures, resulting in a variety of vacuum and vapor systems on the market today. While these vacuum and vapor systems circulate steam at lower pressures and temperatures than pressure steam heating, and effect certain operating economies, they do not approach the low radiator temperatures possible with hot water heating, nor are they ordinarily as economical in operation.

Combines Advantages of Each

In perfecting the Cryer Radiator Control Valve for steam heating systems, the engineers of the Cryer system, backed by over 30 years' experience with heating systems, have given the *operating economies and advantages of hot water heating* to steam heating systems, while maintaining all the inherent advantages of all systems of steam heating as to first cost, flexibility, etc.

As explained on the following page, the Cryer Radiator Control Valve controls the flow of steam into the radiator in an entirely new and unique way, and in addition *mixes the steam with the air and vapor* already in the radiator. Then it circulates this humid mixture of air and steam continuously throughout the *entire radiator,* not merely through a few sections. Mixing a small quantity of steam at about 212° with a larger quantity of relatively cool air and vapor produces a mixture very much below steam temperature, and heats the entire radiator to that temperature *only, and holds it there.*

Temperature of Entire Radiator Can Be Varied at Will

Since the air and steam are continuously mixed and circulated through the radiator, all parts of the radiator are at about the same temperature, and the temperature of the whole radiator may be varied at will from about 95° to about 212° by increasing or decreasing the amount of steam supplied through the radiator control valve. The possible variations of temperature are approximately those obtained with hot water, so that with the Cryer Radiator Control Valve the desirable effects of hot water heating are actually reproduced in steam heating systems. Each radiator in the system is so balanced by the control valve that steam is available at all radiators at the same instant. The valve can be installed on *all new or existing two-pipe steam systems without alterations.*

This system of operation is patented and cannot be used on other radiator control valves. It is *not* thermostatic.

The Cryer Radiator Control Valve introduces a new and fundamentally different conception of the principles of heating with steam, and gives results not heretofore possible.

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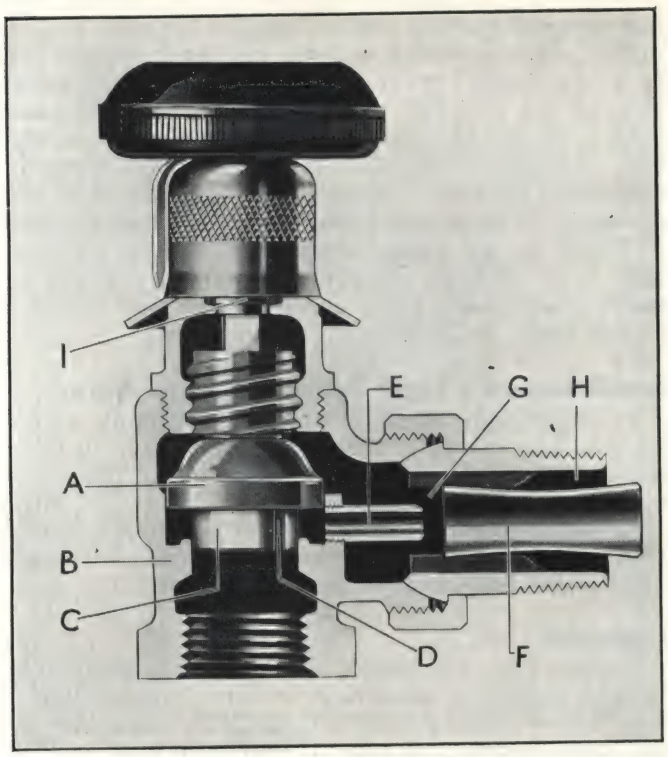

Construction and Operation

Cutaway view shows valve half open.

Inside parts of the valve are cut from drawn brass, insuring strength and long life. A high-quality composition disc prevents leakage to the radiator while the valve is in closed position. A tight seat (I) prevents leakage to the air.

When the valve is opened ⅛ or more, up to almost ¾, the disc holder (A) is raised from rounded seat (B), the slot (D) is gradually exposed, allowing a small amount of steam to flow through it. No steam enters the radiator in this position except through the slot (D). This steam passes into the nozzle (E) only, and then through the modified venturi tube (F). It shoots out of the venturi tube (F) across the top of the radiator, causing a partial vacuum at G. The vapor in the first section of the radiator is drawn back by this partial vacuum through the sleeve (H), and again forced back into the radiator when it strikes the jet of incoming steam.

When the valve has been opened about ¾ or more, the steam begins to flow also between the sleeve (C) and seat (B), and enters the radiator through the large port over the nozzle (E) as well as through the nozzle (E), flowing through the sleeve (H) as well as venturi tube (F). When opened thus, the valve quickly fills the radiator with steam at full pressure. The tight upper seat (I) effectively prevents leakage.

As explained more fully on the following page, the venturi tube (F) combined with the control slot (D), forces continuous circulation of the contents of the radiator and thereby heats it evenly all over. So long as operating conditions remain the same and the valve opening is not changed, the radiator will remain at the same uniform temperature constantly.

Seven Important Advantages and Economies Given by Cryer Radiator Control Valves on Steam Heating Systems

(1) Save Steam

A radiator with a Cryer Radiator Control Valve opened ⅛, uses less than *one-tenth* of the steam used when the valve is opened full. Ordinary radiator valves keep radiators either cold altogether, or partially hot at steam temperatures. On mild days this condition causes overheating, and occupants of the room throw open the windows to keep the temperature down, with consequent increase in steam consumption. Heating with lower radiator temperatures reduces the heat loss due to direct radiation through the windows, and loss through ceilings and walls with which the heated air comes in contact. Better distribution of heat throughout a room is also accomplished. A steam saving during the heating season due to installation of Cryer Radiator Control Valves of as much as *a third or more* of the steam consumed when ordinary or other modulating radiator valves are used, is a reasonable expectation.

(2) Give Benefits and Economies of Hot Water

The beneficial effects of hot water heating, as well as its economies, are obtained with steam heat when Cryer Radiator Control Valves are installed, because the temperature of the radiators can be varied at will from 95° up to 212°. This combines the low first cost of steam systems with the benefits of hot water heating in health and operating cost. Any steam pressure ordinarily used on vacuum or gravity steam systems is sufficient to operate the valve.

(3) Cost No More

Despite the fact that Cryer Radiator Control Valves effect such marked economies and advantages, they cost little or no more than plain radiator valves with no control, and considerably *less than many temperature control valves.* This is due to their very simple construction of fixed parts, and absence of complicated compensating elements.

(4) Eliminate Trouble on Return Line

By continuously circulating the steam and air in the radiator, the Cryer Radiator Control Valve thoroughly prevents the passage of steam into the return line. Only condensate and air go into the return line. This not only prevents trouble with return lines due to steam leakage, but reduces or eliminates the cost of condensing the steam in maintaining a vacuum on the return line.

(5) Used with Any Trap or on Gravity Systems

The Cryer Radiator Control Valve may be used on a vapor or vacuum system with the Cryer Radiator Trap or any ordinary radiator trap. The valve will also operate on gravity lines without a vacuum system.

(6) No Special Installation

The valve comes to the job complete and ready to use. It is not necessary to waste time adjusting it to suit the size or location of the radiator. It is not necessary to make complicated internal adjustments or to insert composition discs or change it to suit local conditions and variations in steam pressure. The valve is simply put into place and is then ready to operate. *Opens and closes quickly.* There are no delicate adjustments to get out of order.

(7) Attractive and Substantial

The valve body is a bronze casting of exceptionally heavy design and strength. The working parts are of brass and have strength and long life. The entire valve is nickelplated with a smooth polish on certain parts, and presents a very attractive appearance.

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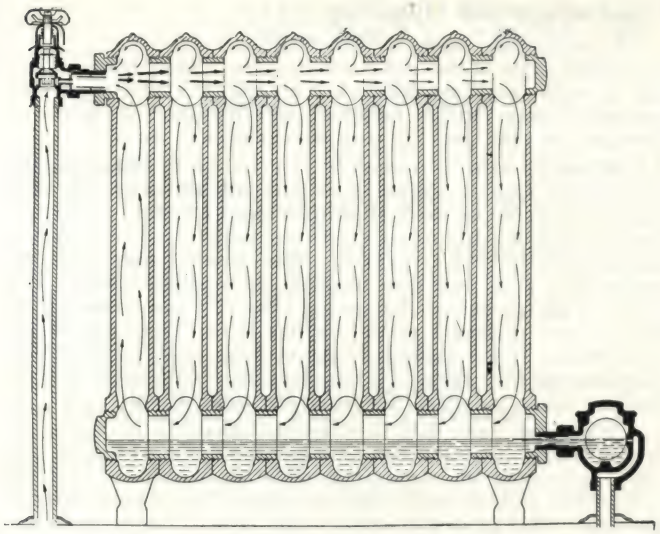

Action of Steam in Radiator Equipped with Cryer Radiator Control Valve

Jet of steam shoots across top of radiator, mixes with air as it falls to bottom, is drawn back up through first section by partial vacuum at the valve and recirculated when it reaches the valve.

How Cryer Radiator Control Valves Circulate Steam and Air in the Radiator

A difference in pressure exists at the two ends of the venturi tube in the coupling because the pressure of the incoming steam is greater than the vacuum in the radiator. This causes a rapid increase in the velocity of the steam, which shoots it across the top of the radiator, whence it descends to the bottom, being mixed with the air and vapor in the radiator. The partial vacuum created at G, as explained on the preceding page, causes the vapor in the section nearest the valve to be drawn upward and around the venturi tube, from which it is again ejected when it comes into contact with the jet of incoming steam. This provides a continuous circulation of steam and air in the radiator at all times.

This circulating effect of the jet and venturi tube is strikingly demonstrated by the Flame Test. The flame of a lighted match or candle held just under the jet of steam coming out from the venturi tube will be drawn into the sleeve around the tube by the force of the partial vacuum created at G. In operation, the steam and air mixture in the radiator is drawn into this sleeve exactly as the flame is drawn in, and then recirculated. *Any desired radiator temperature can be maintained steadily*, provided operating conditions do not change.

With other radiator valves used on two-pipe steam or vacuum systems, whether ordinary or modulating valves, the usual effect of the valve when partially open is to modify room temperature by heating part of the radiator up to full steam temperature and leaving the rest cold. They accomplish this effect by wire-drawing the steam between the disc and seat. This is not only a *wasteful* use of steam at higher temperatures than necessary, but also tends to cause *leakage* due to cutting of seat and disc, and early *wearing out* of the valve or the seat and disc.

The Flame Test

The flame is drawn into the sleeve around the venturi tube, caused by partial vacuum created by force of the issuing jet of steam. The vapor in the radiator is likewise acted on by this partial vacuum

The outstanding feature of the Cryer Radiator Control Valve is that it not only cuts down the amount of steam admitted to the radiator without wire-drawing between the seat and disc, but also mixes this small amount of steam with the gases in the radiator, and then continuously *circulates* the humid mixture evenly throughout the entire radiator. *Not merely through one or two sections, or across the top only.* This mixture of humid air and steam much below 212° in temperature in continuous circulation permits variations in temperature of the entire radiator like those obtained by hot water, from about 95° F. up to 212°.

Specifications for Cryer Radiator Control Valve

All radiators or other direct heating units, except as otherwise noted or hereinafter specified, shall be equipped with the Cryer Radiator Control Valve, as manufactured by the D. G. C. Trap & Valve Co., Inc., New York, N. Y. These shall be of the angle type and constructed of brass or bronze throughout, with rough nickelplated body and polished nickel finish.

Guarantee

The Cryer Radiator Control Valve is guaranteed without restriction to maintain radiator temperatures at any desired reading from 95° to 212°, depending on the valve opening and type of heating system, as long as operating conditions do not change.

Backed by an Organization of Over 30 Years' Experience with Heating Systems

The Cryer Radiator Control Valve is made and sold through distributors by the D. G. C. Trap & Valve Co., Inc., known throughout the United States since 1898 for the installation and operation of heating systems of all types. Thousands of buildings have been equipped with Cryer Systems—vapor, vacuum and gravity.

The Cryer Radiator Control Valve for new or existing steam heating systems of all types gives such systems the effects of heating with hot water, without the higher first cost of hot water heating systems. The remarkable results given on steam heating systems by this valve have been amply demonstrated not only in repeated scientific tests, but in operation in representative buildings, as explained on the following page. Copies of engineering tests are available on request.

Thousands of buildings all over the world have been equipped with Cryer heating systems or devices, including the Bureau of Printing and Engraving at Washington; the Library and Courthouse at Hartford; Vanderbilt University at Nashville; General Electric plants at Erie, Schenectady and Pittsfield; and in New York City over 250 schools, the Commodore and Astor Hotels, New York Stock Exchange, Hudson Terminal Buildings, Kings Park Hospital, Apthorpe Apartments, Belnord Apartments, and the Municipal Building.

Cryer Engineers, backed by this extensive experience, have developed the Cryer Radiator Control Valve, and regard it as a most important contribution to better heating at lower cost.

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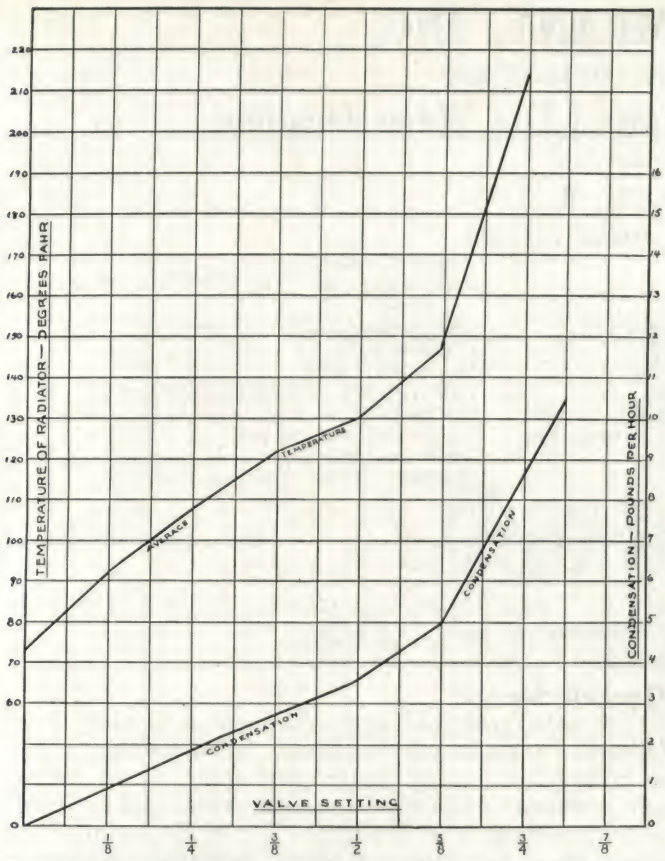


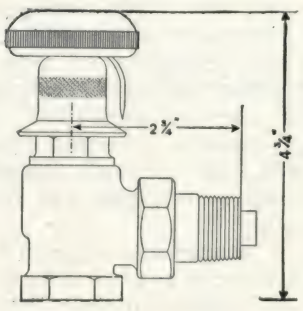
Showing How Cryer Radiator Control Valve Saves Steam and Maintains Uniform Radiator Temperatures Constantly
From tests at Vanderbilt University

Official Tests

The chart above shows the almost unbelievable low radiator temperatures maintained on radiators with the Cryer Radiator Control Valve. This chart is from tests made at Vanderbilt University on a 40-sq. ft. radiator, 26 in. high, with steam at ¼ lb. pressure, using a No. 2 Cryer Radiator Control Valve. The return end was equipped with a trap. The average temperatures of the entire radiator at different valve openings are shown. Note the wide variation in temperature of the radiator from 93° when ⅛ open, up to the full temperature of the steam, 212°, when opened ¾.

The temperatures of different parts of the radiator—top and bottom, and both ends—are very nearly the same with any one valve setting. The entire radiator heats evenly—all of it is used to heat the room, not just part of it.

The chart also shows the savings in steam which inevitably follow reduction in radiator temperatures. The same radiator tested in the previous test at Vanderbilt University, condensed a little over 10 lb. of steam per hour opened over ¾, about the normal rate for steam radiators. But when only ⅛ open, the same radiator condensed just under 1 lb. of steam, or one-tenth of the normal amount. This means real fuel savings on the many mild days of winter, when a comfortable temperature is easily maintained with the valve only ⅛ or ¼ open.



Where Used

On steam heating systems with a return line, either vacuum or gravity, the Cryer Radiator Control Valve effects important savings in steam consumption, and gives the benefits of hot water heating as to health and economy, at the first cost of a steam heat installation. This applies particularly to such buildings as:

- Office buildings
- Apartment houses
- Hotels
- Schools
- Hospitals
- Large residences
- Churches
- Public buildings, etc.

Chase National Bank Building, New York, N. Y.
Equipped with Cryer Radiator Control Valves

Empire Trust Co. Building, New York, N. Y.
Equipped with Cryer Radiator Control Valves

Two of the outstanding buildings recently equipped with Cryer Radiator Control Valves are pictured above—the Chase National Bank Building at Nassau and Cedar Streets, and the Empire Trust Building at 580 Fifth Avenue, New York. These two buildings are examples of types in which Cryer Radiator Control Valves are installed.

The outside shape of the valve has been refined and improved since it was installed on these buildings, but the working parts and principle of operation remain identically the same.

Not Part of a System

The Cryer Radiator Control Valve is not part of any one system. *It cuts fuel cost on all steam heating systems* by increasing their efficiency and economy.

Other Products

For many years Cryer Radiator Steam Traps have been used in every type of building.

J-M Ball Steam Traps are likewise used by many industries on heating lines and where steam is used in manufacturing processes.

Other steam specialties, such as boiler blow-off valve *with by-pass,* are available through the Cryer organization.

DIMENSIONS AND WEIGHTS OF CRYER RADIATOR CONTROL VALVES

Valve No.	Inlet size, in.	Radiator connection, in.	Capacity, sq. ft.
1	½	¾	20
2	¾	¾	60
3	1	1	200
4	1¼	1¼	Over 200

Extension handles for grilles can be supplied.

GRINNELL COMPANY, INC.

MANUFACTURERS AND CONTRACTORS

Grinnell Equiflo Valve for Forced Hot Water Heating

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PROVIDENCE, R. I.

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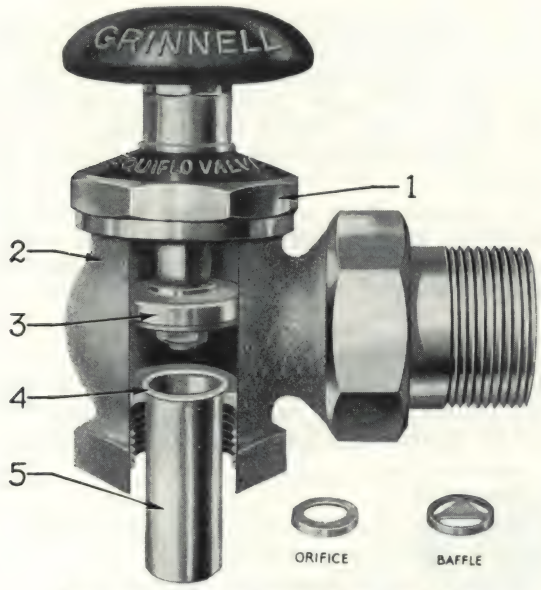
EQUIFLO VALVE.

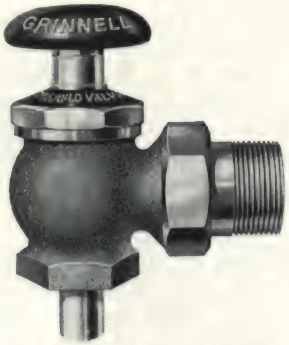
The Grinnell Company Products also include Sprinkler Systems, Thermolier Unit Heaters, Thermoflex Heating Specialties, Pipe Fittings, Fabricated Pipe, and Pipe Hangers—for these products, see Manufacturers' Index.

Grinnell Service

A half century of experience stands in back of all Grinnell Products, the benefits of which we offer freely as consultants in any matter pertaining to the use of our products. At each of our sales offices will be found an engineering staff ready to aid in the solution of problems in the various fields of industry covered by the Grinnell Company.



Sectional View—Grinnell Equiflo Valve



Grinnell Equiflo Valve

SCHEDULE OF PARTS

1. Bonnet
2. Body
3. Disc
4. Seat
5. Equiflo Tube

Grinnell Equiflo Valve for Forced Hot Water Heating

The designing of forced circulation hot water heating systems is so simplified by the Grinnell Equiflo Valve that they can be laid out and installed as easily as vapor or steam systems. This valve consists of a regular type packless radiator valve, with a cartridge or tube made up of a series of orifices and baffles capable of setting up any required frictional resistance. This method of establishing any desired resistance does away with elaborate calculation of pipe sizes.

This unit should not be confused with any type of throttle valve, because the resistance established in each Equiflo Valve is carefully pre-determined and is non-adjustable. This simple method of establishing proper frictional resistance does away entirely with the elaborate calculation of pipe sizes which previously has limited the use of forced hot water systems in spite of their unquestioned superiority over other types of systems in certain classes of buildings. More than this, the Grinnell Equiflo Valve gives more exact equalization than was humanly possible through pipe sizing.

Guarantee—Grinnell guarantees perfectly balanced circulation to each and every radiator where these valves are installed through the system.

Data Sheets
for
Thermoflex
HEATING SPECIALTIES

GRINNELL COMPANY INC.

PROVIDENCE, R. I.

Thermoflex
HEATING SPECIALTIES

For Heat Control

The Thermoflex line consists of Radiator Traps, Blast Traps, Packless Radiator Inlet Valves, Alternators, Vent Traps, Damper Regulators, Lift Adapters, Compound Gauges and Strainers.

Other Grinnell Products

The Grinnell Company products include also Sprinkler Systems, Thermolier Unit Heaters, Equiflo Valves, Pipe Fittings, Fabricated Pipe and Pipe Hangers. For these products see Manufacturers' Index.

Grinnell Service

A half century of experience stands in back of all Grinnell Products, the benefits of which we offer freely as consultants in any matter pertaining to the use of our products. At each of our sales offices will be found an engineering staff ready to aid in the solution of problems in the various fields of industry covered by the Grinnell Company.

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INC.

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Continued on next page

THERMOFLEX HEATING SPECIALTIES

USES OF THERMOFLEX SPECIALTIES

Thermoflex Heating Specialties are used for heat control on all forms of pressure steam heating, vapor and vacuum systems, and on steam systems for the generation of heat for industrial purposes of great variety.

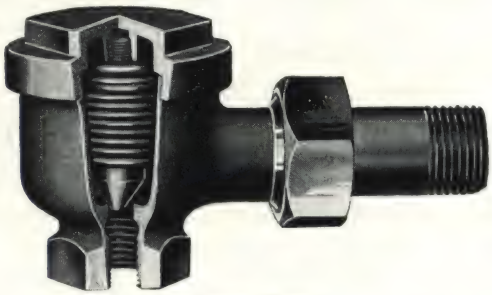
The uses and adaptability of Thermoflex Heating Specialties are set forth in the following pages by diagrams and descriptions together with full information as to sizes, capacities, etc.

Hydron Bellows, a Basic Principle

The Thermoflex Trap is distinguished from all others by its Hydron Bellows—the heart of the trap. The principle in the operation of this bellows, which is the port opening and closing device, is to be found in many of the heating specialties illustrated in this catalogue.

The illustrations below show the principle in its application to Thermoflex traps.

Typical Example of Use of Hydron Bellows in Trap

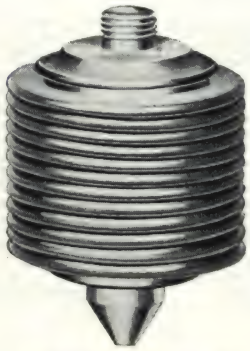


Radiator Trap
Showing Hydron Bellows which opens and closes port openings by thermostatic action

The Manufacture of Thermoflex Traps

Exacting Standards

After fifty years of varied heating experience with both low and high pressure systems, in which every known type of trap has been employed, Grinnell Company has discovered the one trap which meets its exacting standards of manufacture and performance. This trap, together with other heating accessories employing the same principles, is now offered to discriminating architects, heating engineers, contractors and building owners by Grinnell Company as exclusive distributor. This assures Grinnell service and engineering co-operation to those who wish to avail themselves of it.



Hydron Bellows for Traps

The Hydron bellows are formed by hydraulic pressure only and in the very process of making are tested automatically to several hundred pounds pressure—many times the recommended working pressure. Any possible weakness in the metal causes failure before the bellows can be completed. Perfect bellows in all Thermoflex Traps are absolutely secured by the Hydron Tested-During-Manufacture process.

The advantages of this method of manufacture are absolutely apparent because with the Hydron process, the bellows, which is the vital part of the trap, can not be made of anything but perfect tubing.

Structural Features

A further advantage of the Hydron is its entire freedom from tool marks or scratches since it is formed without rolling, rubbing, or spinning action of any kind. The result is that the metal in the finished bellows is remarkably uniform in thickness, metallurgical structure, and physical properties throughout every part of each convolution. This is absolutely essential to a good bellows and is a feature exclusive with the Hydron.

The high internal forming pressure permits the metal to flow freely and without restriction, which materially lengthens the life of the Hydron bellows.

With the Hydron process, the end fittings are attached to the tubing before the hydraulic

Continued on next page

THERMOFLEX HEATING SPECIALTIES

forming of the bellows so that not only is the tubing itself proof-tested in the making, but the same thing is true of the one soldered joint. Any weakness or any nature whatever, either in the tubing or in the soldering of the fittings, will permit the internal pressure to rupture the tubes and break open, thereby destroying the defective unit before it ever becomes a bellows.

Filling with Volatile Liquid—Another advantage of the Hydron bellows lies in the development of a new and efficient method of filling and sealing, which renders practically impossible any loss of the volatile liquid through the filling passage.

High Quality of Tubing Used—To make Hydron bellows, tubes of exceptionally high quality are required. The average tube which is good enough to make an ordinary bellows will not do for a Hydron.

The hydraulic method, involving, as it does, the use of several hundred pounds of internal pressure, requires that the walls of the tubes be made of the highest possible grade of metal, uniform in wall thickness and entirely free from surface imperfections, impurities, hard spots, pin holes, or other hidden defects.

Such tubing has been developed only by the rigid control of every manufacturing operation, from the melting and casting into the ingot of the virgin metals, to the final drawing and finishing operation.

From drawn tubing of such high quality as a foundation, the Hydron is made, and while the original cost of such tubing is considerably more, the forming process used in making the bellows is so much more economical that we are able to offer the Hydron bellows at no greater cost than the ordinary bellows.

Hydron Tested-During-Manufacture Process

Inspected and Certified by Pittsburgh Testing Laboratory

That advertising claims may not be confused with scientific facts, Grinnell Company has turned to the Pittsburgh Testing Laboratory as an outstanding authority in the country for engineering inspection and verification examinations to enable them to certify to the statements made herein concerning Thermoflex traps. Under an annual contract, staff members of the Pittsburgh Testing Laboratory regularly inspect Thermoflex traps during manufacture to continuously ascertain that the Hydron Tested-During-Manufacture process is exclusively employed. They also actually test every completed Thermoflex trap under actual working conditions.

Certificate of inspection tags (as illustrated herewith) are attached by engineers of the Pittsburgh Testing Laboratory to all Thermoflex heating specialties using the Hydron bellows and meeting the test requirements.

Application to Heating Systems

The following pages show the usefulness of Thermoflex heating specialties on various forms of heating systems for buildings.

In the control of heat in steam heating systems, basic facts to keep in mind are that heat is being transmitted at points where condensation takes place, that heat transmission and condensation vary in a certain proportion, that condensation in a system tends to create a vacuum and that this tendency under proper control, accelerates the flow of steam to replace it.

Conditions which facilitate the flow of steam and cause it to condense only where heat is required effect heating efficiency and economy of full consumption.

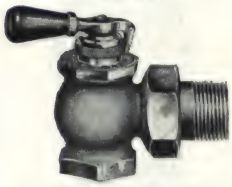
These principles of heat control apply not only to systems designed specially for heating of buildings but for heat generation by steam for any purpose. The Thermoflex specialties are the last word in heat regulation and control.

Continued on next page

THERMOFLEX HEATING SPECIALTIES

THERMOFLEX SPECIALTIES AS ADAPTED TO HEAT CONTROL FOR VAPOR, VACUUM AND PRESSURE HEATING SYSTEMS

Thermoflex Radiator Trap
No. 12



Thermoflex Radiator Inlet Valve
No. 10

Thermoflex Vent Trap

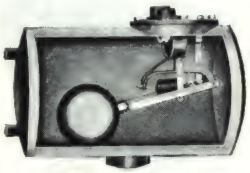
Vapor Systems

Vapor heating equipments are two-pipe systems and differ from gravity two-pipe systems in that the steam is prevented from entering and building up pressure in the return lines by means of thermostatic traps on the return ends of all heating units. They also differ in that the air is eliminated with the condensate through the heating unit lines into the return system and thence to the atmosphere through Thermoflex vent traps instead of through individual air valves on the heating units.

In Thermoflex vapor systems, boiler protection is secured by Thermoflex alternator (return trap) which equalizes boiler and return pressures.

Thermoflex vent traps prevent air from returning through the return lines thus permitting the formation of a partial vacuum when generation of steam pressure above atmospheric pressure ceases. Such installations are sometimes termed "vapor-vacuum systems."

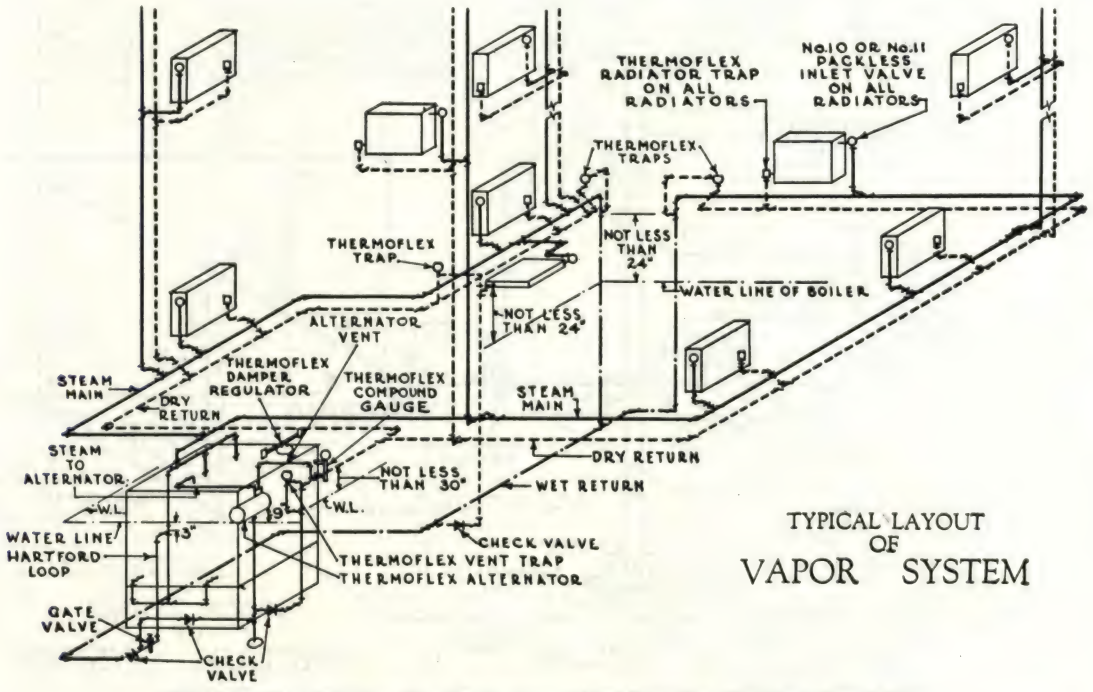
The drawing below shows the correct application of Thermoflex specialties to a vapor system.



Thermoflex Alternator

Thermoflex Damper Regulator

Thermoflex Compound Gauge



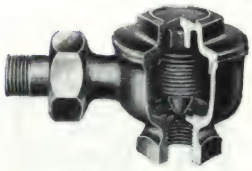
TYPICAL LAYOUT OF VAPOR SYSTEM

This Drawing Shows the Adaptation of Thermoflex Heating Specialties

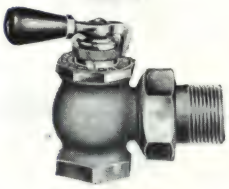
Continued on next page

THERMOFLEX HEATING SPECIALTIES

THERMOFLEX SPECIALTIES AS ADAPTED TO HEAT CONTROL FOR VAPOR, VACUUM AND PRESSURE HEATING SYSTEMS



Thermoflex Radiator Trap
No. 2



Thermoflex Radiator Inlet Valve
No. 10

Thermoflex Lift Adapter

Vacuum Systems of Steam Heating

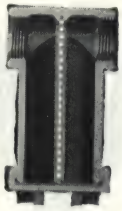
In principle, a vacuum and vapor system are similar. In the vacuum type system a vacuum pump, either steam or electric driven, is used to exhaust air and to return condensate to boiler (or receiving tank). This type of system is usually used on larger installations and in cases where radiation is below the water line of the boiler. It has the advantage of rapidly venting the air from the system and circulating vapor through the system at pressures below atmosphere, yet permitting higher pressures when necessary. It also gives greater economy in operation than the vapor system, and the extra cost of installation is usually more than offset by such economy.

Thermoflex specialties are particularly suited to this type of system due to their high efficiency and service. Thermoflex Traps will not allow escape of steam into returns, thereby aiding in the successful automatic control of the vacuum pump.

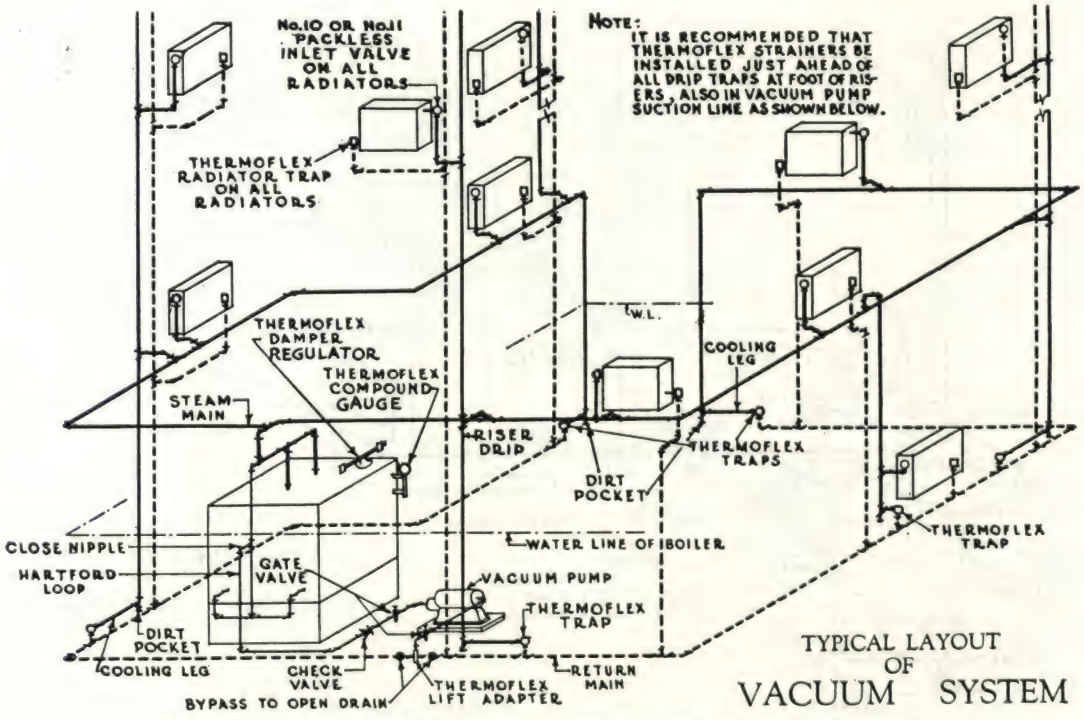
The drawing below shows a typical vacuum system using an electrically driven pump, automatically controlled. It also shows the proper application of Thermoflex specialties as applied to this type of system.

Thermoflex Damper Regulator

Thermoflex Compound Gauge



Thermoflex Strainer
Type G



TYPICAL LAYOUT OF VACUUM SYSTEM

This Drawing Shows the Adaptation of Thermoflex Heating Specialties

Continued on next page

THERMOFLEX HEATING SPECIALTIES

THERMOFLEX SPECIALTIES AS ADAPTED TO HEAT CONTROL FOR VAPOR, VACUUM AND PRESSURE HEATING SYSTEMS

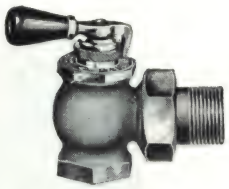
Thermoflex Radiator Trap
No. 2

Thermoflex Strainer
Type G

Pressure Systems

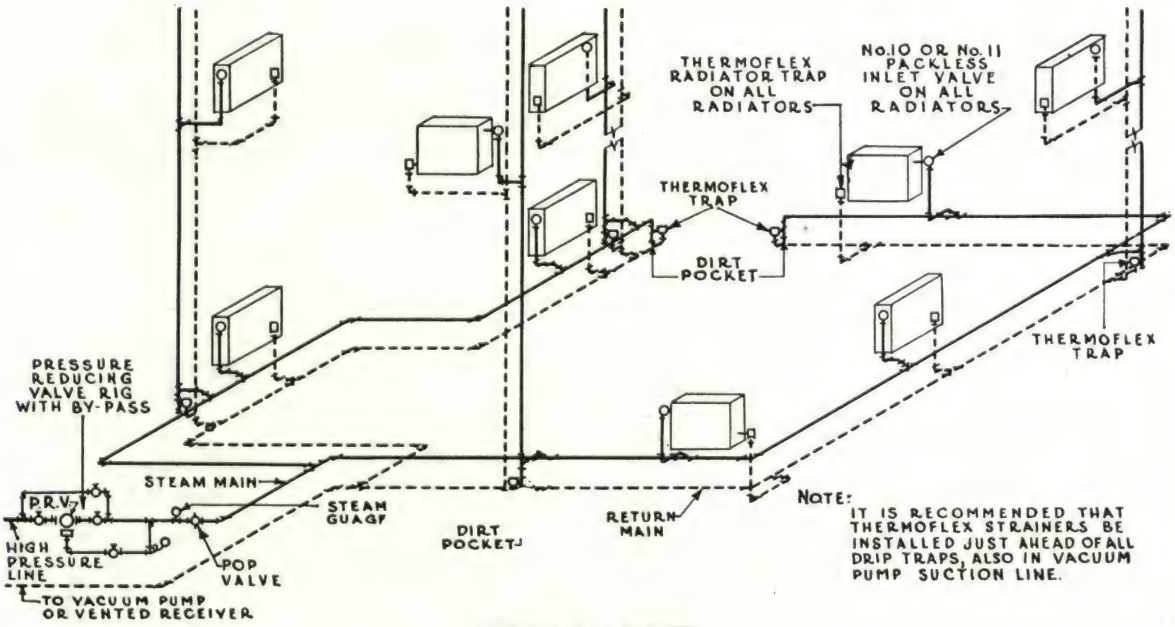
A widely used type of system and using Thermoflex heating specialties to advantage is one wherein any pressure (within the limits of the particular traps, radiation, piping, etc.) may be maintained in the supply system and radiation or coils and where no pressure or a vacuum is carried in the return system. The drawing below is illustrative of such a system and showing the correct application of Thermoflex specialties.

The drawing includes a pressure reducing valve with by-pass for use where the source of steam supply pressure is high and must be reduced to the desired pressure.



Thermoflex Radiator Inlet Valve
No. 10

Thermoflex Radiator Inlet Valve
No. 11



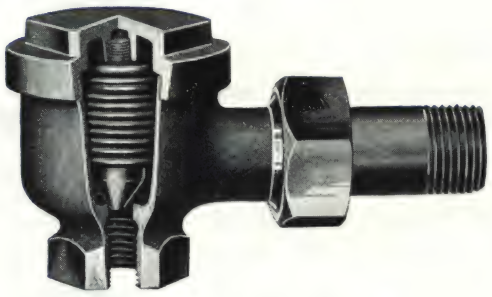
TYPICAL LAYOUT
OF
PRESSURE SYSTEM

This Drawing Shows the Adaptation of Thermoflex Heating Specialties

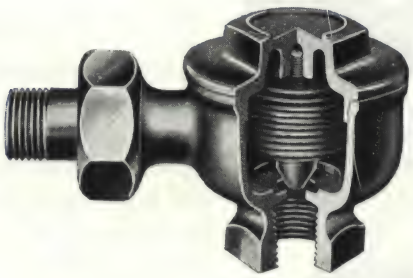
Continued on next page

THERMOFLEX HEATING SPECIALTIES

Thermoflex
RADIATOR TRAPS
No. 12 and No. 2



Radiator Trap No. 12—Angle



Radiator Trap No. 2—Angle

Specify For—Pressure steam heating (up to 25 lb.) vapor, vacuum and all systems where traps are used, on every radiator outlet. Also for drips on drop-feed run-outs.

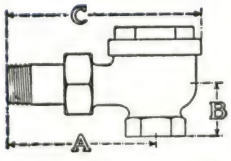
Models—No. 12 is made in angle, right-hand corner and left-hand corner patterns, one size only, ½-in. inlet—½-in. outlet.

No. 2 is made in angle and offset patterns (for offset, see Page 7), two sizes, ½-in. inlet—¾-in. outlet and ¾-in. inlet—¾-in. outlet.

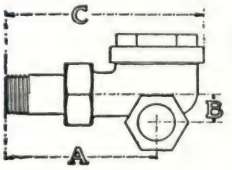
Note that while the ½-in. No. 12 and the ½-in. No. 2 have the same capacity, the body of the ½-in. No. 2 is larger due to the fact that it is tapped ¾ in. on the outlet.

Action—Thermostatic in operation, the highly sensitive Thermoflex-Hydron bellows remains off its seat while passing air and water through the body, but closes instantly against the passage of steam, thus assuring at all times a radiator filled with steam. The large area outlet port assures rapid and efficient drainage and also freedom from trouble caused by dirt and scale.

Specifications—Bodies are heavy all bronze construction with union, fully nickel plated with highly polished trimmings. Union nut is hot forged, having twice the strength of a casting and will not split or stretch. Thermostatic bellows is a full eight fold Thermoflex - Hydron, automatically Tested - During - Manufacture. Each Thermoflex Trap is tested, certified and tagged by the Pittsburgh Testing Laboratory.



Trap No. 12—Angle

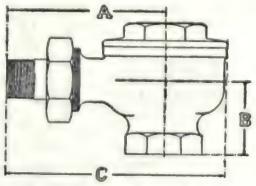


Trap No. 12—L. H. Corner
(R. H. not shown)

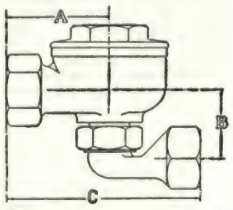
LIST PRICES, CAPACITIES AND DIMENSIONS

Size and No.	List prices	Inlet	Outlet	Capacity sq. ft.	A	B	C
½-in.–No. 12 angle....	$7.00	½	½	200	3¼	1⅛	4¼
½-in.–No. 12 R H. cor	7.00	½	½	200	3¼	⅝	4¼
½-in.–No. 12 L.H. cor.	7.00	½	½	200	3¼	⅝	4¼
½-in. No. 2 angle	8.50	½	¾	200	3¼	1½	4½
½-in.–No. 2 offset....	8.50	½	¾	200	2¼	1⅝	4½
¾-in.–No. 2 angle....	12.00	¾	¾	500	3½	1½	4¾
¾-in.–No. 2 offset..	12.00	¾	¾	500	2¼	1⅝	4½

Capacities are given in sq. ft. of direct cast iron radiation or its equivalent.



Trap No. 2—Angle



Trap No. 2—Offset

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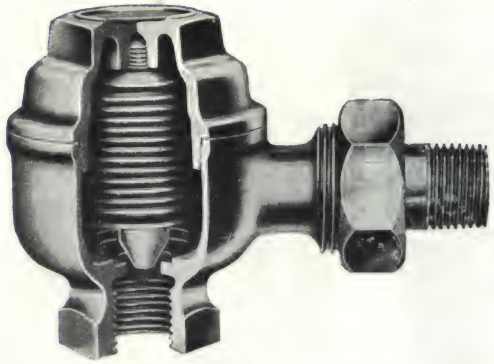
THERMOFLEX HEATING SPECIALTIES

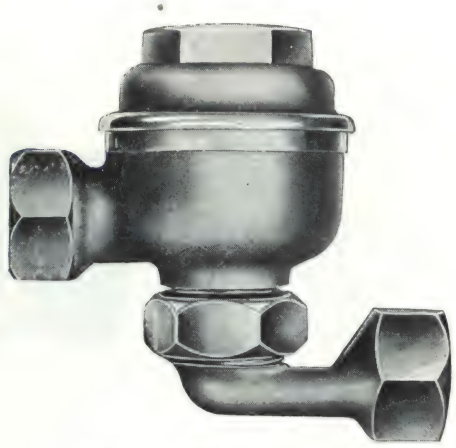
Thermoflex

HIGH DUTY RADIATOR TRAP

No. 3



Radiator Trap No. 3—Angle



Radiator Trap No. 3—Offset

Specify For—Vacuum, vapor or pressure steam heating (up to 25 lb.).

(1) For connection to every radiator.

(2) For drips at bottom of risers.

(3) For drips on drop-feed run-outs.

(4) For return connection to Thermolier—the Grinnell Unit Heater (see Page 15, carrying schedule of traps for Thermoliers, typical connections, etc.).

Action—High duty Thermoflex traps No. 3 are thermostatic in operation and are similar to, but have greater capacity than the No. 12 and No. 2 traps (see Page 6), as will be noted by comparison of the tables at bottom of the pages.

They can be used for special conditions where the service is continuously severe and meet the demands of those engineers who, regardless of price, want over-capacity together with an article which will give super-service.

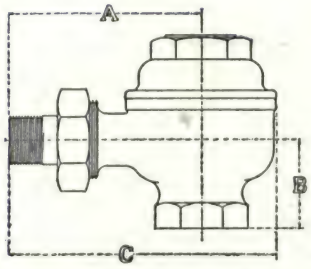
Specifications—Heavy all bronze body with union Fully nickel plated with highly polished trimmings. Hot forged union nut which will not split or stretch. Full twelve-fold Hydron bellows, automatically Tested-During-Manufacture. Each Thermoflex trap is tested, certified and tagged by Pittsburgh Testing Laboratory.

No. 3 Offset Trap—Attention is called to the special patented feature of the No. 3 offset trap. The union swivel connection being placed on the discharge side of the trap enables return piping to be connected to trap from any angle desired. Connection is made on inlet end with a nipple. This offset feature is also available for the No. 2 radiator trap shown on Page 6.

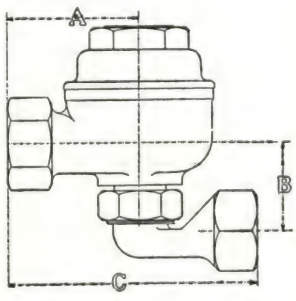
LIST PRICES, CAPACITIES AND DIMENSIONS

Size and No.	List prices	Inlet	Outlet	Capacity sq. ft.	A	B	C
½-in.–No. 3 angle	$10.00	½	¾	350	3¼	1½	4½
½-in.–No. 3 offset	10.00	½	¾	350	2¼	1⅝	4½
¾-in.–No. 3 angle	13.50	¾	¾	800	3½	1½	4¾
¾-in.–No. 3 offset	13.50	¾	¾	800	2¼	1⅝	4½

Capacities are given in sq. ft. of direct cast iron radiation or its equivalent.



Trap No. 3—Angle

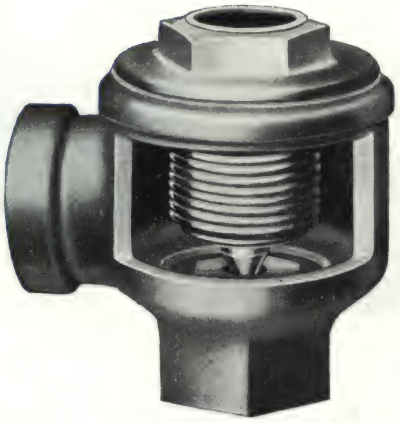


Trap No. 3—Offset

Continued on next page

THERMOFLEX HEATING SPECIALTIES

Thermoflex
IRON BODY TRAP
No. 4



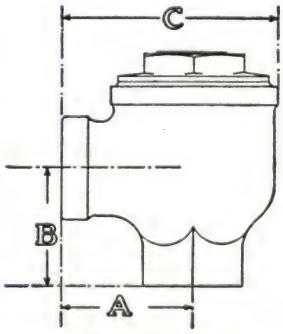
Iron Body Trap No. 4

Specify For—Vacuum, vapor or pressure steam heating (up to 25 lb.). On drips of supply mains and risers, pipe coils, Thermoliers (the Grinnell Unit Heaters), unit ventilators, etc. Also for return connection to dryer coils, process kettles and for other industrial uses where pressures of steam used do not exceed 25 lb. There are many places in heating and industrial steam work where this I. B. (iron body) trap at a lower price, but with all of the other valuable features of the No. 3 high duty trap (shown on Page 7), will be found most satisfactory.

Models—One pattern, angle only *without* union and in three sizes, ¾, 1 and 1¼-in. inlet and outlet respectively.

Action—Thermostatic in action the same as the No. 3 high duty radiator trap and with same capacity for the ¾-in. size; the 1 and 1¼-in. sizes have correspondingly greater capacities. This I. B. trap and also the No. 3 high duty trap with their extra long (12-fold) bellows have high lift which combined with the large orifice provide not only unusual capacity but freedom from dirt and scale troubles.

Specifications—Cast iron body, finished in grey lacquer, with bronze cap and inserted renewable bronze seat in body. Full twelve-fold Thermoflex-Hydron bellows, automatically Tested-During-Manufacture. Each Thermoflex trap is tested, certified, and tagged by the Pittsburgh Testing Laboratory.



Trap No. 4

LIST PRICES, CAPACITIES AND DIMENSIONS

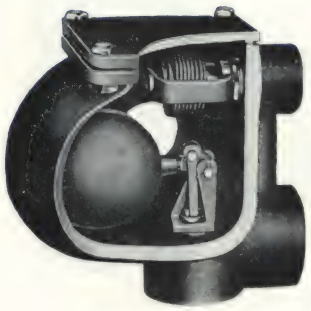
Size and No.	List prices	Inlet	Outlet	Capacity sq. ft.	A	B	C
¾-in.–No. 4	$11.00	¾	¾	800	2¼	2	3¾
1 -in.–No. 4	16.75	1	1	1350	2½	2⅛	4¼
1¼-in.–No. 4	20.00	1¼	1¼	1800	2¾	2¼	4½

Capacities are given in sq. ft. of direct cast iron radiation or its equivalent.

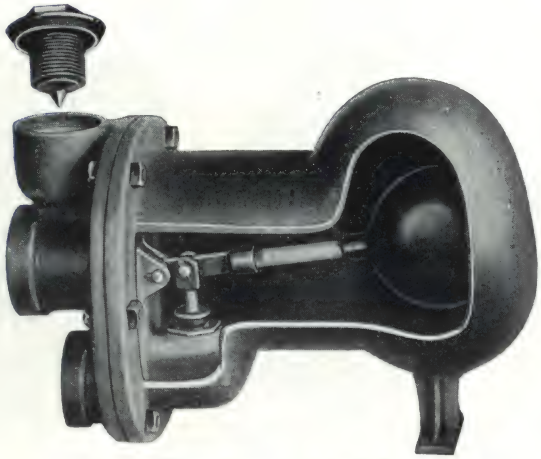
Continued on next page

THERMOFLEX HEATING SPECIALTIES

Thermoflex
BLAST TRAPS



Trap No. 0



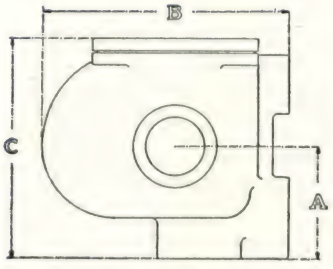
Trap Nos. 1, 2 and 3

Specify For—All types of unit heaters, particularly header to header type; all cast iron and light weight types of hot blast radiation; hot water storage tanks, hot water generators, large supply mains and risers, dryer coils, etc.; especially for conditions where extremely large quantities of condensate must be handled.

Models—The No. 0 differs from the Nos. 1, 2 and 3 in shape of body only; the operation is the same. All sizes are made in two pressure ranges, 0—25 lb. and 25—100 lb.

Action—The action is combined float and thermostatic, the water being normally handled by the large capacity ball float and valve and the air being vented through the thermostatic by-pass. In cases of flood conditions water is also handled through the by-pass, thus adding to the normal rated capacity. The Thermoflex-Hydron bellows on by-pass positively prevents air binding of trap, allows free and rapid venting, and permits no escape of steam into return line.

Specifications—Cast iron bodies with all working parts of bronze (the valve and seats in the high pressure models are of stainless steel) with high test seamless copper ball floats. Bolted-on heads, easily accessible for inspection and cleaning. Hydron bellows automatically Tested-During-Manufacture. Each Thermoflex blast trap is tested, certified and tagged by Pittsburgh Testing Laboratory.

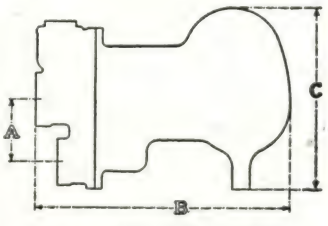


Trap No. 0

LIST PRICES, CAPACITIES AND DIMENSIONS

No.		List prices		In-let	Out-let	Ca-pac-ity	A	B	C
0–25 lbs.	25–100 lbs.	0–25 lbs.	25–100 lbs.						
0	0—1	$30.00	$35.00	2–1¼	2–1¼	650	3	6½	6
1	1—1	60.00	65.00	1	¾	1000	3½	14½	10
2	2—1	70.00	75 00	1¼	1	2000	3½	17½	10
3	3—1	85.00	90.00	1½	1¼	3000	3½	20½	10

Capacities are given in lb. of water per hr. at 2 lb. pressure. Higher pressures will give resultant higher capacities.



Trap Nos. 1, 2 and 3

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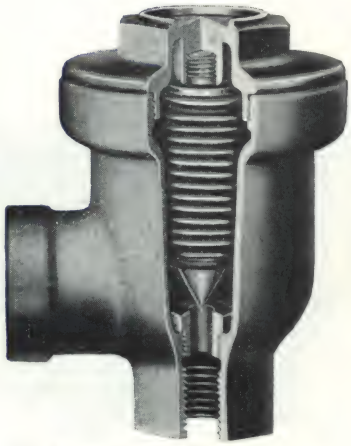
THERMOFLEX HEATING SPECIALTIES

Thermoflex

HIGH PRESSURE TRAPS

No. 100



High Pressure Trap No. 100

Specify For—Working steam pressures from 25 to 125 lb. for use on hospital sterilizers, kitchen equipment, laundry machinery, vulcanizers, drying ovens and kilns, street steam service, Thermoliers, etc. This thermostatic type of trap is rapidly growing in use for these working pressures, because of simplicity of working parts and operation, and therefore, long life. Small in size, light in weight and easily installed.

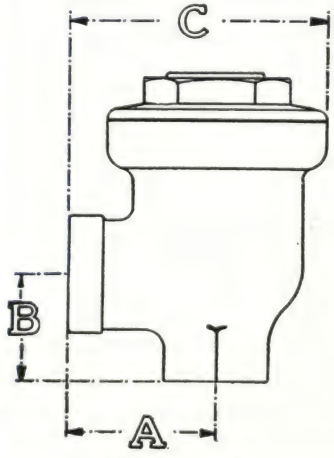
Models—One pattern, angle only without unions. Three sizes, ½, ¾ and 1-in. inlet and outlet respectively. All fully nickel plated.

Action—Thermostatic in operation, closing against escape of steam and allowing free venting and rapid draining.

Caution—These traps being thermostatic in operation must always be installed so that they discharge into a return line or receiver which is vented to atmosphere. They will not operate with a back pressure in the return line or against a head.

Not suitable for use where the total steam temperature exceeds 400°. When discharging into a vacuum return, provision should be made for properly cooling the condensate, or connections should be made as shown in detail on Pages 15-18.

Specifications—Extra heavy bodies with stainless steel renewable seats, fully nickel plated. Special Thermoflex-Hydron bellows automatically Tested-During-Manufacture and fitted with a nitrided steel valve which will not rust and cannot wear. Can also be furnished with unions, chromium plated, polished nickel, etc., at extra cost. Each Thermoflex trap is tested, certified and tagged by Pittsburgh Testing Laboratory.



Trap No. 100

LIST PRICES, CAPACITIES AND DIMENSIONS

Size	List prices		Inlet	Outlet	Capacity lbs. per hr.	A	B	C
	Plain nickel	Polished nickel or chromium						
½	$15.00	$16.50	½	½	500	1¾	1¼	3
¾	20.00	21.50	¾	¾	650	2¼	2	3¾
1	25.00	26.50	1	1	800	2½	2⅛	3⅞

Above capacities are given in lb. of water per hr. at 25 lb. pressure.

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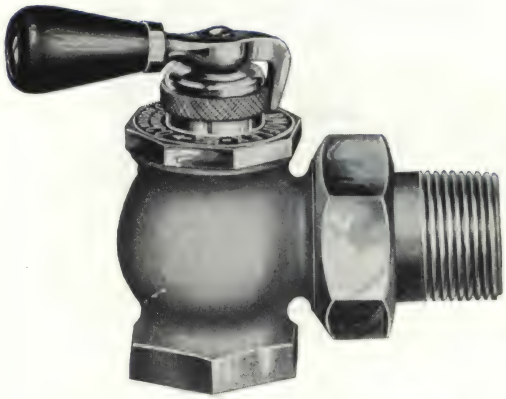
THERMOFLEX HEATING SPECIALTIES

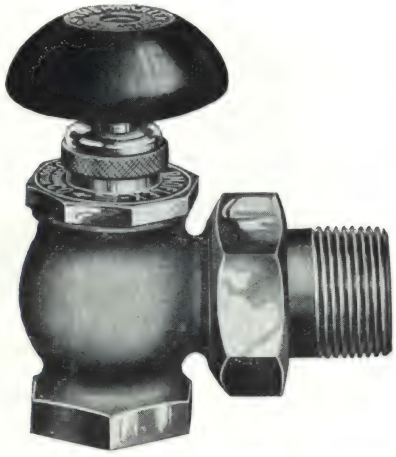
Thermoflex

PACKLESS RADIATOR INLET VALVES

No. 10 and No. 11



Inlet Valve No. 10—Lever Handle



Inlet Valve No. 11—Wheel Handle

Specify For—All types of direct radiators on vapor, vacuum and low pressure heating systems on the supply end of each radiator.

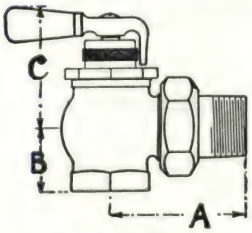
Models—Two models as illustrated, lever handle and wheel handle. The No. 10 and No. 11 valves are identical, except for handle. Either lever or wheel is furnished as desired at same price. Three body styles—angle, right-hand corner and left-hand corner.

Action—For manual control only. Will fully open or close with less than one full turn of the lever or wheel.

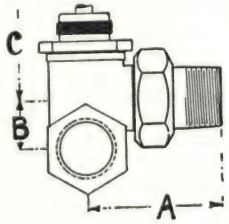
Specifications—All bronze construction, fully nickel plated with highly polished trimmings. Large dial plate, easily read.

Non-heating levers and wheels. Note the low bonnet construction which gives a very pleasing appearance.

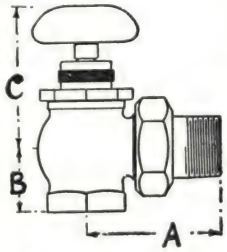
Special Equipment—The No. 10 and No. 11 Valves can also be furnished with lock shields and various types of extended handles and stems. These are covered on Page 12.



No. 10—Angle Pattern



No. 10 and 11—R. H. Corner Pattern
(L. H. not shown)



No. 11—Angle Pattern

LIST PRICES, CAPACITIES AND DIMENSIONS

Size	List prices		Capacity No. 10 & 11	No. 10 angle			No. 11 angle			No. 10 R. H., L. H.			No. 11 R. H., L. H.		
	No. 10 & 11 angle	No. 10 & 11 R. H., L. H.		A	B	C	A	B	C	A	B	C	A	B	C
½	$4.55	$5.00	0— 30	2¾	1⅛	2¼	2¾	1⅛	2¾	2¾	15/16	2¼	2¾	15/16	2¾
¾	5.30	6.00	31— 60	2¾	1⅛	2¼	2¾	1⅛	2¾	2 9/16	15/16	2¼	2 9/16	15/16	2¾
1	6.25	6.90	61—120	3⅛	1⅜	2⅜	3⅛	1⅜	2⅞	3 3/16	1	2⅜	3 3/16	1	2⅞
1¼	7.85	8.65	121—200	3½	1½	2¾	3½	1½	3¼	3 5/16	1 3/16	2¾	3 5/16	1 3/16	3¼

Capacities are given in sq. ft. of direct cast iron radiation with a pressure at the valve of 8 oz.
A higher pressure on the supply or a vacuum on the return will give correspondingly higher capacities.

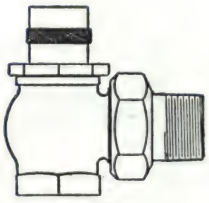
Continued on next page

THERMOFLEX HEATING SPECIALTIES

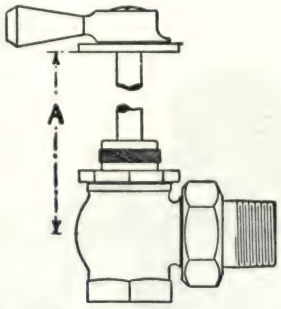
Thermoflex

PACKLESS RADIATOR INLET VALVES

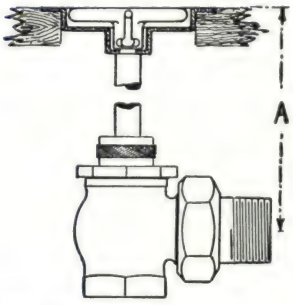
With Special Attachments



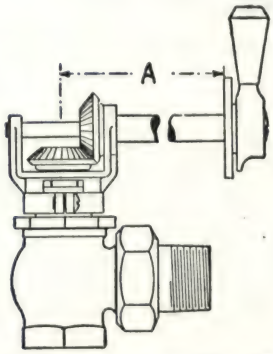
Lock Shield Type—No. 10—1



Standard Vertical Extension—No. 10—2
(Wheel handle—No. 11—2, not shown)



Flush Type Extension—No. 10—3



90° Angle Extension—No. 10—4
(Wheel handle—No. 11—4, not shown)

Above we show Thermoflex packless inlet valves with four types of special attachments:

No. 10—1. Standard lock shield pattern.

Nos. 10—2 and 11—2. Standard vertical extension.

No. 10—3. Special drop wheel which is flush with top of window seat or sill. Wheel is lifted up to operate valve and will automatically drop to flush position when released.

Nos. 10—4 and 11—4. Gear driven, 90 deg. extension where lever or wheel is desired on vertical face of a panel or wall.

All types furnished complete ready for installation.

LIST PRICES

Size	Angle				Right or left hand corner			
	*10—1	10—2 11—2	10—3	10—4 11—4	*10—1	10—2 11—2	10—3	10—4 11—4
½	$5.55	$ 7.55	$ 8.55	$10.55	$6.00	$ 8.00	$ 9.00	$11.00
¾	6.30	8.30	9.30	11.30	7.00	9.00	10.00	12.00
1	7.25	9.25	10.25	12.25	7.90	9.90	10.90	12.90
1¼	8.85	10.85	11.85	13.85	9.65	11.65	12.65	14.65

*Key for No. 10—1, list price, ea. $0.75.

Note: Other special offset extensions, etc., can be furnished upon special order. Prices upon application.

Important: Dimension "A" must be given with order.

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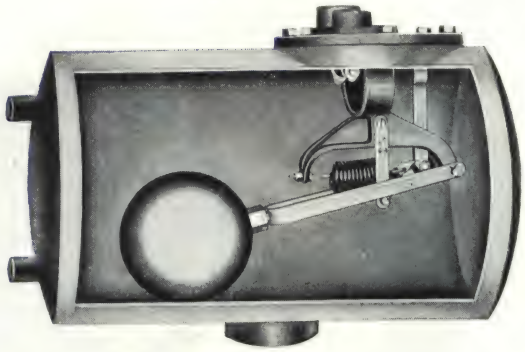
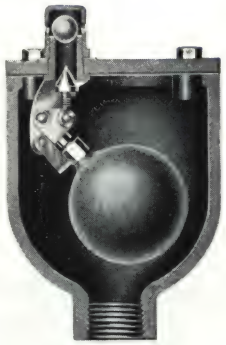
THERMOFLEX HEATING SPECIALTIES

Thermoflex

ALTERNATORS—VENT TRAPS



Alternator



Vent Trap

Specify—The Thermoflex alternator and Thermoflex vent trap, in combination (see typical detail on page 16) on every vapor heating system to insure positive return of water to the boiler under pressure conditions. Usually one alternator is installed per job, but several vent traps may be used as deemed necessary for rapid venting according to the layout.

Models—Alternator is made in one model only and in four sizes.

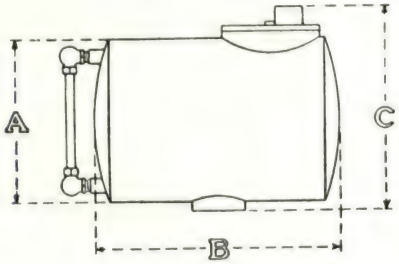
Vent trap is made in one model only and in two sizes.

Action—The accumulation of condensate in the returns and consequently in the alternator body, due to a pressure on the boiler, causes the float to rise and at its high point opens the live steam valve (which supply must come direct from the boiler) with a snap action, instantly equalizing pressure in the alternator and allowing water to flow by gravity to the boiler. As float drops to low position, it snaps closed the steam valve and opens the vent of alternator allowing the alternator to again fill. The above cycle is repeated so long as the pressure on the boiler continues.

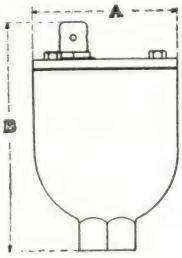
During these cycles the vent trap is constantly venting air and will close should water reach it. It will also prevent return of air, once vented, allowing at times a vacuum to be carried in the returns.

Specifications—Alternators have steel bodies on all sizes. All working parts are of bronze and design is such that the entire mechanism is removed with head, allowing for easy access. Bodies tapped for water gauges. Gauges furnished only on order and charged extra. Vent traps have cast iron bodies with all working parts of bronze.

Seamless high test copper ball floats used in both alternators and vent traps.



Alternator



Vent Trap

LIST PRICES, CAPACITIES AND DIMENSIONS

Thermoflex alternators									Vent traps					
No.	List price	Steam Inlet	Steam From boiler	Water Tapping	Capacity	A	B	C	No.	List price	Tapping	Capacity	A	B
1	$100.00	1	1¼	1½	2500	10½	16½	13	30	$20.00	¾	800	2½	4
2	175.00	1	1½	2	6000	12½	18½	15						
3	300.00	1½	2	2½	12000	16½	21½	22½	40	28.00	1	5000	4½	7
4	500.00	1½	2½	3	20000	20½	24½	26½						

Capacities are given in sq. ft. of direct cast iron radiation or its equivalent.
Capacities of alternators are based on bottom of same being 9 in. above water line. A greater distance will increase their capacities slightly.

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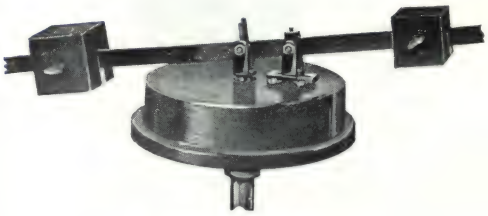
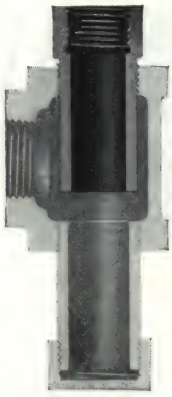
THERMOFLEX HEATING SPECIALTIES

Thermoflex

DAMPER REGULATORS—LIFT ADAPTERS—COMPOUND GAUGES



Damper Regulator



Lift Adapter

Compound Gauge

Specify—Thermoflex damper regulators for sensitive and accurate control of pressure on steam boilers using coal, oil or gas for fuel.

Thermoflex lift adapters for lifts in return lines on vacuum heating systems only.

Thermoflex compound gauges for accurate reading of pressures on steam boilers of all types.

Models—Damper regulators in one model, and two sizes.

Lift adapters in one model, seven sizes, in connection with regular screwed fittings. Compound gauges in three sizes.

Specifications—Damper regulators have cast iron case, large area metal diaphragms, fully enclosed and are furnished complete with rods, weights, chains and pulleys.

Lift adapters, cast iron. Outlet is tapped one size smaller than fitting size, except 4-in. size which is tapped 3 in. on outlet.

Compound gauges have cast iron case, bronze ring with T-handle cock. Retard type and very accurate.

LIST PRICES AND DIMENSIONS

Damper regulators			Compound gauges		
No.	Size diaphragm	List price	No.	Size dial	List price
			80	5	$15.00
90	7	$42.00	81	7	40.00
91	10	50.00	82	8½	56.00

LIFT ADAPTERS

No.	*List price	Fitting size	Adapter outlet	No.	*List price	Fitting size	Adapter outlet
				73	$ 6.00	2	1½
70	$3.00	1	¾	74	7.00	2½	2
71	4.00	1¼	1	75	8.00	3	2½
72	5.00	1½	1¼	76	10.00	4	3

*List price covers lift adapter only; does not include fittings shown.

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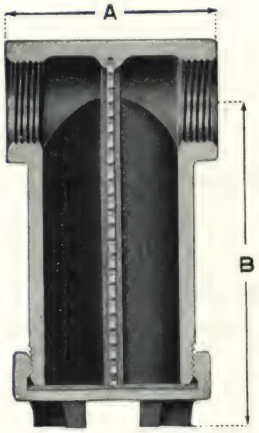
THERMOFLEX HEATING SPECIALTIES

Thermoflex
STRAINERS



Strainer—Type G

Specify For—All drip points in steam supply mains and risers before all drip traps; before all blast traps, reducing valves and governors, and at all points necessary to protect specialties from dirt and scale.

Models—Two models as illustrated and sizes as listed.

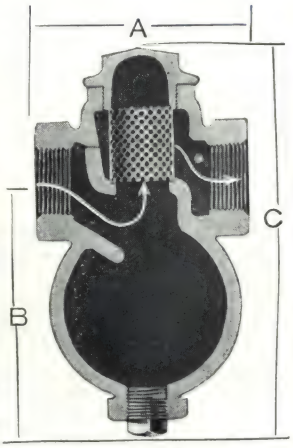
Specifications—Cast iron bodies with bronze screens or baskets, screwed or flanged. Can also be furnished with special screens or baskets of monel, stainless steel, etc., at an extra cost.

LIST PRICES AND DIMENSIONS
Type G (screwed end only)

Size	List price	A	B	Size	List price	A	B
½	$3.55	2¼	3¼	1½	$19.00	4¾	7½
¾	4.75	3	4¼	2	23.75	5½	9½
1	8.30	3½	5½	2½	38.00	6½	11½
1¼	14.25	4	6½	3	52.00	7⅝	13⅝

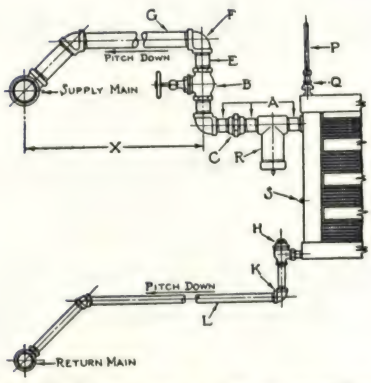
Type F

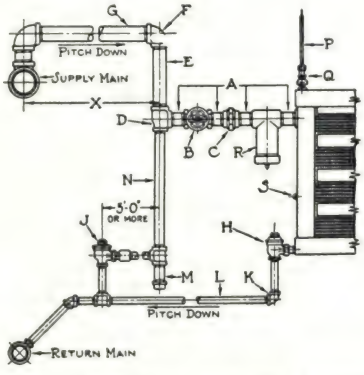
Screwed end					Flanged end (std.)					
Size	List price	A	B	C	Size	List price	A	B	C	Dia. flg.
2½	$50.00	8½	10½	16	3	$75.00	11	11¼	16½	7½
3	67.00	8½	10½	16	3½	100.00	12	12	18½	8½
3½	92.00	10¾	12½	19½	4	125.00	13	12	18½	9
4	117.00	10¾	12½	19½	5	150.00	15	15	23	10
					6	210.00	16	16½	25¾	11



Strainer—Type F

Thermoflex
TRAPS
As Applied to Grinnell Thermoliers





Typical Connections for Thermolier for Vacuum and Vented Return Gravity Heating Systems

Fig. No. 1
Fig. No. 1 for equipments where distance "X" is *less* than 10 ft.

Fig. No. 2
Fig. No. 2 for equipments where distance "X" is *more* than 10 ft.

***SCHEDULE OF TRAPS "H" FOR THERMOLIERS**

Thermolier No.	100, 100-A	200, 200-A	300, 300-A	400, 400-A
Low pressure 0 to 25 lbs.	½ in. No. 2	½ in. No. 2	¾ in. No. 2	¾ in. No. 2
High pressure 25 to 125 lbs.	½ in. No. 100	½ in. No. 100	½ in. No. 100	½ in. No. 100
Thermolier No.	600, 600-A	800, 800-A	1200, 1200-A	1600, 1600-A
Low pressure 0 to 25 lbs.	¾ in. No. 3 or 4	¾ in. No. 3 or 4	1 in. No. 4	1¼ in. No. 4
High pressure 25 to 125 lbs.	¾ in. No. 100	¾ in. No. 100	1 in. No. 100	1 in. No. 100

Note: Trap "J" should be ½ in. in all cases. *Due to patented internal cooling leg in the Grinnell Thermolier, the above recommended trap sizes when used with Thermoliers have a greater capacity than their standard rating would otherwise allow.

Note: Above sketches are reproduced from the Grinnell Thermolier Data Book, in which are listed the schedules of materials for these layouts; also full engineering data on Thermolier capacities, dimensions, weights, supports, wiring diagrams, etc. Copy furnished on request.

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THERMOFLEX HEATING SPECIALTIES

TYPICAL DETAILS OF VAPOR SYSTEMS

Illustrating Proper Applications of

Thermoflex

HEATING SPECIALTIES

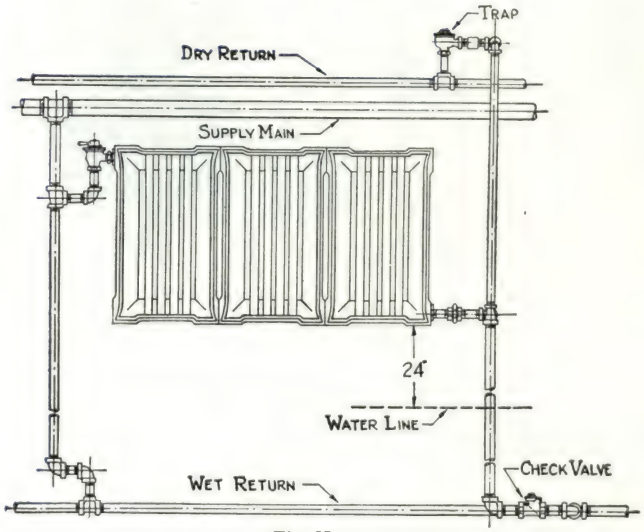

Fig. No. 1
Connections to Radiator Located Below Supply Main

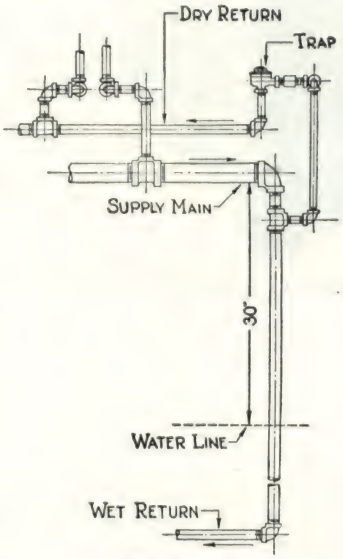

Fig. No. 3
Dripping and Venting End of Steam Main to Wet and Dry Return

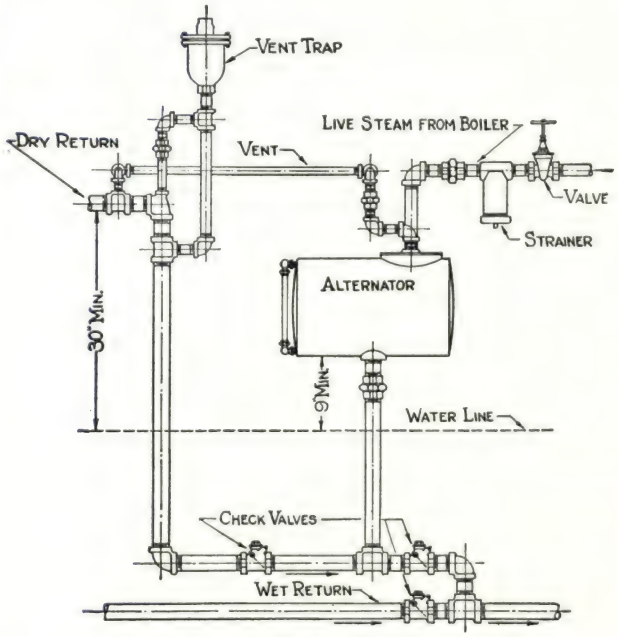

Fig. No. 2
Connections to Alternator and Vent Trap

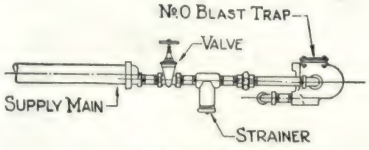

Fig. No. 4
Dripping End of Supply Main Through No. 0 Blast Trap. This Method Is Recommended on Vapor Systems Where a Dry Return Only Is Used

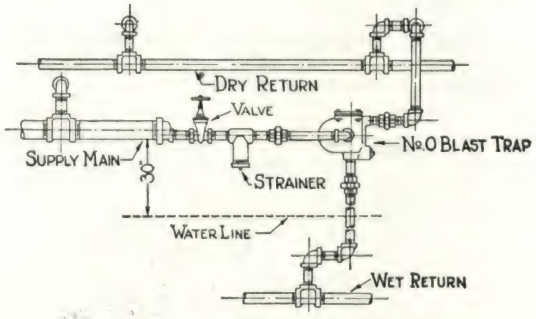

Fig. No. 5
Dripping End of Main to Pressureless Wet Return and Venting to Dry Return

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THERMOFLEX HEATING SPECIALTIES

TYPICAL DETAILS OF VAPOR OR VACUUM SYSTEMS

Illustrating Proper Applications of

Thermoflex
HEATING SPECIALTIES

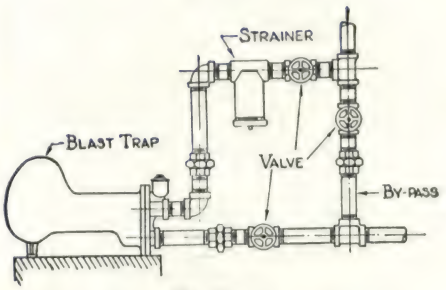

Fig. No. 6
By-pass Connections to Blast Trap

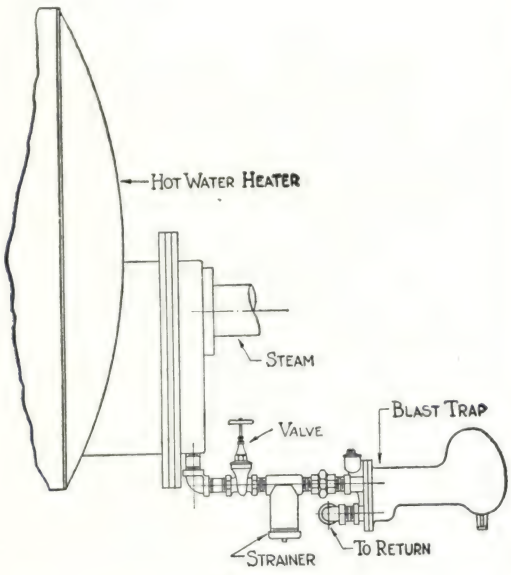

Fig. No. 7
Blast Trap Connections to Hot Water Heater

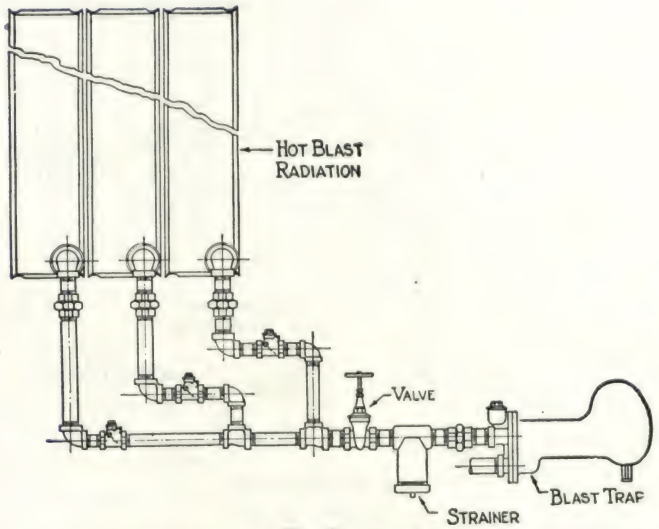

Fig. No. 8
Blast Trap Connections to an Indirect Hot Blast Heater

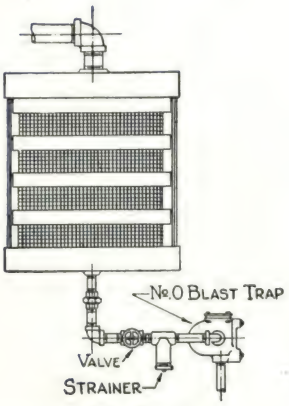

Fig. No. 9
Recommended Return Connections to a Header to Header Type of Unit Heater

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THERMOFLEX HEATING SPECIALTIES

TYPICAL DETAILS OF VAPOR, VACUUM AND PRESSURE SYSTEMS

Illustrating Proper Applications of

Thermoflex

HEATING SPECIALTIES

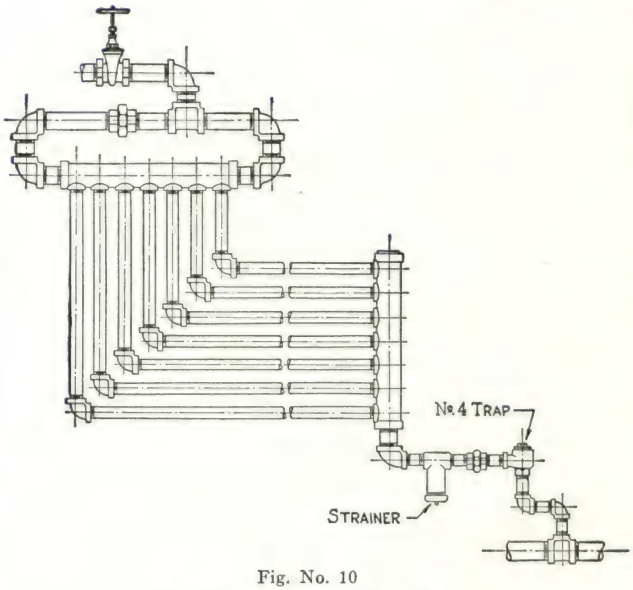

Fig. No. 10
Vapor or Vacuum Systems
Connections to coils on side walls

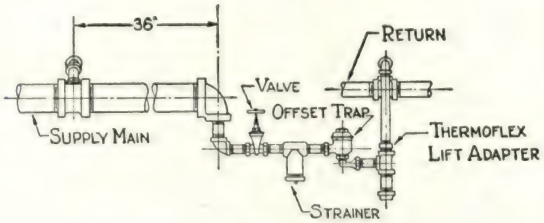

Fig. No. 11
Vacuum System
Dripping end of supply main to return at level of or above supply main

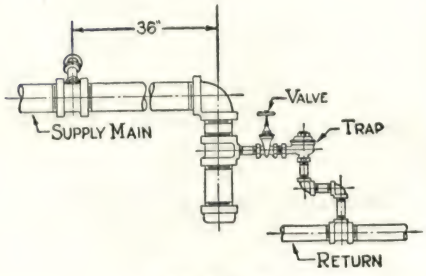

Fig. No. 12
Vacuum System
Dripping end of supply main where return is below supply main

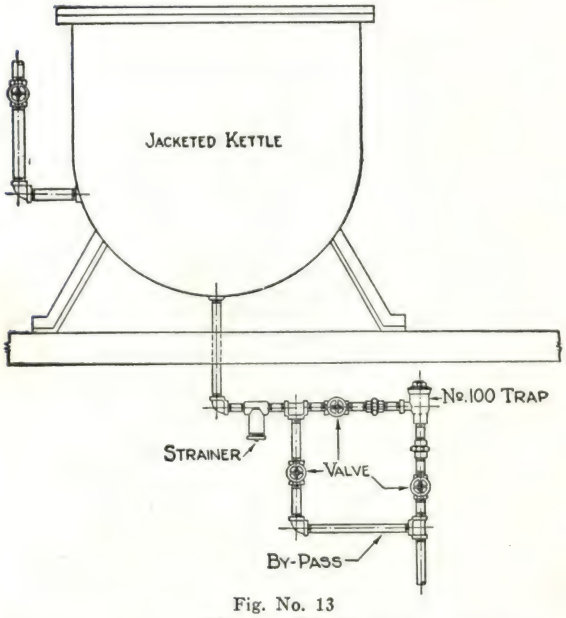

Fig. No. 13
Process Work
Application of No. 100 Thermoflex high pressure trap to a steam jacketed kettle

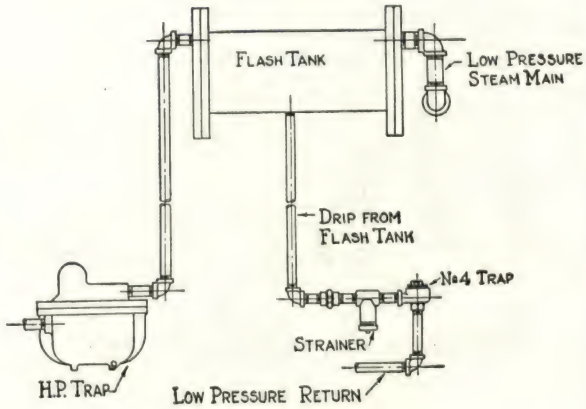

Fig. No. 14
Discharging High Pressure Trap
To low pressure return using a flash tank

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HOFFMAN HEATING EQUIPMENT

Hoffman Heating Equipment

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Waterbury, Conn.

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Branches Throughout the Dominion

PART I

Hoffman Valves and Controlled Heat Equipment

Efficient Heating

To give maximum heat and comfort from fuel burnt is the fundamental requirement of the modern heating system. Fuel consumption beyond that necessary to maintain indoor heating comfort is waste.

By providing the correct handling of steam, air and water, Hoffman Valves insure the reduction of fuel waste, efficient performance of the heating system and the elimination of heating troubles.

Basic Principle

The basic principle used in the design of all Hoffman Venting Valves is that of an all-metal thermostatic member containing a volatile or heat sensitive fluid which causes valve action upon slight temperature changes.

Automatic

Hoffman Valves are automatic and non-adjustable, and thus insure flexibility and economy of operation without thought or attention on the part of the user.

Accuracy

As the internal fluid pressure in the thermostatic member maintains a constant relationship with the external steam pressure, Hoffman Valves operate with the same degree of accuracy throughout the wide range for which each valve is intended.

GUARANTEE

Every Hoffman Valve (except Nos. 20 and 21 Traps) is individually tested and guaranteed to function properly for a period of five years, when installed and operated under conditions for which they were designed. A written guarantee is gladly furnished upon request.

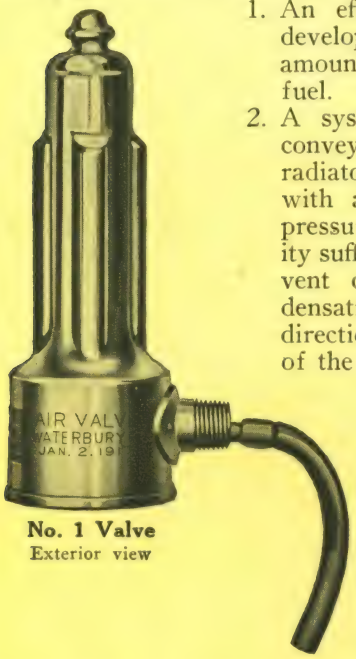
Continued on next page

HOFFMAN VENTING VALVES

One-Pipe Gravity Steam Systems

The satisfactory and economical operation of one-pipe steam systems is dependent upon:

1. An efficient boiler that develops the maximum amount of steam from fuel.
2. A system of piping to convey steam to the radiators or heating units with a nominal loss in pressure and at a velocity sufficiently low to prevent conflict with condensation flowing in a direction opposite to that of the steam.
3. Air valves on heating units and pipe lines to eliminate air from the system at a rate consistent with best results and to close the vent port when valve is in contact with steam or water.



No. 1 Valve
Exterior view

Perfect results can be obtained only when these three requirements are met. A combination of the first two cannot completely overcome a deficiency in the third. An efficient boiler with a well-designed system of piping cannot result in a satisfactory heating plant unless air is properly relieved from the system. Money well invested in a reliable boiler and piping becomes a "frozen asset" through false economy in using low priced inefficient air valves.

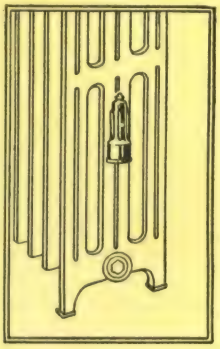
Hoffman No. 1 Valve

The No. 1 Hoffman Siphon Air Valve insures positive, noiseless and trouble-proof venting of radiators. It also goes a step farther in improving the action of the boiler and piping system or overcoming to a large extent any deficiencies that may exist in them.

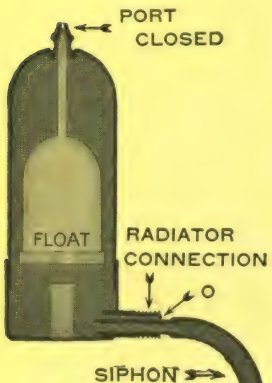
The diameter of the vent port in the No. 1 Hoffman Valve has been scientifically determined to free the radiator of air at a rate which does not cause excessive initial condensation during the heating-up period. Such action prevents the gurgling or pounding which is caused by too rapid release of air.

The rate of air flow *from* the radiator governs the rate of steam flow *into* the radiator. The rate of air venting is, therefore, an important factor in radiator performance. In addition, if air is released at too high a velocity, water piles up in the far end of the radiator causing valve action. This slows the rate of venting and, with improper valve action, "spitting" occurs.

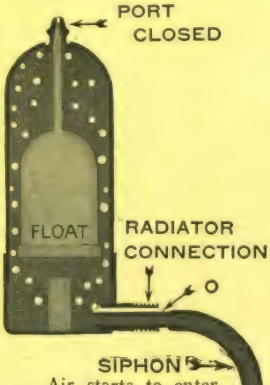
Thermostatically, the action of the Hoffman Valve is so sensitive that it positively distinguishes between steam and heated air. Upon contact with steam the valve instantly closes and when air at a temperature a few degrees less than that of the steam reaches the valve it is promptly released. This action is very important, for approximately one-third of a cubic inch of air or non-condensible gas is released by the condensation of steam



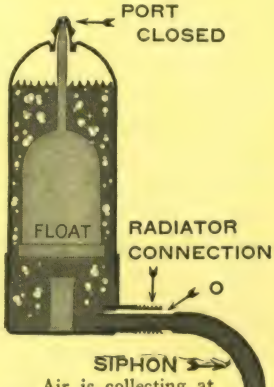
The Operation of the Ordinary Valve



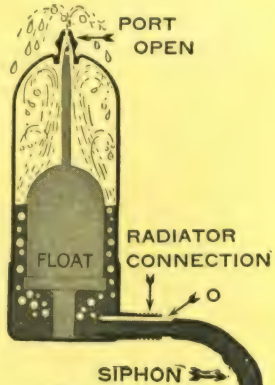
Here, the ordinary valve is filled with water. The float is lifted by the water and has closed the port, making the valve a *sealed chamber*. Before water can run out, air must enter to take its place.



Air starts to enter through opening O; water begins to run out of siphon. *Note this:* the air must *bubble up through water* to reach the top of the valve. The port is still closed.



Air is collecting at top of valve. An equal amount of water has run out; but not enough to lower the float; for port is closed. The air must still *force its way through* the water.



The float has dropped. Note there is still water in the path of the air, between the radiator connection and the *open* port. The air rushing into the valve blows this water through the port, spattering it over floors and walls.

Continued on next page

HOFFMAN VENTING VALVES

per square foot per hour, and unless provision is made for venting this air from the radiator, full efficiency is not obtainable.

The thermostatic member is a light buoyant float which closes the port without leakage whenever water surges into the valve. As soon as water is siphoned from the valve the port is opened and venting is resumed without the slightest "spit." This action is made possible by the double shell construction which makes the Hoffman Valve the only one on the market having perfect siphonic action.

The difference between the action of ordinary air valves and the Hoffman Valve under water conditions is shown by the diagrams at the bottom of pages 2 and 3.

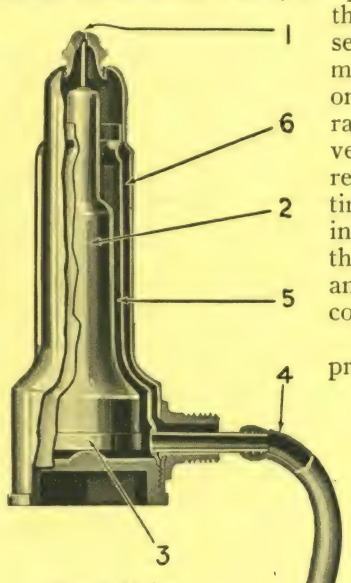
Operation of No. 1 Hoffman Valve

As soon as steam is generated at the boiler, a pressure is exerted on air in the radiators and as the vent port (1) is open, air will escape at the proper rate to cause steam to flow into the radiator and condensation to return through the same pipe line without commotion of any sort.

As steam advances in the radiator the air becomes warmer, but this temperature increase has no effect on the fluid sealed up within the float (2) until a temperature of 180° F. is reached. At this point the thermostatic fluid starts to vaporize. As the fluid is sealed up in the float under a vacuum, the vaporization continues until a temperature of 195° is reached, when the fluid pressure becomes equivalent to atmospheric pressure. With further increase in temperature the fluid pressure increases until, at a temperature of 207-208°, a sufficient pressure is generated to overcome the metal tension of diaphragm (3). Then the vent port instantly closes.

It will thus be seen that the vent port is either wide open or closed tightly. The instantaneous action in changing from a wide open to a closed port results in practically noiseless venting. In valves where the port is slowly closed a noticeable hissing occurs as the air escapes through the narrow aperture. In addition, the port is frequently prematurely closed and air bottled up in the radiator.

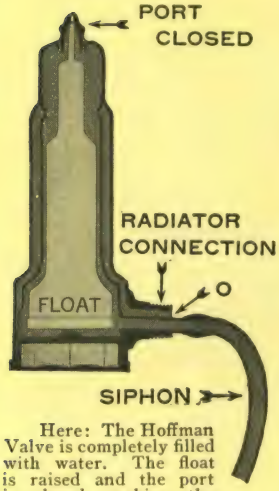
Whenever air at a temperature of one or two degrees less than the temperature of the steam reaches the valve, the port is opened and the air vented. Observation of a Hoffman Valve installed on a steam hot radiator will show venting of air at regular intervals, the time between venting depending upon the size of radiator and rate of steam condensation.



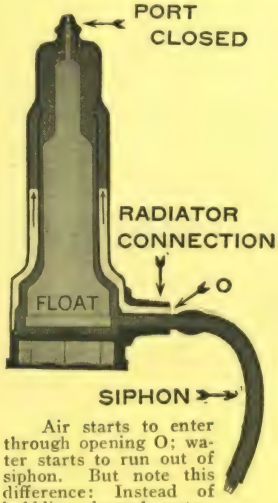
No. 1 Valve
Sectional View
Has ⅛-in. radiator connection. Maximum guaranteed operating pressure, 10 lbs.

If, through improper pitch of the piping, or radiator, water is present in excessive quantities, its escape through the vent port is prevented by the prompt operation of the thermostatic member which is likewise a buoyant float. As soon as water drops away from the valve the

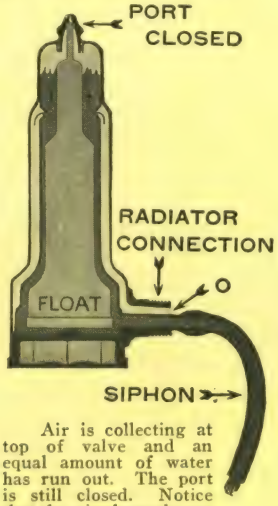
The Operation of the Hoffman Valve



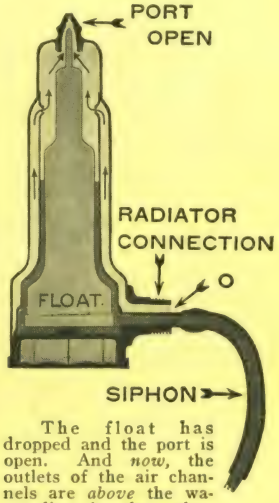
Here: The Hoffman Valve is completely filled with water. The float is raised and the port is closed, making the valve a *sealed chamber*, which air must enter before the water can run out.



Air starts to enter through opening O; water starts to run out of siphon. But note this difference: Instead of bubbling through water, the air is *compelled* to move through *special air channels* to reach the top of the valve.



Air is collecting at top of valve and an equal amount of water has run out. The port is still closed. Notice that the air-channels are now *clear of water*.



The float has dropped and the port is open. And *now*, the outlets of the air channels are *above* the water line in the valve. There is not a *drop* of water in the path of the air. Therefore valve *cannot* spit or leak.

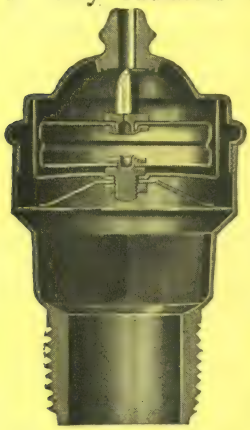
Continued on next page

HOFFMAN VENTING VALVES

siphon (4) drains the float chamber (5) and the vent port is opened, air passing through the valve in the space (6) between the inner and outer shell. The flow of air through this space occurs at the same time that the water lowers in the float chamber. As a result, the opening of the vent port occurs without the escape of water. Because of this construction providing separate passages, release of air from the valve and the drainage of water back into the radiator takes place without conflict.

Venting the Pipe Lines

If only radiators in a one-pipe system are vented, distribution of steam is not uniform. The radiators near the boiler will heat first and those at the end of the pipe lines will be the last to fill with steam. If, however, the end of the main is vented, steam will quickly fill the piping and upon closing the main vent will then flow into the radiators at a uniform rate. This permits the radiators located at distant points from the boiler to receive their supply of steam practically as quickly as the radiators close to boiler.

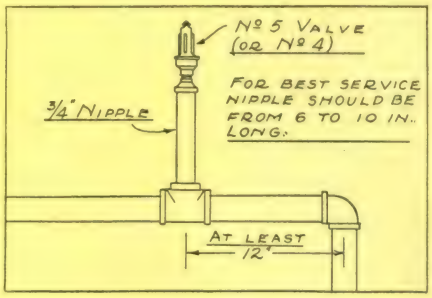


No. 4 Valve

Standard connection, ¾ in. Supplied with ¼-in. connection when so ordered. Maximum guaranteed operating pressure, 10 lbs.

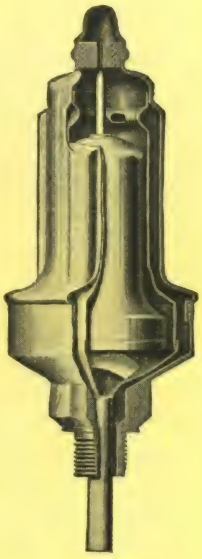
Hoffman No. 4 Quick Vent Valve

The No. 4 Hoffman Quick Vent Valve provides correct venting of the ends of mains and long risers. It is a large capacity valve with ⅛-inch port and is also recommended for other conditions where quick venting is required.



The valve is intended for service where steam and air only are to be handled. It should not be installed under conditions where water is present in excessive quantities, for the valve does not contain combination float and thermostatic member similar to the No. 1 Valve. It, therefore, should not be used for venting the end of return mains where the distance between the low point in the main and the boiler water line is less than 18 inches.

Thermostatically, the No. 4 Valve operates in the same manner as the No. 1 Valve in that it closes tightly upon steam contact and opens when air at a temperature of two or three degrees less than steam is delivered at valve.



No. 5 Valve

Maximum guaranteed operating pressure for valves with $\frac{1}{16}$-in. port, 10 lbs.; for $\frac{3}{16}$-in. port, 3 lbs. Supplied with ⅜-in. pipe connection. For less than 3 lbs. pressure $\frac{3}{16}$-in. port should be specified—from 3 lbs. to 10 lbs., $\frac{1}{16}$ in.

Hoffman No. 5 Valve

The No. 5 Hoffman Quick Vent Float Air Valve is intended for service similar to that of the No. 4, but in addition it may be used under conditions where water is encountered. Under water conditions the valve operation is the same as the No. 1 Valve, the double shell construction and siphon performing the same functions.

Use of No. 1 Hoffman Valves on Two-Pipe Gravity Systems

Hoffman No. 1 Valves are also suitable for use on two-pipe gravity systems.

Venting Valve Specification for One-Pipe Gravity Systems

The purpose and intent of this specification is to cover venting valves for a complete one-pipe gravity steam system.

While the system is being operated for temporary heat, or while it is being cleaned, radiators shall be equipped with pet cocks, or second-hand air valves.

After the system has been thoroughly cleaned, a No. 1 Hoffman Siphon Air Valve shall be installed on each radiator, and a No. 4 ¾-inch Hoffman Quick Vent inserted in a nipple and coupling, approximately 12 inches from the end of each main. The distance between the low point of the main and waterline of boiler shall not be less than 18 inches. (Where waterline difference is less than 18 inches a No. 5 Hoffman Valve with $\frac{1}{16}$-inch port shall be used.)

Optional—To prevent theft in Public Buildings, Apartment Building Entrances, etc.

Each No. 1 Valve shall be securely fastened to the radiator by means of a Hoffman Valve Lock. No tapping in the radiator for this purpose will be permitted.

Continued on next page

HOFFMAN VENTING VALVES

One-Pipe Gravity Vacuum Systems

The purpose of vacuum heating is to create and maintain a partial vacuum in the radiators and mains in order that steam may be generated at a temperature below 212 degrees.

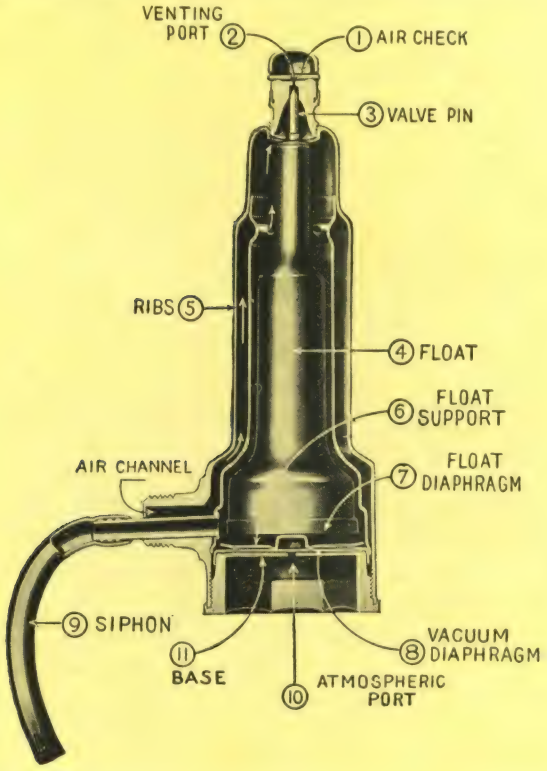
The advantages of a vacuum system over an ordinary steam system are that the radiators will retain their heat much longer—it is possible to get up steam more quickly—and a considerable saving in fuel consumption is effected.

Hoffman No. 2 Valves and Vacuum Specialties

Specialties for converting an ordinary one-pipe steam system into a vacuum system were first perfected by Hoffman Specialty Company and consist of Hoffman No. 2 Radiator Valves, Hoffman No. 6 or 16 Valves for venting mains, and Hoffman Kompo Gage.

Hoffman No. 2 Valves vent the air from the system in the same way that the No. 1 Valve does—promptly, efficiently and noiselessly. In addition, they perform another function. After air is exhausted from the radiators, the valve port automatically locks itself and prevents air from re-entering the radiator.

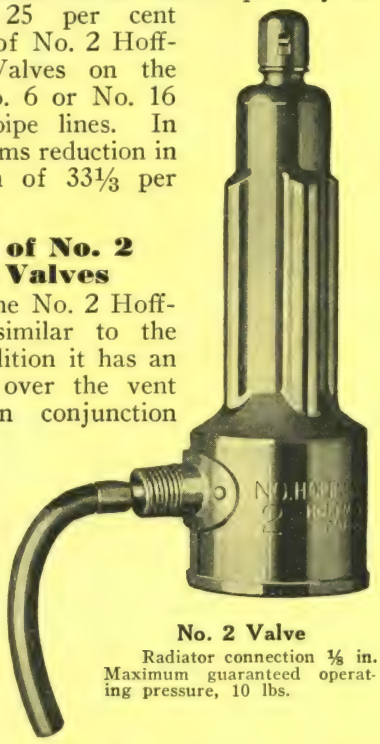
Under these conditions and provided the system is air-tight at all other points, when steam condenses in the radiator and shrinks to approximately 1/1700 of its previous volume, a vacuum is created. Air does not rush back into the system, and cool it off, nor is it necessary to force air out when steam is again generated.



The practical advantages of a vacuum system with Hoffman No. 2 Valves are shown by the chart of comparative performances on page 6.

Hoffman No. 2 Valves make possible the distribution of steam to all the radiators in 15 minutes instead of an hour as with an ordinary steam system and insure radiators remaining hot for three hours instead of 30 minutes after fires are banked.

In systems using oil or gas burners, the number of operations of the burner per day is reduced about 25 per cent through the use of No. 2 Hoffman Vacuum Valves on the radiators and No. 6 or No. 16 Valves on the pipe lines. In coal burning systems reduction in fuel consumption of 33⅓ per cent is common.



No. 2 Valve
Radiator connection ⅛ in. Maximum guaranteed operating pressure, 10 lbs.

Operation of No. 2 Hoffman Valves

In construction the No. 2 Hoffman Valve is similar to the No. 1 but in addition it has an air check valve over the vent port working in conjunction with a vacuum diaphragm.

Normally the air check (1) does not function in the maintenance of a vacuum, for when a radiator is filled with steam and the float diaphragm (7) is expanded, closing the port, the vacuum diaphragm (8) will expand whenever the pressure goes down below atmosphere and follow up the contracting float diaphragm, thus maintaining the port closed against air intake.

In a half-hot radiator the float diaphragm (7) is not expanded and the vent port (2) is open. Consequently with a cessation of steam generation, air would be drawn in to fill the space given up by the steam as it condenses were it not for the fact that as soon as the pressure goes down to atmosphere the air check drops and temporarily closes the vent port. Return of air is prevented and as soon as a vacuum of 1 inch is present in the system, vacuum diaphragm (8) expands, lifting the float, and closing the vent port. After this action occurs the air check has no further function.

The superiority of the diaphragm controlled port compared with valves having air check only is indicated by the fact that the total pressure exerted in holding the vent port closed is approxi-

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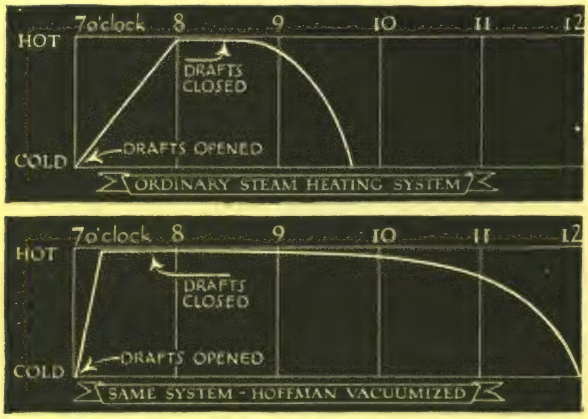
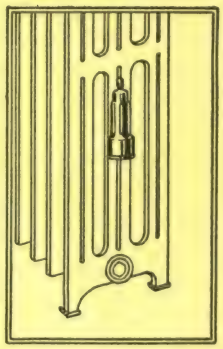
HOFFMAN VENTING VALVES



mately 20 times greater than that exerted in maintaining a check valve closed. This greater pressure exerted by the diaphragm holds the valve pin more tightly against its seat and also aids in crushing or pushing away small particles of dirt which might be caught between the valve pin and its seat, thus insuring a valve which is maintained tightly closed under normal as well as abnormal conditions.



How to Vacuumize a One-Pipe Steam System

To make an air-tight joint, white lead or some other joint compound should be used, but before applying, insert valve in tapping, giving it two or three turns, then apply the white lead to the thread. This will prevent lead from entering the valve through the inlet connection.

Valves

We recommend the use of packless or leak-proof radiator valves, but successful results can be obtained with ordinary radiator valves providing they are properly packed. If new valves of the standard type are installed they should be repacked in order to make certain that all possible air leaks through the stem stuffing box are eliminated. The same applies to old valves. For this purpose we recommend the use of $\frac{1}{16}$-inch Valve Stem packing of standard make. Customer should be informed that it is necessary to tighten up the stuffing nuts each year.

Air Leaks

The usual places for air leaks aside from stuffing boxes of the radiator valves are the water gauge, damper regulator diaphragm, gauge or try-cocks and safety valves. It is advisable to remove the old gauge glass washers and replace them with new washers. See that damper regulator does not permit escape of steam or allow air to be drawn into system. Discs and seats of the water column gauge cocks should be examined to make certain that they make an air-tight joint when closed. The try-cock on the water gauge should be tightened so that the handle can be turned only with considerable effort. Bubbles rising through the water in the gauge glass show a leak in the lower packing nut or try-cock.

For new work, the piping should be carefully installed so as to prevent as far as possible leakage of air at the joints. Before installing, fittings should be examined for sandholes. All pipe lines should be painted with black asphaltum.

Test

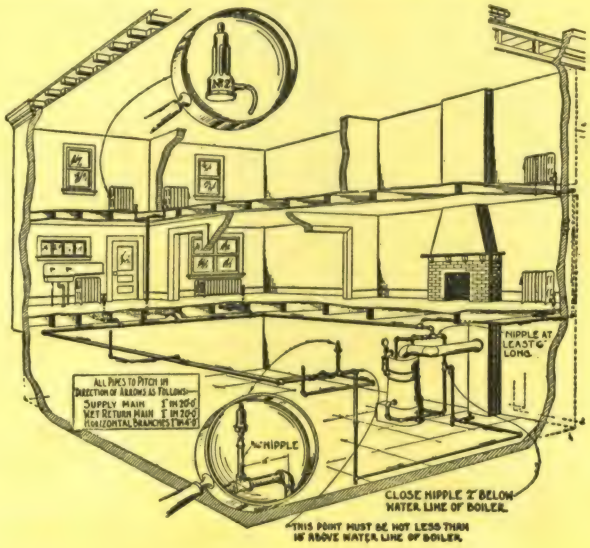
With boiler filled to proper level and before pipe covering is put on, a kindling fire should be started and a pressure of approximately ten pounds generated, maintaining this pressure until all radiators are steam hot from end to end.

Carefully examine joints for steam leaks. When it is ascertained that there are no leaks under steam pressure, dump the fire and open all windows in order to quickly create a vacuum.

If all joints are practically tight, the vacuum gauge should show at least 18 inches when the system is cold and should hold this vacuum with a loss of not over one inch every two hours. When the system is under highest vacuum, a second examination of all joints should be made and any air leaks will be denoted by a hissing at the point of leakage.

Installation of New Work

To obtain best results, valves should not be installed on new jobs until the system has been operated for several weeks using pet-cocks or old valves. The purpose of this preliminary operation is to clean out the radiators and pipes of the usual collection of dirt and other foreign substances which are always present in new work.



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HOFFMAN VENTING VALVES

Hoffman No. 16 and No. 6 Valves

While Hoffman No. 2 Valves create a vacuum in the radiators, it is also necessary in order to completely vacuumize the system to vent and lock the air out of the mains. The No. 16 Hoffman Valve is recommended for this purpose except in cases where the presence of excessive amounts of water is encountered, when the No. 6 Valve should be used.

No. 16 Valve

Is 3⅝ in. high over all and can be installed where the pipe lines are run too close to ceiling to accommodate the No. 6. Operation similar to No. 6 valve. Can be used on steam pressure up to 10 lbs. Size of port ⅛ in.; connection ¾ in.

The No. 16 and No. 6 Valves are suitable for use on mains, risers and other conditions where a quick vent is required and return of air to the system must be prevented.

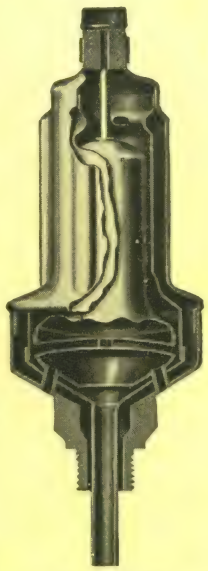
For venting the ends of mains where the difference between the low point of the main and the water line is less than 18 inches, the No. 6 Valve should always be used.

For handling all conditions in one-pipe vacuum systems, the No. 6 Hoffman valve is suggested. This valve has the double shell construction and operates under steam, air and water conditions in the same manner as the No. 2 Vacuum Valve.

Hoffman Valve Lock

The Hoffman Valve Lock prevents the unauthorized removal or theft of No. 1 and No. 2 Valves in public buildings, apartment houses, etc. In office and apartment buildings equipped with No. 2 Vacuum Valves, the Lock prevents removal of the valve when system is operating under vacuum and the resultant intake of air.

The Lock fits all types of radiators and requires no extra labor for tapping. The threaded connection of the air valve is slipped through the opening in the lock and then inserted in the radiator. When valve is in proper position two set screws are tightened with a special key. The "double bite" of the set screws on the curved surface of the radiator prevents turning the valve and they cannot be loosened without using the special wrench.



No. 6 Valve

Maximum guaranteed operating pressure for valves with ⅛-in. port, 10 lbs.; for ⅜-in. port, 3 lbs. Supplied with ⅜-in. pipe connection.

Kompo Gage

In order that the user may see the conditions under which the system is operating, a Kompo Gage should be installed on the boiler. For description, see page 13.

Valve Lock

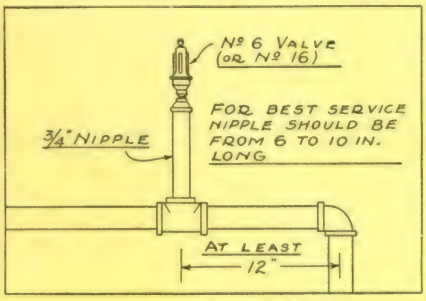
Suggested Specification for One-Pipe Gravity Vacuum System with Hoffman Specialties

The purpose and intent of this specification is to cover venting valves for a complete one-pipe vacuum system.

While system is being operated for temporary heat or cleaned, radiators shall be equipped with pet-cocks or second-hand air valves.

After the system has been thoroughly cleaned, a No. 2 Hoffman Vacuum Valve shall be installed on each radiator and a No. 16 Hoffman Vacuum Valve, inserted in a nipple and coupling, approximately 12 inches from the end of each main. The distance between the low point of the main and waterline of boiler shall not be less than 18 inches. (If waterline difference is less than 18 inches, specify No. 6 valve in place of No. 16.)

A Hoffman Kompo Gage shall be placed on the boiler.



Tests

After installing No. 2 and No. 16 valves and before pipe covering is attached, a test shall be made in the presence of architect's representative and be conducted as follows:

Boiler shall be filled to proper level and slow kindling fire started. When all radiators have been filled with steam, during which time boiler shall show a steady waterline, fire headway shall be increased and a pressure of 10 pounds generated. While maintaining this pressure, contractor will examine all joints for steam leakage and, upon finding system tight, fire is to be dumped and system permitted to go into vacuum as quickly as possible. When system is cool, a vacuum of not less than 18 inches shall be indicated and the rate of loss shall not be over a total of 2 inches in the following three hour period.

Optional—For Public Buildings, Apartment Houses, etc. "Each No. 2 Valve shall be securely fastened to the radiator by means of a Hoffman Valve Lock. No tapping in the radiator for this purpose will be permitted."

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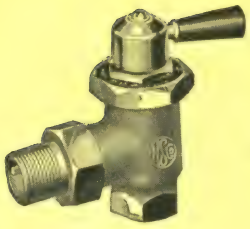
Hoffman Controlled Heat

Adaptable to All Types of Buildings

Hoffman Controlled Heat Consists of These Controlling Devices



No. 7 Valve

Controls—at the touch of a finger—the heat output of each radiator.

Differential Loop

Controls—automatically—and protects the boiler water line.

No. 8 Return Line Valve

Controls—automatically—the flow of condensation and air from each radiator.

Kompo Gage

Registers pressure or vacuum under which the system operates.

Damper Regulator

Controls—automatically—the combustion of fuel and the production of steam in accordance with the demand.

Continued on next page

Hoffman Controlled Heat

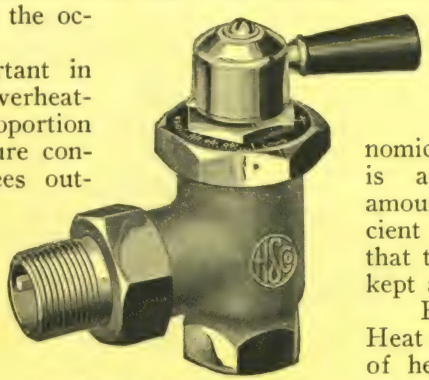
The ideal heating system is one in which heat is instantly available when required and where the heat output of each radiator can be controlled to meet the individual needs of the occupant of each room.

This requirement is important in preventing fuel waste due to overheating, as it is customary to proportion radiation for extreme temperature conditions (0 or minus 10 degrees outside, 70 degrees inside) notwithstanding the fact that in most localities minimum temperatures are reached on but ten or twelve days during the winter.

Therefore, during most of the heating season only 55 to 70 per cent of the total radiation is required to maintain 70 degrees inside.

In addition, the modern heating system should be economical to operate, require minimum attention and give trouble-proof service over a long period of time.

Hoffman Controlled Heat fulfills every requirement of the ideal heating system. It gives quick and uniform heating throughout the entire house or building—or it may be adjusted so as to provide rapid heating and high temperatures for certain rooms and lower temperatures for others.



No. 7 Modulating Valve

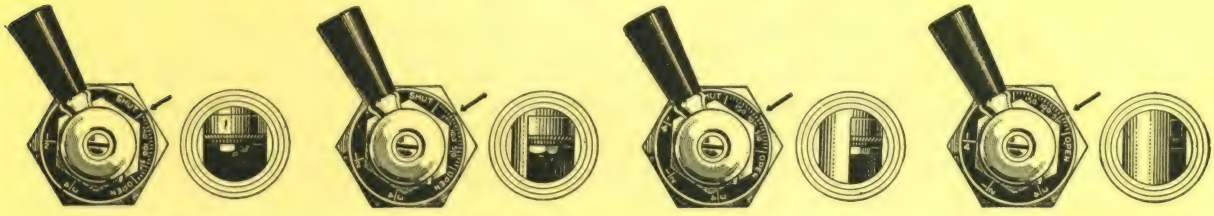
Regularly supplied with lever handle. On special orders, it can be furnished with wood wheels, lock shields or closed top. Also obtainable with extension stem and handle or chain pull.

It requires very little attention, being the most nearly automatic system of its type on the market. It is economical, because fuel consumption is accurately regulated by the amount of heat needed. And so efficient is Hoffman Controlled Heat that the amount of radiation can be kept at a minimum.

Finally, Hoffman Controlled Heat makes possible the regulation of heat output from a radiator in the same way that the flow of water from a faucet is controlled. By a touch of the finger, the valve lever may be set to turn the steam fully on, completely off or at any intermediate point desired. No other heating system offers the flexibility of Hoffman Controlled Heat.

Hoffman Controlled Heat is equally suitable for residences, apartment houses, schools, hotels, hospitals, office buildings or other structures.

How the No. 7 Valve Is Adjusted by the Heating Contractor



200 sq. ft. 150 sq. ft. 100 sq. ft. 50 sq. ft.

Dial Settings and Corresponding Port Areas

One of the outstanding advantages of Hoffman Controlled Heat is that the heating contractor can secure a perfect "balancing up" of the system. This is accomplished by the adjustment of a dial on the top of the valve which in turn regulates a port built into the valve.

The dial has a range of adjustments from 10 to 200 square feet of direct cast iron radiation, each graduation representing 10 feet with 2 ounces pressure at the radiator. When set at 200 feet the valve port is wide open and for smaller radiators it is cut down to the proper area for each individual radiator.

When the system is installed the dial is ordinarily set to correspond with the size of the radiator. Thus for an 80 foot radiator it is set at 80, for a 50 foot radiator at 50, etc. This setting is made by loosening the lock nut on top of the valve which permits turning the dial to the proper position.

With this done the system is ready to be balanced. The valve lever (which makes a secondary adjustment described on page 10) is set at the ½ mark. Steam is raised to the maximum pressure under which the system is intended to operate. Each radiator is inspected. Those one-half hot are O.K.

But some may be more than one-half hot due to oversizing the piping while others are less than half hot due to unreamed pipes or similar conditions. With other valves it would be necessary to let the radiators cool and take the valves apart to correct the adjustment.

Not so with the Hoffman No. 7. As the adjustment is *external* and *visible*, the valve may be set in a few moments *while the system is in operation.*

It is done in this way. If the radiator is less than half hot, the lock nut is loosened and the dial is set up a few graduations higher. On radiators that are more than half hot the dial is turned down a number of graduations. The lock nuts are then tightened to make the adjustment permanently correct.

The system is now "balanced up" and heat will be uniformly distributed to all parts of the system. But if it is desired to make some radiators heat first, it can be done by giving them a larger port opening than would be normally required. This valve is *truly modulating.* The port area may be varied with extreme accuracy, which means that an absolutely accurate control of steam admitted to the radiator is always readily obtained.

Continued on next page

HOFFMAN CONTROLLED HEAT

Operating Principle of Controlled Heat

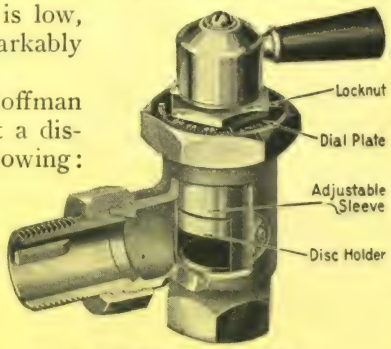
Hoffman Controlled Heat is a simple two-pipe vapor vacuum system. Because steam is generated at low pressure and a partial vacuum created in the system, fuel consumption is low, and the heating up period is remarkably short.

The specialties comprising Hoffman Controlled Heat and that make it a distinctly superior system are the following:

No. 7 Adjustable Modulating Valve

The most important feature of Hoffman Controlled Heat is the No. 7 Adjustable Modulating Valve. This valve is made in one size only (¾ in.) and is adaptable for radiators up to 200 square feet of heating surface. An externally adjustable port permits the heating contractor to proportion the port area of each valve to meet the requirements of the radiator. The accuracy of the adjustment is controlled by means of a graduated dial plate and the adjustment can be made whether steam is present in the system or not.

The adjustment is very simple. By loosening a lock nut and turning the valve handle an adjustable sleeve varies the port diameter in accordance with the position of the dial plate, after which the lock nut is tightened and graduated control of the adjusted port is obtained through the use of a secondary set of graduations, which permit the entrance of sufficient steam to heat one-quarter, one-half, three-quarters or the entire radiator.



No. 7 Modulating Valve
Sectional View

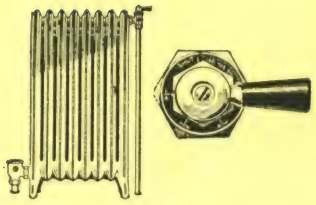
By means of this adjustable port the distribution of steam throughout the entire system can be so balanced that all radiators will heat uniformly, or if desired certain radiators can be favored and permitted to receive their supply of steam before the other radiators are completely heated.

In systems where oil or gas is used and the burner thermostatically controlled, the No. 7 Valve permits the proper distribution of steam and prevents the thermostat from closing down the burner before all radiators are uniformly heated.

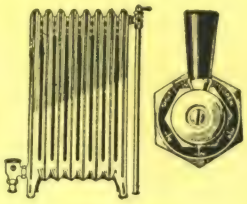
The valve is ruggedly constructed, having a cast body of steam metal heavily nickel-plated. Bonnet and tail piece are hot brass forgings, which have a tensile strength considerably greater than castings of the same composition.

The action of the valve is very free; a touch of the finger being sufficient to change the position of the lever handle. The stem stuffing box is packed with a special laminated packing which lasts indefinitely without requiring attention or tightening of the stuffing nut. This feature practically places the valve in the so-called "packless class."

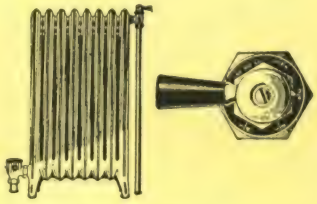
How the User Can Regulate Hoffman Controlled Heat



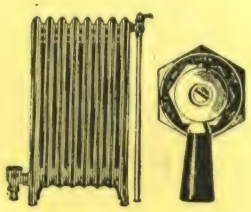
Mild Days
Open the valve so that the pointer is at the ¼ mark. Then there will be just enough heat in the radiator to take the chill off the room.



Average Days
If the valve is opened to the ½ mark, the radiator will give plenty of heat for the ordinary winter day.



Cold Days
On a really cold day more heat will be needed. Turn the valve to the ¾ mark.

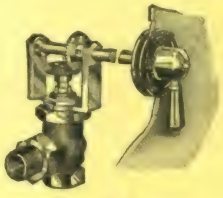


Bitter Cold Days
On raw, biting cold days when the thermometer hangs around zero, open the valve all the way.

Wood Wheel

Chain Pull

Extension Stem



Bevel Gear

Lock Shield

Straight Extension Stems in any length can be furnished on receipt of measurements.

Continued on next page

HOFFMAN CONTROLLED HEAT

Nos. 8 and 9 Return Line Valves

On the return side of each radiator is a No. 8 Hoffman Return Line Valve for controlling the release of air and condensation from the radiator without steam loss. This valve is extremely sensitive in operation and maintains the return end of the radiator at practically the same temperature as the inlet, insuring full heat output.

Nos. 8 and 9 Return Line Valve or Radiator Trap

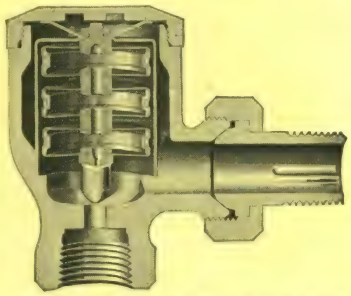
The body of the valve is steam metal, heavily nickelplated with cap and tail piece made of a hot brass forging.

The thermostatic member consists of six diaphragms assembled into a hollow chamber which contains the thermostatic fluid. Leakage at the joints is prevented by the special metal to metal construction, which is soldered at all points as an extra factor of safety. The method of making the joints, however, is such that the use of solder is not absolutely necessary.

In the thermostatic member of any valve it is essential that the metal used be such that it will not soften or crack under repeated operation. After several years of research the Hoffman Diaphragm Metal was developed which meets the most rigid requirements. Before being used the diaphragm metal must undergo durability tests which call for a minimum of three million operations expanding under pressure and contracting by metal tension at the rate of 70 times per minute in a temperature of 350 degrees. After passing this intensified test, which is more severe than would be encountered in ten years of service, the metal is put into manufacturing process.

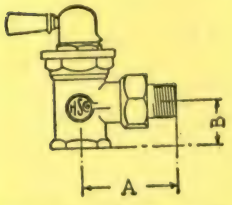
Another important feature in valve operation is the thermostatic fluid. In Hoffman Return Line Valves the fluid is of such a nature that its pressure maintains a constant relationship with that of steam and as a result the valves may be used within a wide pressure range and with uniformly sensitive operation under varying pressures. Because of the fluid and diaphragm metal used, Hoffman Return Line Valves may be used under pressures as high as 50 pounds without change or adjustment.

The thermostat is mounted in a cage so constructed that all thermostats for each size of valve may be interchanged without adjustment. This feature is very important in meeting specifications which call for the operation of a system during the cleaning out period with thermostat removed from the valve body. In replacing the thermostat it is simply necessary to insert it in the valve body, tighten the cap and perfect operation is obtained. This feature is also of great assistance in cleaning valves after they have been in service for long periods under unfavorable conditions.

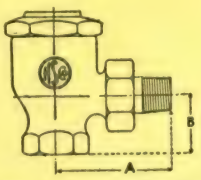


Nos. 8 and 9 Return Line Valve

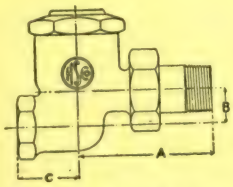
The No. 8 Valve is made in ½ in. size and can be supplied in angle, straightway, right and left hand offset patterns. The normal capacity is 200 sq. ft. of direct cast iron radiation; port diameter all pressures up to 50 lb., ¼ in. The No. 9 Valve is made in ¾ in. size, angle and straightway patterns only, having a normal capacity of 600 sq. ft. of direct cast iron radiation. For pressures under 15 lbs. valve is supplied with ⅜-in. port and $\frac{3}{16}$-in. port for pressures of 15 to 50 lbs.



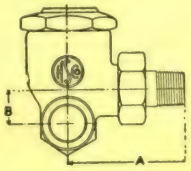
Nos. 7 and 19 Angle Pattern



Nos. 8, 9 and 18—Angle Pattern



Nos. 8, 9 and 18—Straightway Pattern



Nos. 8 and 18—Right or Left, Offset Pattern

Style	Size, in.	Diameter valve port, in.	Maximum capacity, sq. ft.	Dimensions† A	B	C
No. 7 Angle	¾		200	2 7/8	1 3/8	
No. 19 Angle	¾		200	2 7/8	1 3/8	
No. 8 Angle	½	¼	200	2 23/32	1 9/32	
No. 8 Straightway	½	¼	200	2 23/32	1 9/32	1 13/32
No. 8 Offset	½	¼	200	2 23/32	1 9/32	1 5/16
No. 18 Angle	½	¼	100	2 3/4	1 1/4	
No. 18 Straightway	½	¼	100	2 3/4	7/8	1 3/8
No. 18 Offset	½	¼	100	2 3/4	7/8	1 3/8
No. 9 Angle	¾	⅜*	600	3 5/32	1 11/32	
No. 9 Straightway	¾	⅜*	600	3 1/8	1 5/16	1 1/2

*No. 9 Valve furnished with $\frac{3}{16}$-in. port for pressures above 15 lbs.

†When specified on order, Hoffman Nos. 7, 8, 18 and 19 Valves will be supplied in accordance with measurements adopted by the Heating and Piping Contractors' National Association.

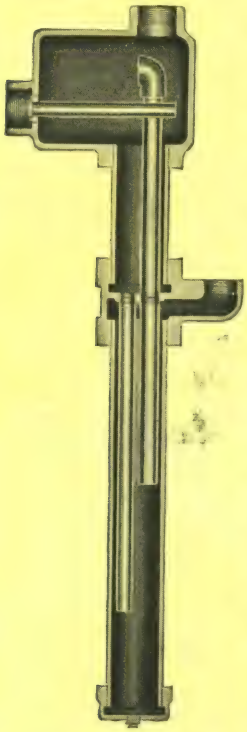
Continued on next page

HOFFMAN CONTROLLED HEAT

Hoffman Differential Loop

To eliminate complicated apparatus for handling condensation and returning it to the boiler it is possible in most cases to permit condensation to return by gravity. This, however, necessitates some control over the boiler water line to prevent water from leaving the boiler if a high pressure is accidentally generated.

The Hoffman Differential Loop is a simple, yet efficient, device, that provides this safeguard. It does not function under normal operation. If, however, a dangerous pressure should be generated, the loop instantly comes into action and prevents damage to the boiler.



Differential Loop

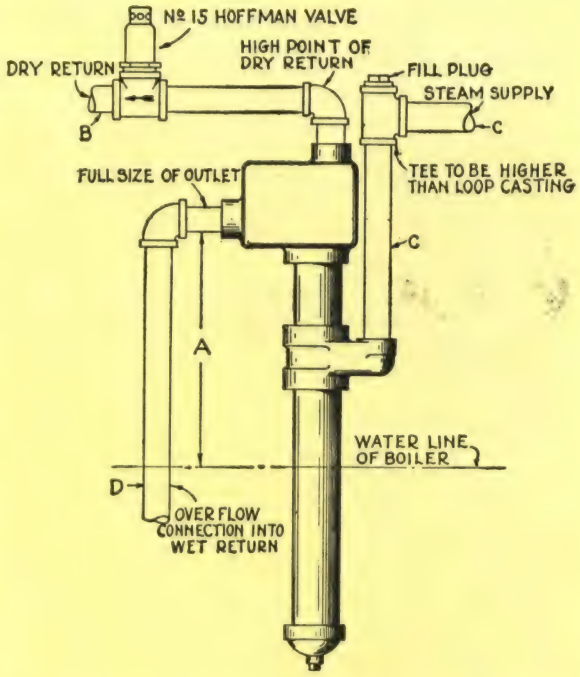
Sold as part of Controlled Heat Equipment.

Prices on loops or basement specialities, for use otherwise, are quoted on application, and sold only when we approve plan of installation.

No. 0 and No. 02 Loops should not be used where the low point in the dry return is less than 24 in. above boiler water line. With the No. 03 and No. 04 Loop this distance must be at least 30 in.

The Loop contains no moving parts to corrode or stick and prevent action at any time when necessary. The operation is obtained through the use of a water column which seals a connection between the steam and return mains until such time as a predetermined pressure is generated, when the connection is unsealed and a small quantity of steam is blown into the return main. This action closes the port of the main vent and compresses the air in the return sufficiently to prevent water from rising beyond the level in the return established by the predetermined pressure. As soon as a sufficient quantity of steam is delivered to the return to accomplish the desired results, the blow-over connection is resealed and remains so until there is need for an additional supply of steam.

When the Loop functions it maintains a fixed differential pressure between the steam and return main. In the standard No. 0 and No. 02 Loops the differential pressure is 10 ounces, while with the No. 03 and No. 04 a 14-ounce differential is maintained. The maintenance of this differential permits circulation of steam throughout the system even though the main vent port is closed. Furthermore, by the maintenance of this differential when the loop has functioned, a radiator which has been turned off may be put into commission and filled with steam in practically the same time as would be required if the Loop had not functioned.



As a positive control over the boiler water line and insurance against damaged boilers, due to forcing out of water under the excessive pressures, the Loop is the simplest and most efficient device on the market.

DIMENSIONS OF LOOP

Loop No.	Capacity, sq. ft.	Dimensions, in.			
		A	B	C	D
0	2000	24	1¼	1¼	¾
02	3500	24	1¼	1¼	¾
03	7500	30	1½	1½	1
04*	15000	30	2	2	1¼

*04 Loops made by siamesing 2 No. 03 Loops with nipples, tees and unions.

No. 15 Valve

In conjunction with the Loop a special valve for venting the entire system is used—the No. 15 Hoffman Vacuum Valve—which permits free venting of air through its ¾-inch vent port and prevents air returning to the system by means of a light check, which is thoroughly reliable in fulfilling its requirements.

No. 15 Valve

The No. 15 Valve is intended for use only in connection with Hoffman Differential Loops.

Venting of Mains

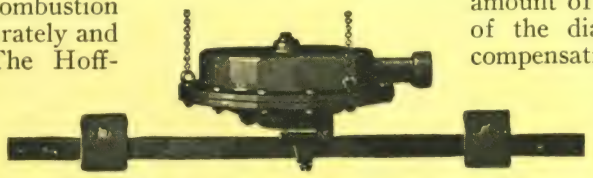
For venting the mains into the dry returns, from two to six, depending on the size of the installation, No. 18 Valves are used. A complete list of Controlled Heat Equipment required for various sizes of installations is given on page 14.

Continued on next page

HOFFMAN CONTROLLED HEAT

Hoffman Damper Regulator

In order that heat may be supplied promptly when there is a demand for it, it is necessary to maintain the pipe lines filled with steam under very low pressure at all times. To prevent the generation of excessive quantities of steam, the rate of combustion in the boiler must be accurately and positively controlled. The Hoffman Damper Regulator fulfills this requirement in that it maintains steam in the pipe lines at all times under uniform pressure and whenever the demand for steam is changed, by opening or closing a No. 7 Valve, the response at the boiler is instantaneous.



Hoffman Damper Regulator

This sensitive operation is obtained through the use of a large diameter rubber diaphragm, which multiplies slight variations in pressure into sufficient power to operate the drafts.

The diaphragm is submerged in water at all times, preventing steam vulcanization of the rubber. To maintain a fixed amount of water on the upper side of the diaphragm at all times a compensating disc is used to occupy the space given up by the diaphragm as it expands in response to a pressure increase. With a constant water load on the upper side of the diaphragm and the balancing of the dampers by means of compensating weights on the lever, the regulator is just as sensitive in closing as in opening the drafts.

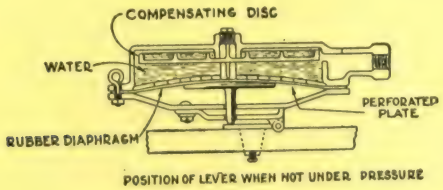


Figure 1

Shows Damper Regulator under no pressure. Compensating disc is in its uppermost position, the bottom of the plate being in line with bottom of inlet. The space above diaphragm is filled with water up to the inlet. Weights on lever are to be so placed that they will hold the diaphragm against the perforated plate. Drafts are held open until the predetermined pressure is generated, when, through diaphragm action which in turn is transmitted to the lever, drafts are closed.

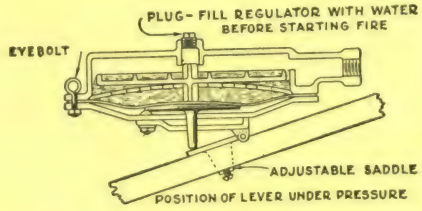


Figure 2

Shows position of Damper Regulator when drafts are closed. Vapor pressure has overcome upward force exerted by the weights on lever arm and forced diaphragm downward. The water on the diaphragm lowers with it and likewise the compensating disc until top of the disc is level with the bottom of the inlet, thus preventing any addition to the water above the diaphragm. With a slight drop in vapor the weights force the diaphragm upward and drafts are opened.

Hoffman Kompo Gage

The new Hoffman Kompo Gage is used with either Hoffman Controlled Heat installations or One-pipe Gravity Steam Heating Systems, equipped with Hoffman No. 2 Vacuum Valves. It accurately indicates the pressure of the vapor being generated in the boiler, or shows whether the plant is operating under vacuum conditions.

The Kompo Gage measures pressure up to 30 pounds, the first 5 pounds being shown in ounce graduations, with a retard from 5 pounds to 30 pounds. Vacuum is shown up to 30 inches, the first 10 inches being indicated in ½-inch graduations, with a retard from 10 inches to 30 inches.

An unusual feature of the Kompo Gage is the externally operated set screw which resets the hand. During shipment it often occurs that the hand is jarred from its normal position at zero. By turning the set screw, without dismantling the gauge or removing the glass, the hand may be reset to zero with perfect assurance that it will register as accurately as when it left the factory.

Coupled with the Hoffman Damper Regulator, this new gauge eliminates all guesswork from the important detail of firing the boiler. The result is marked fuel economy through more efficient firing.

Kompo Gage

The Hoffman Kompo Gage is made in one style only—pressed steel case and ring, finished in dull black, white dial 5 inches in diameter, pressure and vacuum readings in black. Pipe connection is ¼ inch.

Specifications for Controlled Heat

A six-page specification for Hoffman Controlled Heat installations is furnished upon request.

Continued on next page

HOFFMAN CONTROLLED HEAT

Equipment for Controlled Heat

For convenience, Hoffman Controlled Heat Equipment is classified in two groups: Radiator Specialties and Basement Specialties.

Standard Radiator Specialties

Description	Size of connection	Capacity sq. ft. radiation†
No. 7—Modulating Radiator Supply Valve, Lever Handle (Angle Type Only)..... Wood wheel—lock shield—closed top, furnished without extra charge.	¾ in.	200
No. 7—Valve with extended stem	¾ in.	200
No. 7—Valve with chain pull attachment	¾ in.	200
*No. 8—Return-Line Valve or Radiator Trap, ¼ in. Port..	½ in.	200
**No. 9—Return Line Valve or Radiator Trap, ⅜ in. Port..	¾ in.	600

*No. 8 furnished in angle, straightway, right or left-hand corner type.

**No. 9 furnished in angle or straightway only. Angle type Nos. 8 or 9 shipped unless otherwise ordered.

†Capacity based on 240 B. T. U. per hour.

Standard Basement Specialties

Class "O"—Basement specialties for installations up to 2000 square feet Direct Radiation, consisting of:

2 No. 18 Return Line Valves for venting Steam Mains into Dry Return.
1 No. 0 Hoffman Differential Loop, including one No. 15 Vacuum Valve.
1 No. 13 Hoffman Damper Regulator.
1 No. 14-A Hoffman Kompo Gage.

Class "B"—Basement specialties for installations of 2001 to 3500 square feet Direct Radiation, consisting of:

3 No. 18 Return Line Valves for venting Steam Mains into Dry Return.
1 No. 02 Hoffman Differential Loop, including one No. 15 Vacuum Valve.
1 No. 13 Hoffman Damper Regulator.
1 No. 14-A Hoffman Kompo Gage.

Class "C"—Basement specialties for installations of 3501 to 7500 square feet Direct Radiation, consisting of:

4 No. 18 Return Line Valves for venting Steam Mains into Dry Return.
1 No. 03 Hoffman Differential Loop, including one No. 15 Vacuum Valve.
1 No. 13 Hoffman Damper Regulator.
1 No. 14-A Hoffman Kompo Gage.

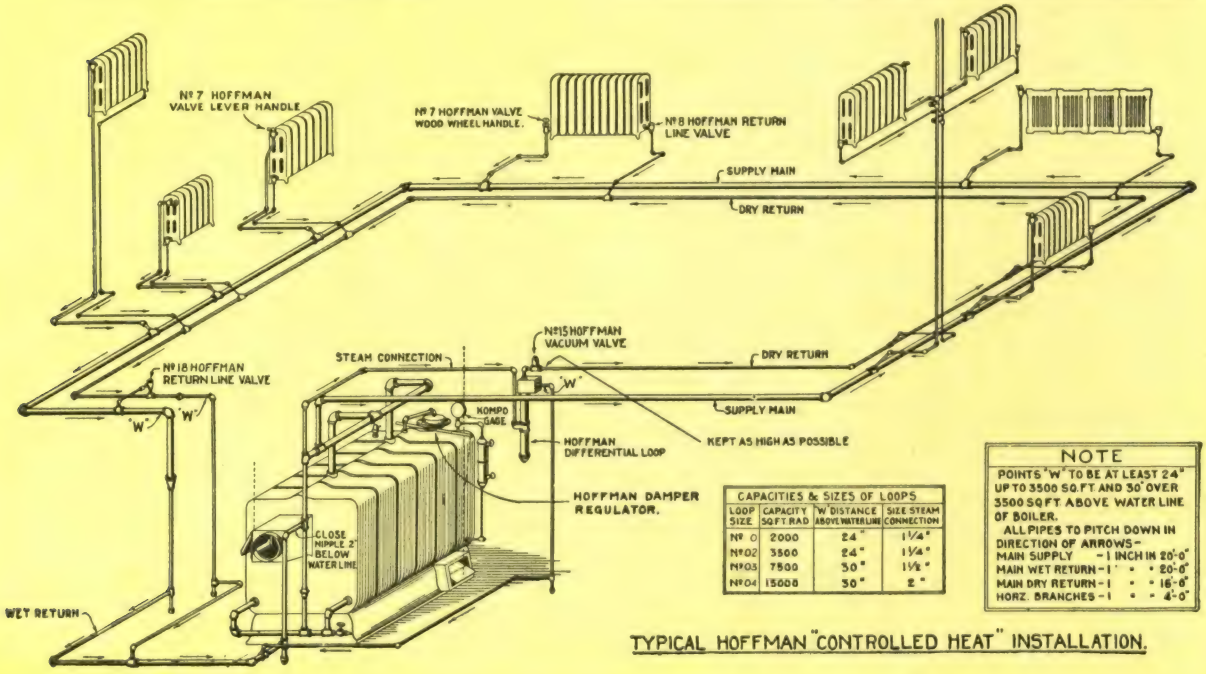
Class "D"—Basement specialties for installations of 7501 to 15,000 square feet Direct Radiation, consisting of:

6 No. 18 Return Line Valves for venting Steam Mains into Dry Return.
1 No. 04 Hoffman Differential Loop, including two No. 15 Vacuum Valves.
1 No. 13 Hoffman Damper Regulator.
1 No. 14-A Hoffman Kompo Gage.

Additional Basement Equipment

(Occasionally required for large installations.)

Service	Valve No.
Return Line Valves for Venting Air only from Mains, Indirect Radiators, etc., into Dry Return.....	8 or 18
Return Line Valves for Return Connections from Indirect Radiators, Unit, Superfin, Vento or Aerofin Heaters, or to drip Steam Mains, Risers, etc.....	9 or 12
Damper Regulator for Each Additional Boiler	13
Kompo Gage for Each Additional Boiler	14-A



CAPACITIES & SIZES OF LOOPS

LOOP SIZE	CAPACITY SQ.FT. RAD	'W' DISTANCE ABOVE WATER LINE	SIZE STEAM CONNECTION
№ 0	2000	24"	1¼"
№02	3500	24"	1¼"
№03	7500	30"	1½"
№04	15000	30"	2"

NOTE

POINTS 'W' TO BE AT LEAST 24" UP TO 3500 SQ.FT AND 30" OVER 3500 SQ.FT ABOVE WATER LINE OF BOILER.

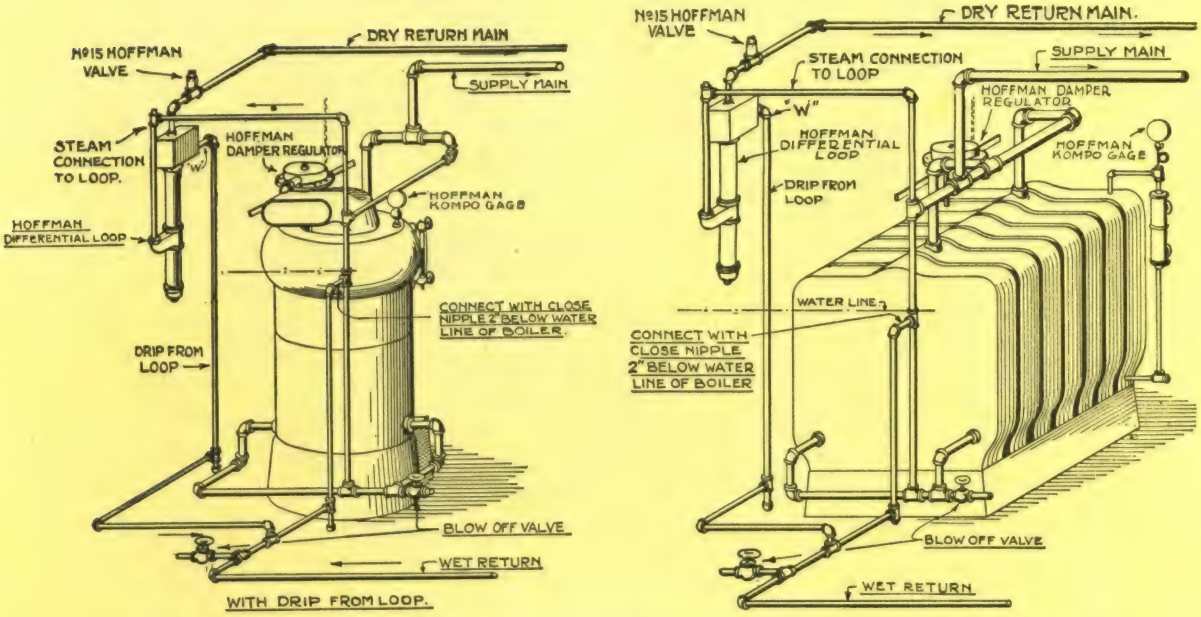
ALL PIPES TO PITCH DOWN IN DIRECTION OF ARROWS—
MAIN SUPPLY —1 INCH IN 20'-0"
MAIN WET RETURN—1 " " 20'-0"
MAIN DRY RETURN—1 " " 16'-0"
HORZ. BRANCHES—1 " " 4'-0"

TYPICAL HOFFMAN "CONTROLLED HEAT" INSTALLATION.

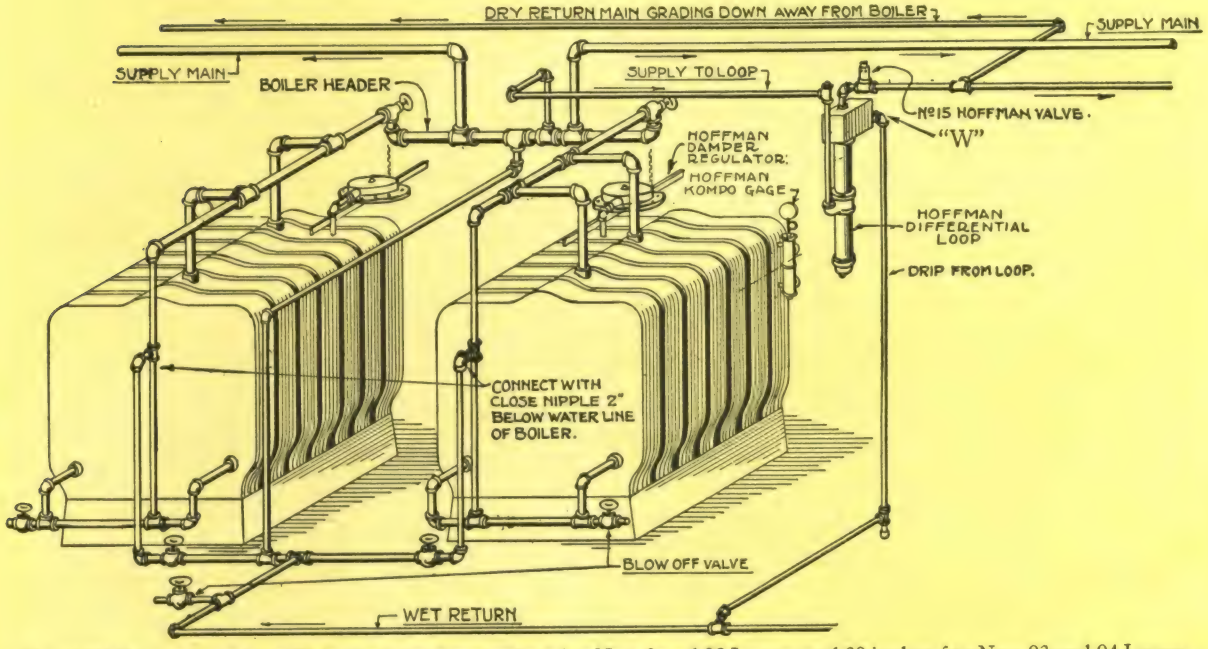
Continued on next page

HOFFMAN CONTROLLED HEAT

Typical Installation Details



Typical Method of Installing Hoffman Equipment on Round and Sectional Boilers



Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

Typical Method of Installing Hoffman Equipment with Twin Boiler Setting

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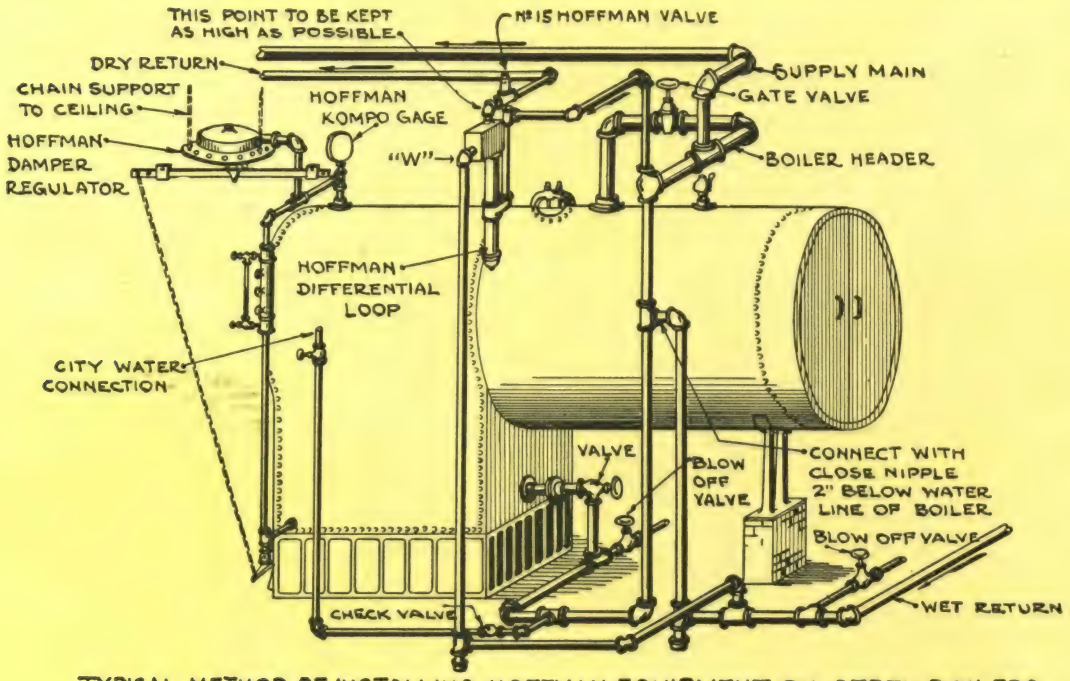
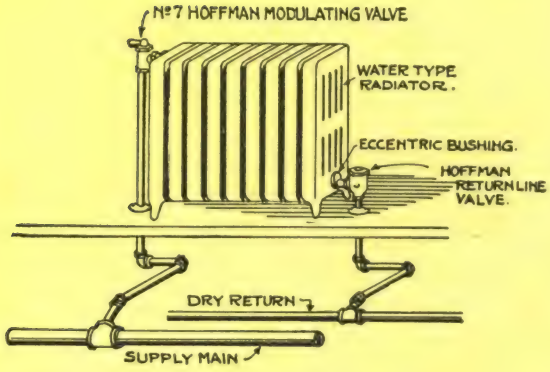
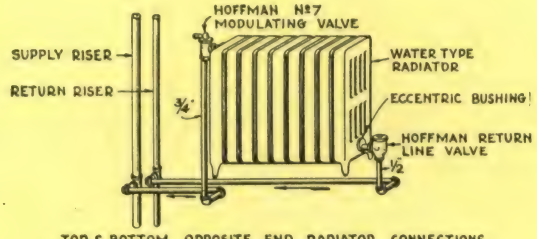
HOFFMAN CONTROLLED HEAT



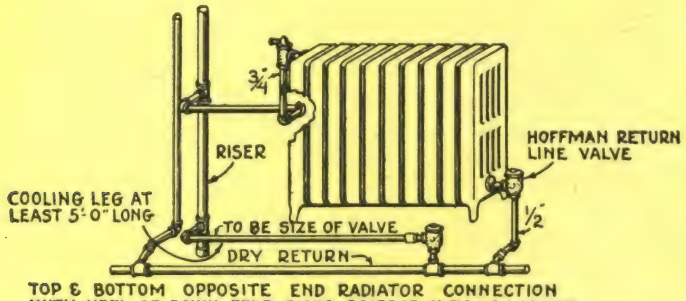
TYPICAL METHOD OF INSTALLING HOFFMAN EQUIPMENT ON STEEL BOILERS.



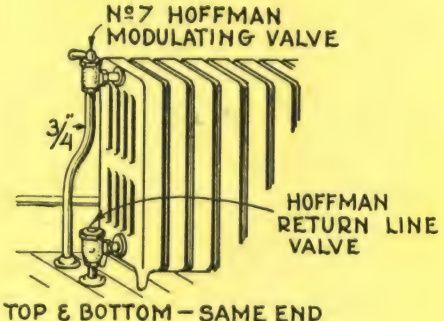
TYPICAL RADIATOR CONNECTION.



TOP & BOTTOM OPPOSITE END RADIATOR CONNECTIONS FROM UP OR DOWN FEED RISERS — (USUAL METHOD)



TOP & BOTTOM OPPOSITE END RADIATOR CONNECTION WITH HEEL OF DOWN FEED RISER DRIPPED INTO DRY RETURN



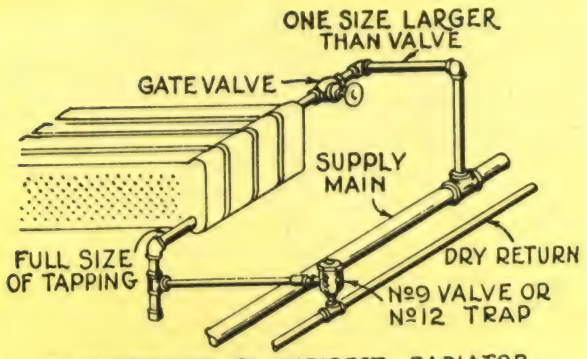
TOP & BOTTOM — SAME END RADIATOR CONNECTION

Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

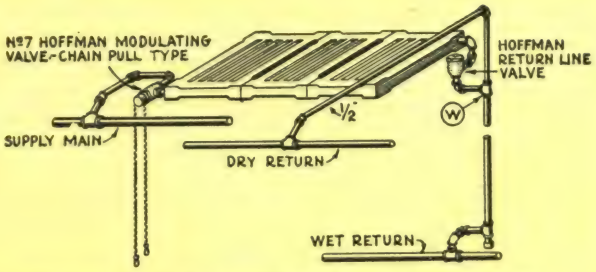
Typical Installation Details

Continued on next page

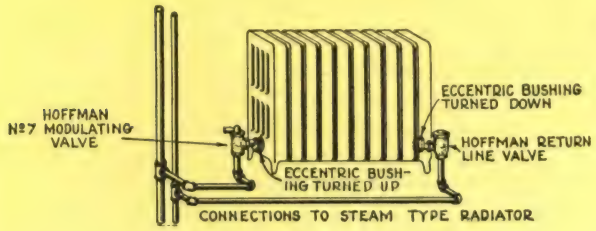
HOFFMAN CONTROLLED HEAT



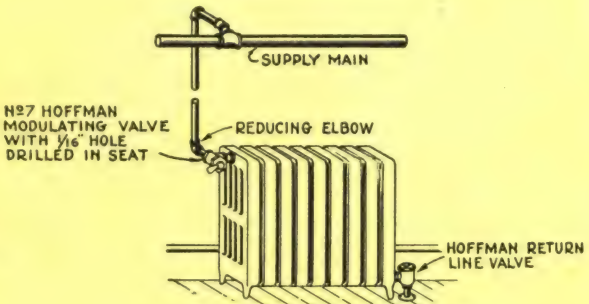
CONNECTIONS TO INDIRECT RADIATOR DRIPPING & VENTING INTO DRY RETURN.



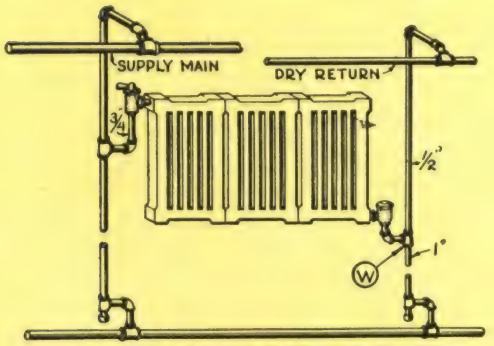
CONNECTIONS TO CEILING RADIATOR WITH RETURN DRIPPED INTO WET RETURN & AIR VENTED INTO DRY RETURN



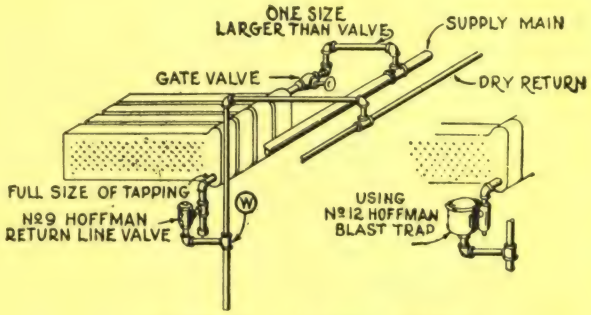
CONNECTIONS TO STEAM TYPE RADIATOR



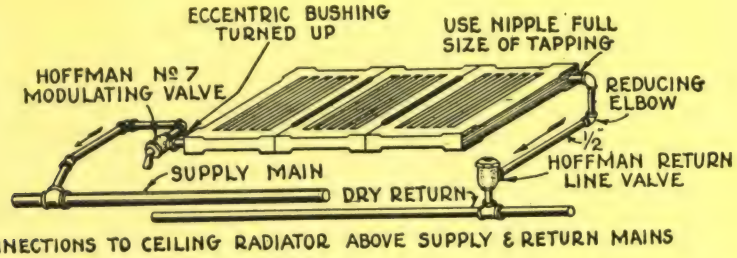
RADIATOR CONNECTION WITH DOWN FEED RISER DRIPPED THROUGH SUPPLY VALVE



CONNECTIONS TO RADIATOR HUNG ON WALL
[WHEN SUPPLY & RETURN DRIPS CONNECT TO WET RETURN AND AIR IS VENTED THRU HOFFMAN VALVE INTO DRY RETURN]



CONNECTIONS TO INDIRECT RADIATOR DRIPPING INTO WET RETURN & VENTING AIR INTO DRY RETURN.



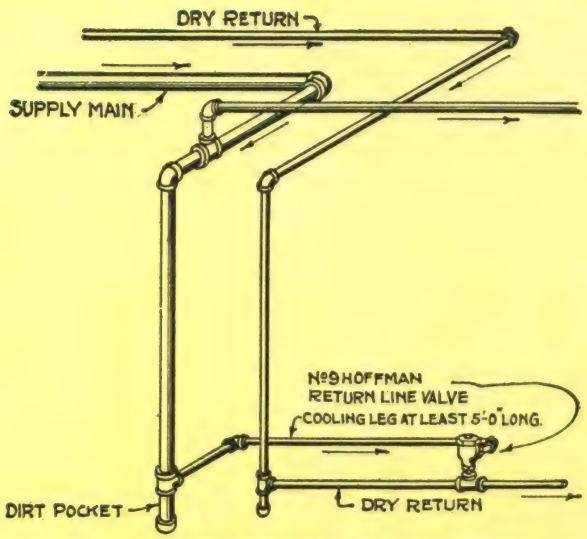
CONNECTIONS TO CEILING RADIATOR ABOVE SUPPLY & RETURN MAINS

Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

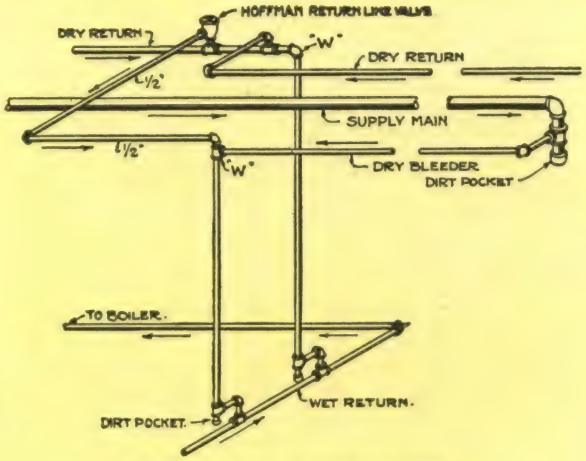
Typical Installation Details

Continued on next page

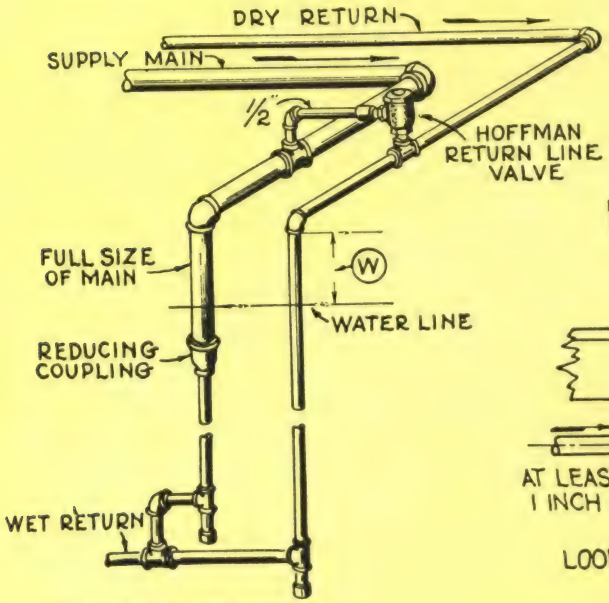
HOFFMAN CONTROLLED HEAT



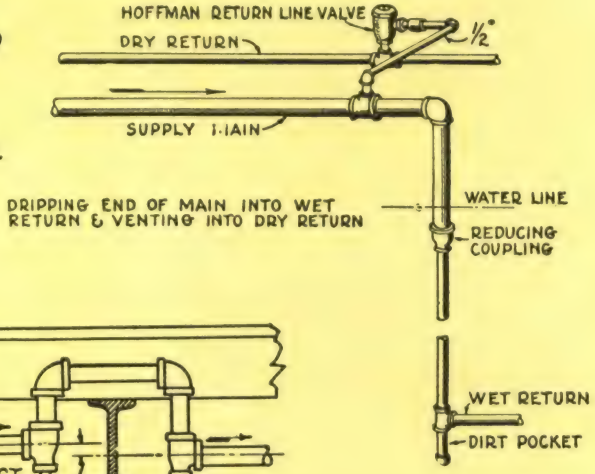
DRIPPING END OF SUPPLY & RETURN MAINS INTO DRY RETURN AT LOWER LEVEL.

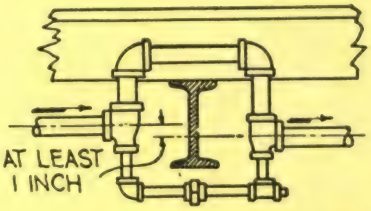


BLEEDING & VENTING END OF MAIN FROM UNEXCAVATED PART OF BUILDING.

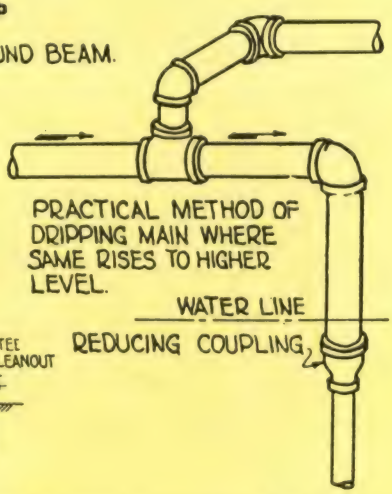


VENTING & DRIPPING ENDS OF MAINS

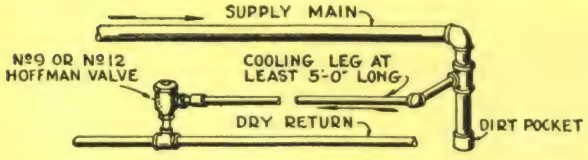




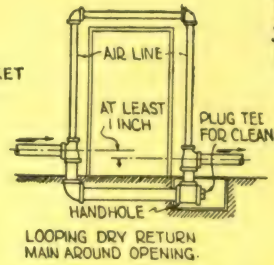
LOOPING MAIN AROUND BEAM.



PRACTICAL METHOD OF DRIPPING MAIN WHERE SAME RISES TO HIGHER LEVEL.



DRIPPING END OF MAIN INTO DRY RETURN



LOOPING DRY RETURN MAIN AROUND OPENING.

Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

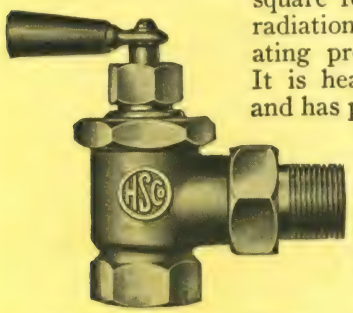
Typical Installation Details

Continued on next page

MISCELLANEOUS HOFFMAN VALVES

No. 19 Hoffman Radiator Valve

Quick-opening, semi-packless type intended for vacuum pump installation or for vapor systems where modulation is not required. Valve is made in ¾-inch size only, having a capacity of 200 square feet direct cast iron radiation; maximum operating pressure 15 pounds. It is heavily nickel plated and has polished trimmings.



No. 19 Radiator Valve
Supplied with lever handle, wood wheel, lock shield, closed top or extended stem

The valve stem is in one piece, the end engaging in disc holder having a quadruple thread which allows full port opening with three-quarters of a turn of handle.

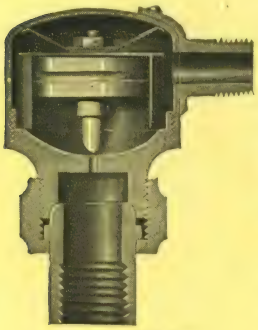
The stem packing is lubricated, compressed asbestos fibre that will last indefinitely and requires no attention other than an occasional take-up of the packing nut. Handle is hard black fibre that withstands severe service without breakage. Valve disc is genuine Jenkins Bros. composition.

Regularly supplied in lever handle type. On special orders, wood wheel handles, lock shields, closed tops or extended stems furnished.

No. 3 Hoffman Air Line Valve

The No. 3 Hoffman Air Line Valve is a compact all-metal valve for air line or Paul Systems, where an exhaust line is carried from the valve back to a central point where in many cases air is drawn out of the system by a vacuum pump.

Normally the port is open for the passage of air and remains so until steam reaches it, when the thermostatic member instantly closes the discharge port tightly and no steam escapes into the air line.



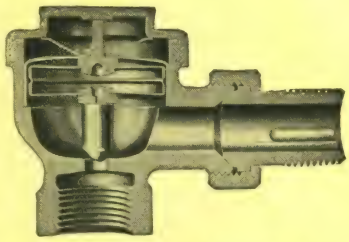
No. 3 Valve
Radiator connection, ⅛ in.; air line connection, ¼ in. Maximum guaranteed operating pressure, 10 lbs.

With proper installation of air line systems no difficulty is encountered with water logged radiators, but if water is present in the system in excessive quantities and thrown against the No. 3 valve it will escape into the air line. To allow for unforeseen conditions, the use of an automatic water feeder is recommended on all boilers in air line systems.

The Hoffman-Economy Air Line Pump (see page 40) is intended for accelerating the removal of air from these systems and maintaining a vacuum on the air line.

No. 18 Hoffman Return Line Valve

This valve is similar in construction and basic principle to the No. 8 Hoffman Return Line Valve. It is used where radiator units contain not over 100 square feet of direct cast iron radiation, and the pressure at the trap not in excess of 15 pounds. The thermostat consists of one chamber made by two diaphragms separated by a space ring to which they are fastened. In the center of the bottom diaphragm the valve pin is attached. The joint being expanded and soldered remains absolutely tight. The thermostat is held in its cage by a pin expanded and attached to the top diaphragm, this pin extending through the cage and engaging with the boss on the cap. All thermostats are interchangeable.



No. 18 Return Line Valve
Made in ½ in. size only and is furnished in angle, straightway, right and left hand offset patterns. Maximum guaranteed pressure is 15 lbs.

No. 11 Hoffman Vapor Vacuum Valve

This valve is used for venting return mains in vapor vacuum systems or for other conditions where a large venting capacity is required. Valve has a ¾-inch vent port. For preventing the escape of water the valve has a large buoyant float with a double valve, one disc controlling ¾-inch port and the other an auxiliary port $\frac{3}{16}$ inch in diameter. If water enters the valve, closing off the port, and then recedes, the $\frac{3}{16}$-in. port is first opened and as air pressure is relieved slightly the ¾-inch port opens and full venting area obtained. Above the float-controlled port is the thermostat which controls a ¾-inch single valve port. An air check over the discharge port prevents return of air to system.

For preventing damage to valves in shipment a set screw is used to hold the float tightly against its seat. It is necessary that the set screw be backed away before valve is installed.

No. 11 Vapor Vacuum Valve
Valve has ¾-in. pipe connection and is guaranteed for operating pressures up to 15 lbs.

Continued on next page

MISCELLANEOUS HOFFMAN VALVES

No. 12 Hoffman Blast Trap

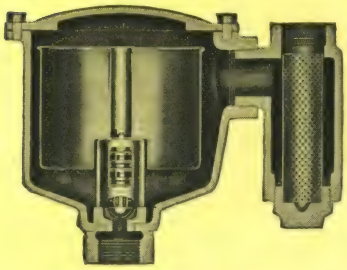
Especially well adapted for draining condensation from:

Indirect Radiators
Blast, "Vento" or "Superfin" Stacks
Unit Heaters
Ends of Steam Mains and Risers
Dryers and Drums
Hot Water Generators
Laundry Machinery

In functioning it distinguishes between steam, heated air and water of condensation, giving free discharge of air and condensation.

The trap embodies the desirable feature of open bucket or float traps in that it relieves condensation immediately upon its arrival at the trap regardless of the water temperature. Combined with the float is a thermostatic member which positively overcomes the chief difficulty with float traps by automatically relieving air as well as condensation from the system.

The normal position of the valve is open and this is held until steam reaches it when it closes tightly. If small quantities of condensation flow to the trap the thermostat functions and relieves the water, but if larger amounts of condensation, beyond the capacity of the port controlled by the thermostat reach the trap, the float lifts the thermostat from its seat and opens the large port. Maximum capacity is thus obtained.

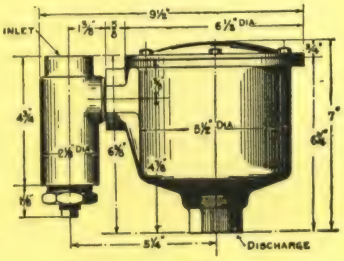


No. 12 Blast Trap
Pipe connections with strainer, 1 in. inlet and outlet.

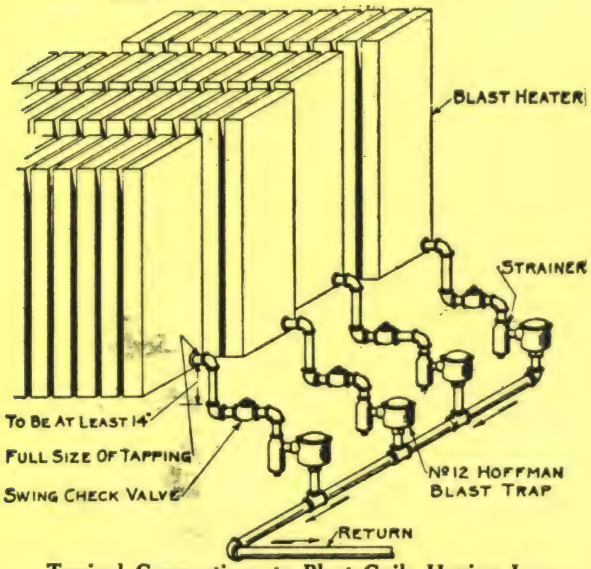
TABLE OF NOMINAL CAPACITIES

Pressure, lb. per sq. in.....	½	1	2	3	4	5
Capacity, lb. per hr.	800	1,000	1,500	1,800	2,000	2,500
Capacity in sq. ft. radiation with ¼ lb. condensation per sq. ft. per hr.	3,200	4,000	6,000	7,200	8,000	10,000

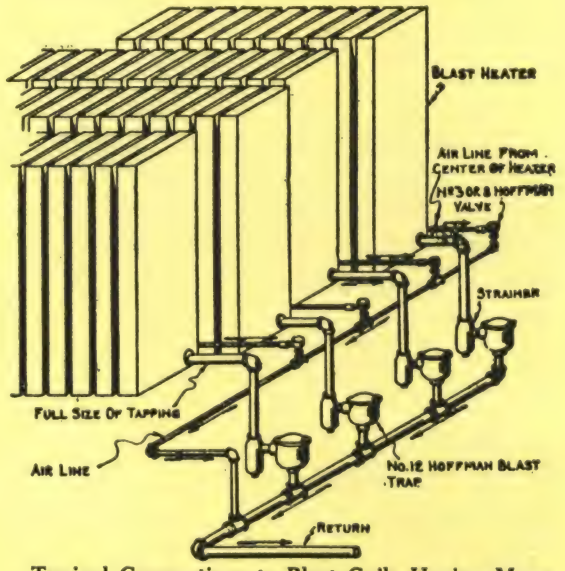
Maximum guaranteed operating pressure 30 lbs. Capacities for over 5-lbs. pressure furnished on application.



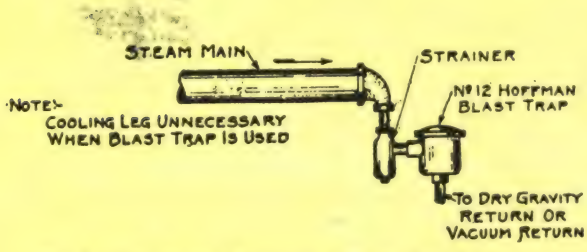
Dimension Diagram



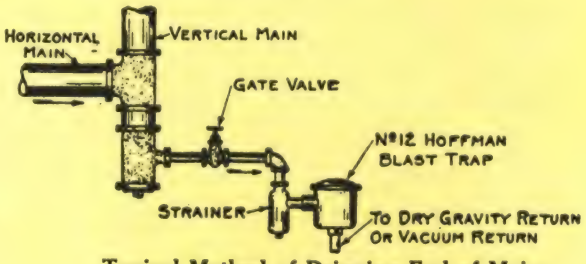
Typical Connections to Blast Coils Having Less Than 12 Sections



Typical Connections to Blast Coils Having More Than 12 Sections



Typical Method of Dripping End of Mains



Typical Method of Dripping End of Mains

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MISCELLANEOUS HOFFMAN VALVES

Hoffman Thermostatic Steam Traps

Nos. 20 and 21 Steam Traps
Pressure Range 0 to 100 Pounds without Change or Adjustment

Construction

The Hoffman Steam Trap is of strong, rugged all bronze construction. The diaphragms in the thermostat, the valve pins and valve seat are all made of the same non-corrosive alloy which has been successfully used for diaphragms in Hoffman Valves for a number of years. The alloy withstands high temperature steam without softening, and repeated action without cracking. It also withstands the scoring action of steam, hence its use in the wearing parts.

A strainer attached to a plug is built into the trap body permitting ready removal for cleaning. All renewable parts are interchangeable, permitting replacement without change or adjustment of any sort.

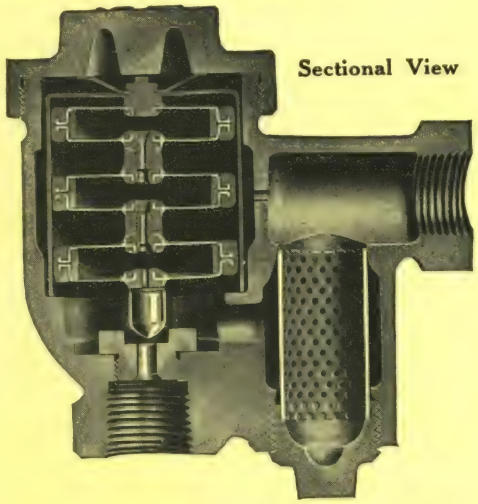
Advantages

The Hoffman Steam Trap is easy to install and may be placed directly in the pipe line without requiring hangers or supports. It is made in Angle Pattern, saving one fitting. It has only one moving part which expands in a straight line, with no levers or hinged joints to stick.

The Hoffman Steam Trap normally has a wide open vent port which is maintained until all air and condensation are relieved from the system, after which steam contact with the thermostat closes the port. No hand operated by-passes are required to vent air from the system. The trap cannot air-bind or freeze.

The opening and closing of the port are practically instantaneous. By means of a cooling leg condensation is held a short time until its temperature drops sufficiently below that of steam to contract the thermostat and permit a full port opening. The length of cooling leg permits the engineer to vary the trap capacity and number of discharges.

The Hoffman Steam Trap has the thermostat on the inlet side of the trap and sensitive accurate action is obtained thereby. Compared with traps having thermostatic members on the discharge side of the port, a considerable saving in steam in the course of a year is possible.



Sectional View

Operation

The uniform operation of Hoffman Steam Trap throughout its wide pressure range is due to the constant relationship between the fluid pressure within the thermostat and the external steam pressure. When the thermostat is in contact with steam the internal fluid pressure generated is such that the diaphragms are fully expanded and the discharge port closed. When water or air at temperatures below that of steam reach the thermostat a reduction in fluid pressure occurs and the steam pressure compresses the thermostat, thus opening the port by an amount directly proportional to the fluid pressure loss within the thermostat. As the fluid pressure loss is dependent on the temperature of the air or condensation surrounding the thermostat, it will be seen that the lower the temperature of condensation the greater the pressure loss and the wider the port opening. The necessity for and influence of a cooling leg on trap capacity is thus clearly indicated.

Capacity

The discharge capacity of Hoffman Steam Traps is dependent upon differences between the temperature of condensation delivered to the trap and steam temperature. The following tables give continuous discharge capacities:

CONTINUOUS DISCHARGE CAPACITY NO. 20 TRAP
Pounds of water per hour

Pressure per sq. in., lb.	Temperature drop			
	20°	25°	30°	35°
10	275	450	600	725
20	425	615	775	900
30	550	750	940	1075
40	640	860	1075	1225
50	715	960	1210	1380
60	775	1050	1340	1540
70	820	1130	1440	1675
80	860	1200	1510	1760
90	900	1250	1560	1830
100	925	1260	1590	1860

Pipe connections. in.
Trap No. 20 ..... ½
Trap No. 21 ..... ¾

CONTINUOUS DISCHARGE CAPACITY NO. 21 TRAP
Pounds of water per hour

Pressure per sq. in., lb.	Temperature drop			
	20°	25°	30°	35°
10	375	610	800	950
20	575	825	1050	1200
30	725	985	1250	1410
40	835	1150	1450	1640
50	925	1285	1620	1860
60	1010	1410	1775	2075
70	1085	1525	1900	2250
80	1150	1600	2010	2400
90	1190	1660	2090	2490
100	1225	1725	2140	2550

Port Diam., in.	Weight, lb.
¾	3¼
1¼	3¾

Continued on next page

PART II

Hoffman-Economy Pumps

VACUUM PUMPS
CONDENSATION PUMPS
RECIPROCATING PUMPS
UNDERGROUND PUMPS
AIR LINE PUMPS

Condensation or vacuum pumps are widely used in heating systems for all classes of buildings where accelerated circulation at low pressure is desired or where condensation cannot return to boiler by gravity.

Hoffman-Economy Pumps offer to architects, engineers and heating contractors a line of products designed and built to meet the most exacting requirements. The basic engineering principles are scientifically correct—materials and workmanship are of the finest grade—and the units are sturdily constructed in every detail.

Hoffman-Economy Pumps are manufactured in a complete range of sizes for all types of installations requiring such equipment; and can be specified with the definite assurance that they will give years of efficient service with minimum maintenance.

GUARANTEE

Hoffman-Economy Pumps are guaranteed for capacity and against defects in material or workmanship for a period of one year from the date of installation. This guarantee applies to the pump only and covers the furnishing of new parts to replace those found defective. The guarantee applying to motors and electrical equipment is the same as that given by the manufacturer of the motor or equipment used or specified.

It is a condition of purchase that HOFFMAN SPECIALTY CO., INC. shall not be held liable for any damage or delay which may be caused by defective material and that no allowance for labor will be made for the replacement of parts claimed defective without written consent of HOFFMAN SPECIALTY COMPANY, INC.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Uses and Selection of Hoffman-Economy Pumps

Vacuum Heating Systems

Return Line Vacuum Systems—On large installations, where it is desired to accelerate steam circulation at low pressures by maintaining a vacuum on the return mains, a Hoffman-Economy Return Line Vacuum Pump provides rapid removal of air from the system and the return of condensate to the boiler. See pages 24 to 29.

Air Line Systems—On air line or "Paul" systems, a Hoffman-Economy Air Line Vacuum Pump is used to remove air from the system. The pump, however, handles no condensate and does not act as a boiler feed pump. See page 40.

Gravity Heating Systems

Low Pressure—*For Drainage of Radiation Below Water Line . . .* In installations where part of the radiation is below the boiler water line, it is only necessary to provide a pump of sufficient capacity to handle the condensate from these units, allowing condensate from radiators on upper floors to return to the boiler by gravity.

For Acceleration of Circulation . . . In many installations, especially those covering a large area, where the distances between the boiler water line and the low point of the piping system are not sufficient to compensate for the friction in the pipe lines, the use of a pump and receiver will improve circulation of steam. It will also insure prompt return of condensate to the boiler. This permits lower boiler pressure with resultant saving in fuel.

Medium and High Pressures (35 to 100 pounds square inch)—On installations where pressures above 25 pounds are required only part of the time, electric condensation pumps replace steam driven pumps and traps for returning condensate to the boiler. Steam driven devices require the maintenance of a predetermined boiler pressure to insure their operation, even though steam is not required for other purposes. On such jobs electric pumps reduce fuel consumption, permit banking fires at night and over week-ends and operate without attention.

When steam is required for process work and where all condensate is not returned to the boiler, electric condensation pumps are used for returning condensate and for automatically feeding makeup water by the addition of a float controlled water feeder.

How to Determine Correct Pump—Wherever condensate will drain to the horizontal receiver, a Horizontal Pump is recommended. See pages 30 to 36.

Where returns are below floor level or where condensate cannot flow by gravity to horizontal tank, a Vertical Underground Pump should be selected. See pages 38 and 39.

In factories or where pressures of 50 to 100 pounds are carried and where lower initial cost is a factor and slight noise not objectionable, a Reciprocating Pump may be substituted for a horizontal pump. See page 37.

How to Determine Electric Current Available

In various parts of the country or sometimes in the same city, different electric currents are available. It is, therefore, necessary to ascertain from the architect, electrician or power company the current furnished to the building. Often this information is given on the name plate of the electric power meter.

Alternating current may be one, two or three phase, 110, 220, 440, or 550 volts and 60, 50, 40, 30, or 25 cycles. Two or three phase power is usually found where there is a total of 5 hp. or more in a single building. If there is only a lighting line the current will probably be single phase or direct current. Care must be used in selecting pumps having motors 3 hp. and over, as power companies frequently run in two or three phase lines to operate motors of this size. If, therefore, there is only a lighting circuit in the building and it is desired to use a large pump, inquire of the power company what current will be furnished.

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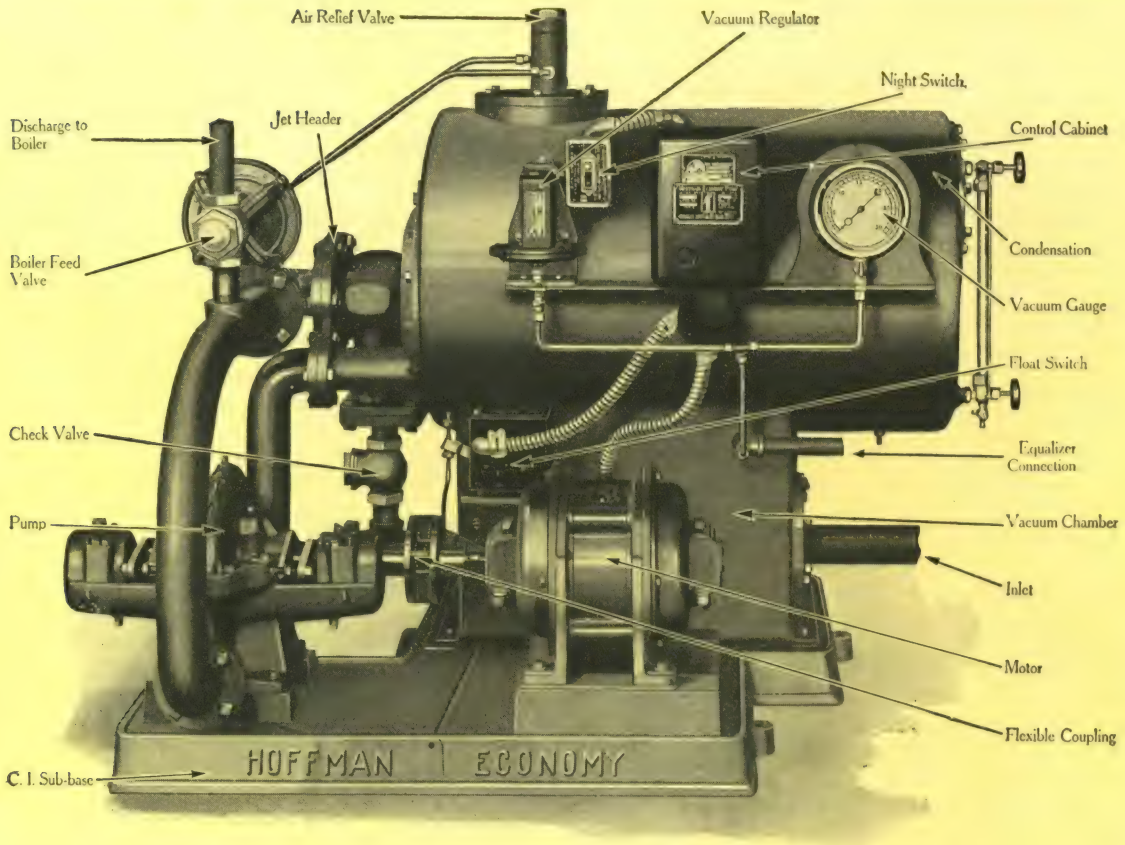
HOFFMAN-ECONOMY PUMPS



Hoffman-Economy Return Line Vacuum Pumps
Single and Duplex Units

The Hoffman-Economy Return Line Vacuum Pump performs three functions: it removes air from the heating system; maintains a vacuum on the return mains for lifting condensate, if necessary; and returns condensate to the boiler.

Efficiency—The jet type vacuum producer used in these pumps is the simplest and best known method for exhausting air and vapors. It has no moving parts and avoids close clearances on pump; difficulties in maintaining vacuum due to wear are reduced to a minimum.

Pumps can handle extremely hot water and are smooth and quiet in operation.

Unit is capable of producing a vacuum of 25 inches in all sizes and a considerably higher vacuum in sizes SV-4 and larger.

Dependability—Special arrangement of relief valve eliminates danger of water overflowing to floor, even in event of current failure.

The pump being submerged always maintains its water seal; under normal conditions there is no possibility of pump running dry and requiring priming.

Because pump maintains a constant pressure on the jets the motor load is constant, thus insuring longer life of motor.

Easy to Install and Service—Return inlet is located 8½ to 15½ inches above floor. In many installations it is possible to have water return by gravity, whereas with other pumps lift fittings or a pit would be required.

The use of standard motors permits replacement from local stocks when necessary.

All operating parts are readily accessible without dismantling unit.

Duplex Units—Duplex units consist of a single tank with one set of jet vacuum producers, one float switch, two pumps, two motors and two vacuum regulators. Each pump is valved so that access may be had to one pump without interrupting the operation of the other.

All standard pumps are adapted for pressures up to 20 pounds, except Nos. SV-0 and DV-0 which are designed for 10 pounds pressure. High pressure units or steam turbine drive can be furnished when desired.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Construction Details

Centrifugal Pump—All units of 16,000 square feet capacity and over have horizontal split case centrifugal pumps, which are fitted with enclosed type, double suction, non-overloading bronze impellers, carefully machined. Shaft is of alloy steel turned and ground all over.

Bearings are of renewable bronze ring oiling type mounted in large oil wells. Construction of bearing housings prevents escape of oil and excludes water and dust. Oil level cups and inspection holes are fitted with spring hinge covers.

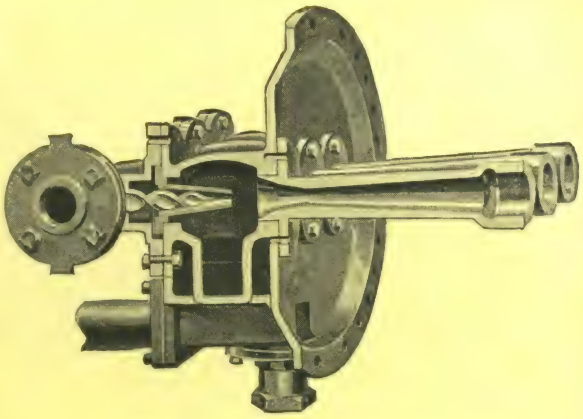
Pumps of 12,000 square feet capacity and under have vertically split volute pumps with enclosed bronze impellers, renewable bronze stand bearing and outboard ball bearing. All impellers are carefully balanced and hand filed on the interior to insure smooth, efficient operation.

Jet Vacuum Producer—Hoffman-Economy jet vacuum producer is extremely simple in construction and has been thoroughly tested both in the laboratory and in actual service. It consists of the manifold and body, into which are fitted brass pressure nozzles and the venturi discharge tubes. These parts are all flanged and bolted together. Multi-jets are used to increase capacity.

Tanks—Tanks are of a heavy gauge welded steel. Lower tank acts as a pedestal and serves as an accumulator, while upper tank holds the circulating water and controls the feeding of water to the boiler.

Lower tank has two compartments, one serving as a combined baffle and sediment chamber which removes all dirt and scale before reaching the accumulator chamber.

An underground auxiliary accumulator tank may be substituted for lift fittings where radiation or returns are below pump level.



Cross Section of Jet Vacuum Producer

Motors—Motors have liberal overload capacity and are guaranteed against a temperature rise greater than 40° when operating at full load.

Single phase 1 hp. 110 volts and 1½ hp. 220 volts motors and larger are equipped with magnetic contactors with thermal overloads. Smaller motors are controlled directly from float switch.

Polyphase motors of all sizes are equipped with thermal overload cutouts.

Magnetic contactors with overload and no voltage release are used in 2 hp. sizes and larger.

Smaller sizes are controlled directly by float switch.

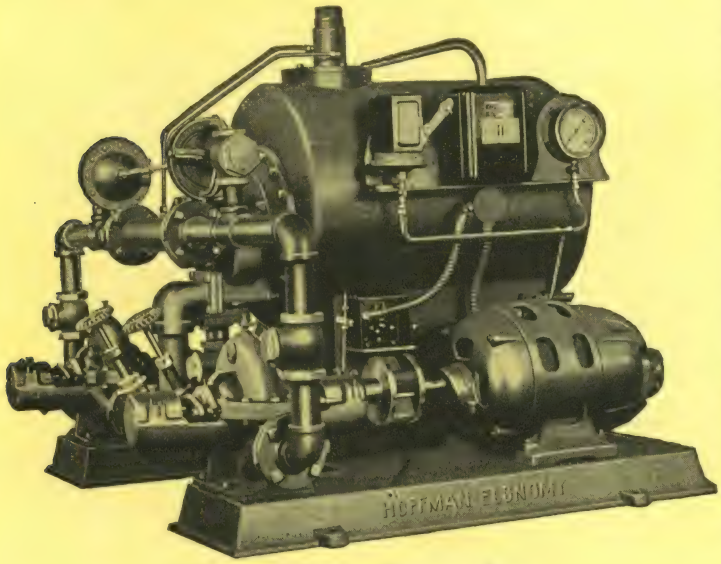
Direct current motors 1 hp. and over are equipped with automatic starter having overload protection. Smaller motors are controlled directly by float switch.

Connection between the smaller pumps and motors is by means of pin and strap type flexible couplings. In units requiring 7½ hp. or more, rubber bushing couplings are used.

Automatic Control — The automatic control supplied as standard equipment consists of automatic starter, double pole vacuum regulator and float switch, all of standard make enclosed type.

Automatic starters are used on large units so that vacuum regulators and float switches carry only pilot currents. All wiring conforms to National Electric Code.

Boiler Feed Control Valves—The diaphragm operated boiler feed valve is a single seated valve controlled by a pilot in the pump discharge. This valve closes tightly without water hammer and lasts indefinitely. All parts are readily accessible for inspection or cleaning.



Standard Duplex Vacuum Pump

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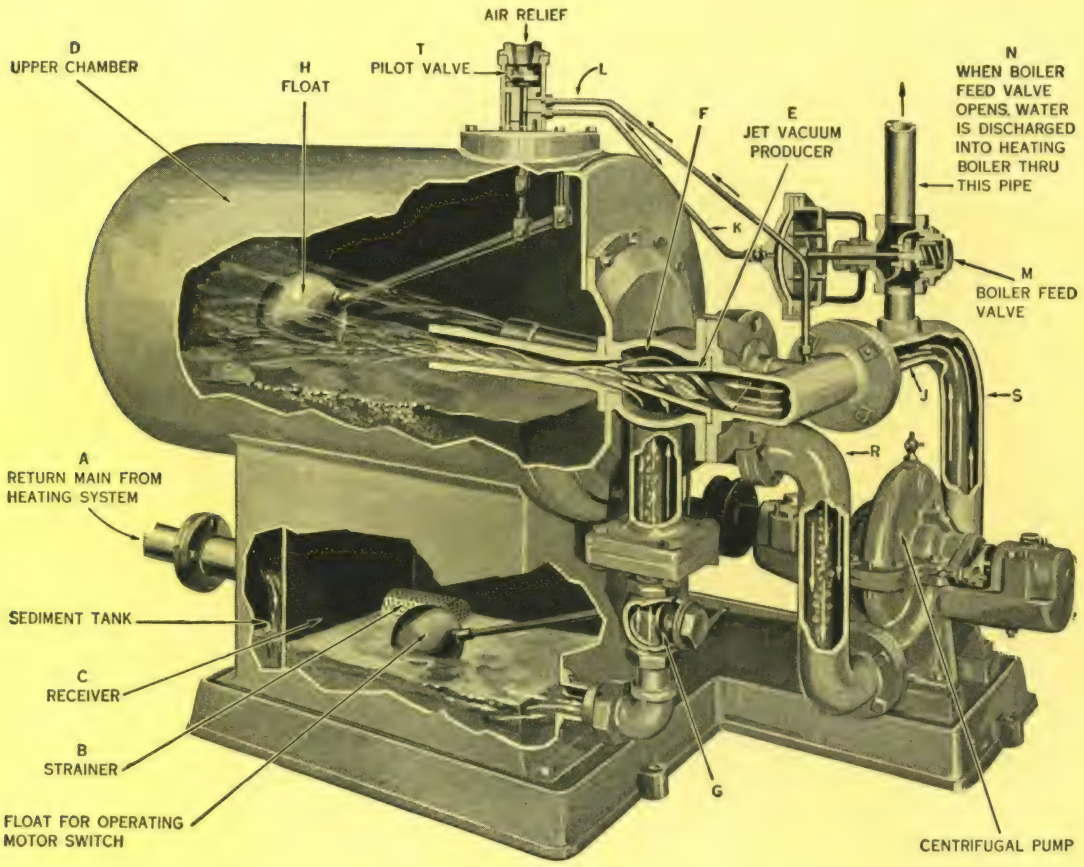
HOFFMAN-ECONOMY PUMPS



How Return Line Vacuum Pump Operates

Before starting pump, the upper chamber D should be half filled with water. The pump upon being started will circulate this water through circuit RSJ and by the discharge of water from jet E a partial vacuum is formed in chamber F, which lifts check G and permits air and condensation which has flowed through strainer B into receiver C to be lifted into upper chamber D.

If return main A is so located that condensation cannot flow into receiver C by gravity, vacuum is first created in C and the water is then drawn up from a lift pocket at the low point in the return.

When upper chamber D receives its full charge of water, float H rises, lifting pilot valve T and permitting the passage of water from line J (which is under approximately 30 pounds pressure) to pass through lines L to K to boiler feed valve M, which is opened and condensation is discharged through line N directly to boiler. When water in D recedes, pilot valve T is closed and, with pressure relieved from diaphragm in valve M, the boiler feed valve closes, remaining so until the cycle is repeated.

This operation continues until the required vacuum is obtained, when the automatic vacuum regulator* comes into action and stops the pump, provided the float switch* is in the off position. When vacuum in the system drops to the minimum setting or when sufficient condensation has collected in receiver C to operate float switch, the pump is again started.

If it is desired to operate the pump on float control only, the switch in the vacuum control circuit can be opened and the pump permitted to operate without maintaining any predetermined vacuum.

Because of the constant head pressure of cool water in upper chamber D and lines RSJ and the mixture of this cool water with the hot water flowing through check G, it will be readily seen why the Hoffman-Economy Pump handles hotter water than other vacuum pumps.

*Illustrated on page 24.

Tested and Guaranteed

Every Hoffman-Economy Vacuum Pump is carefully tested before shipment for capacity, pressure, etc. and permanent record retained at factory. Pump is guaranteed for capacity and against defects for a period of one year.

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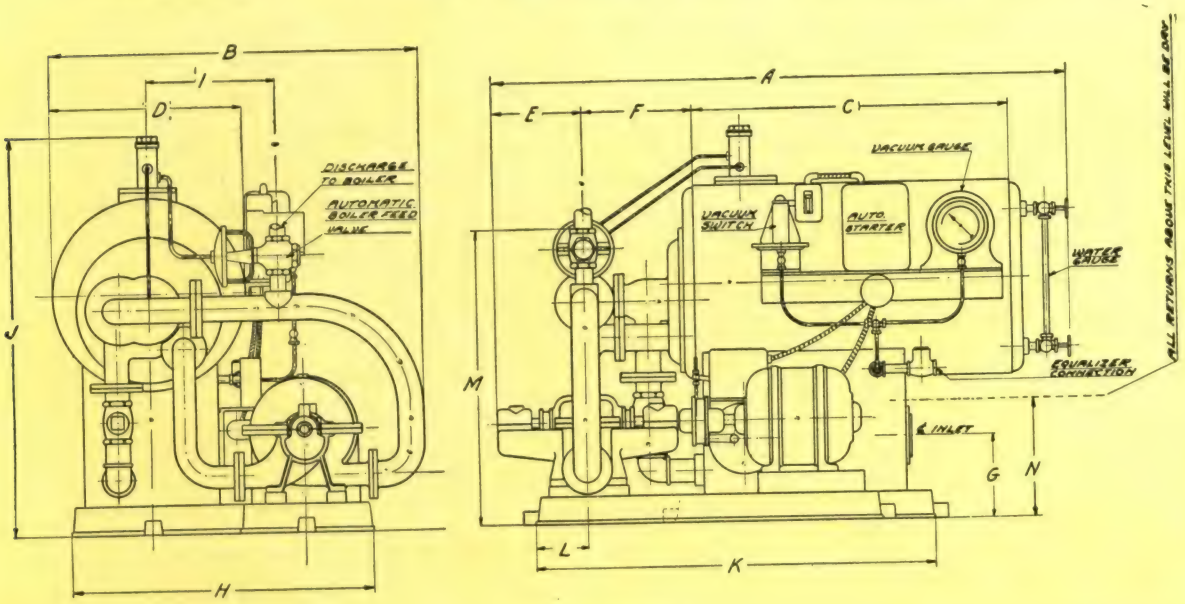
HOFFMAN-ECONOMY PUMPS

Table of Dimensions
Hoffman-Economy Return Line Vacuum Pumps



SINGLE PUMPS

Pump No.	Cap. sq. ft. direct cast iron radiation	Water cap. g.p.m.	Air cap. cu. ft. min.	Orifice size,* in.	Motor, hp.	Size discharge conn., in.	Size of return inlet, in.	Approx. shipping wt., lb.†	Dimensions in inches (These dimensions are approximate and must not be used for construction)													
									A	B	C	D	E	F	G	H	I	J	K	L	M	N
SV-0§	1,500	3	1	1/16	1/2	3/4	1 1/4	400	Furnished on application													
SV-1A	3,500	7	3	3/32	3/4	1	1 1/2	700	49 1/2	29	30	18	10 1/2	2	11 1/2	28	13	40	31		29	12
SV-2	5,000	9	3	7/64	1	1	1 1/2	750	49 1/2	29	30	18	10 1/2	2	11 1/2	28	13	40	31		29	12
SV-2A	7,000	13	4	1/8	1	1	2	750	49 1/2	29	30	18	10 1/2	2	11 1/2	28	13	40	31		29	12
SV-3A	12,000	18	7	11/64	1 1/2	1	2 1/2	950	56 1/2	39	30	20	9 1/2	12	8 1/2	31	13 1/2	41 1/2	45	6 1/2	29	12
SV-4	16,000	22	9	3/16	2	1 1/4	3	1025	56 1/2	39	30	20	9 1/2	12	8 1/2	31	13 1/2	41 1/2	45	6 1/2	31	12
SV-5	20,000	28	12	7/32	3	1 1/4	3	1150	58	46	30	24	10 1/2	12	9	37	18 1/2	46	50	7 1/2	33	12 1/2
SV-6	26,000	35	15	1/4	5	1 1/2	3	1300	58	46	30	24	10 1/2	12	9	37	18 1/2	46	50	7 1/2	33	12 1/2
SV-7	40,000	60	21	9/32	5	1 1/2	4	1550	64	47	36	26	10 1/2	12	11	37	18 1/2	48	50	7 1/2	34	13
SV-8	65,000	90	34	11/32	7 1/2	2	5	1800	69 1/2	52	42	28	10 1/2	12	11	41	21	54	57	7 1/4	41	14
SV-9	100,000	140	50	7/16	10	2 1/2	8	3100	78	64	54	36	11	12	15	48	23 1/2	66	62	8 1/2	52	18
SV-10	150,000	210	102	9/16-5/8	15	2 1/2	10	4000	84	72	60	42	11	12	15 1/2	54	25	72	70	9 1/2	58	18 1/2
SV-11	250,000	350	130	25/32	25	4	12	6000	Furnished on application													

*Size of sharp edge orifice in 1/8-in. plate through which pump maintains 10-in. vacuum.
†Weights of 25 cycle units will be approximately 33 1/3% in excess of weights listed.
§SV-0 discharge pressure, 10 lb.
Note: Dimensions are for 20-lb. pumps only. Dimensions of high pressure pumps furnished on application.

Auxiliary Accumulator Tanks for Use with Vacuum Pumps

In many installations where returns are brought back to the pump below floor level, it is desirable to operate the pump during the day under vacuum and float control, while at night the vacuum control is cut out. By using Hoffman-Economy Accumulator Tank it is possible to let condensation flow to tank by gravity and by means of a float control in tank operate the pump without maintaining a predetermined vacuum. The tank is made of cast iron, equipped with Float Control and Lift Fitting and may be placed so that cover will be flush with floor. In such installations the vacuum control on pump should be connected to the auxiliary tank or return before it enters the pump.

STANDARD SIZES

Tank size		Suitable for draining sq. ft. rad.	Capacity gallons per ft. depth	Approximate shipping weight, lb.
Diam., in.	Depth, in.			
16	30	12,000	10.4	350
20	30	20,000	16.3	500
24	30	26,000	23.4	650
30	36	40,000	36.6	1,000
30	48	65,000	36.6	1,200
36	48	100,000	53.0	1,600

Tanks longer than standard may be furnished in two sections. In such case, flanges are faced and bolts and gaskets furnished for assembly.

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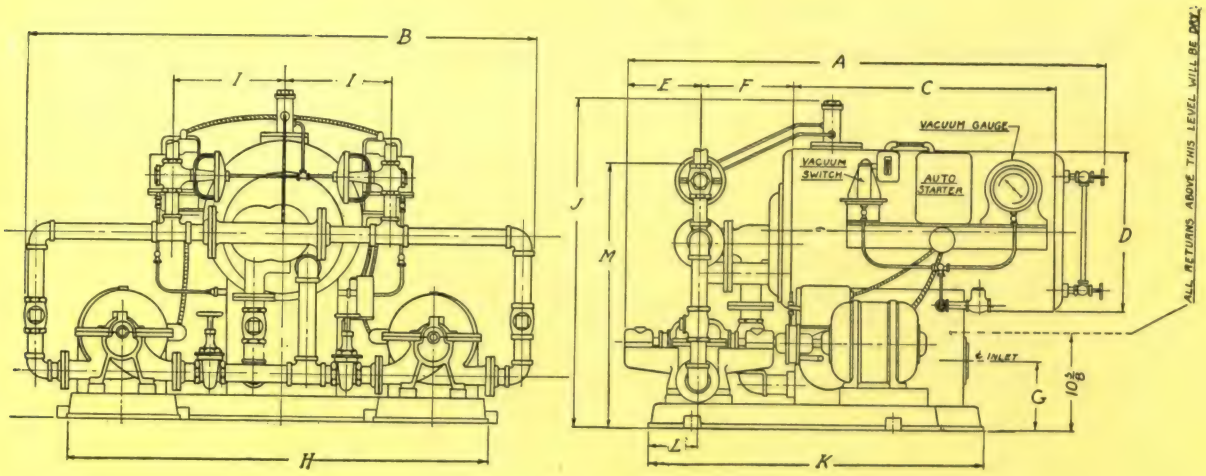
HOFFMAN-ECONOMY PUMPS



DUPLEX PUMPS

Pump No.	Cap. sq. ft. direct cast iron radiation	Water cap. g.p.m.	Air cap. cu. ft. min.	Orifice size,* in.	Motor, hp.	Size discharge conn., in.	Size of return inlet, in.	Approx. shipping wt., lb.†	Dimensions in inches (These dimensions are approximate and must not be used for construction)													
									A	B	C	D	E	F	G	H	I	J	K	L	M	N
DV-0§	1,500	3	1	1/16	1/2	3/4	1¼	800	Furnished on application													
DV-1A	3,500	7	3	3/32	3/4	1	1½	1200	50½	50	30	18	9½	4½	8	45½	‡	40	33	1½	29	12
DV-2	5,000	9	3	7/64	1	1	1½	1300	50½	50	30	18	9½	4½	8	45½	‡	40	33	1½	29	12
DV-2A	7,000	13	4	1/8	1	1	2	1300	50½	50	30	18	9½	4½	8	45½	‡	40	33	1½	29	12
DV-3A	12,000	18	7	11/64	1½	1	2½	1600	57	65½	30	20	9½	12	9	53½	13½	42	45¼	6	29½	12
DV-4	16,000	22	9	3/16	2	1¼	3	1800	57	65½	30	20	9½	12	9	53½	13½	42	45¼	6	31½	12
DV-5	20,000	28	12	7/32	3	1¼	3	2000	59	71½	30	24	10½	12	9½	57	18½	46½	48	6	33½	12½
DV-6	26,000	35	15	¼	5	1½	3	2280	59	71½	30	24	10½	12	9½	57	18½	46½	48	6	33½	12½
DV-7	40,000	60	21	9/32	5	1½	4	2700	65	73	36	26	10½	12	11½	57	18½	48½	48	6	34½	13
DV-8	65,000	90	34	11/32	7½	2	5	3150	70½	79½	42	28	10½	12	11½	64	21	54½	54¼	7½	41½	14
DV-9	100,000	140	50	7/16	10	2½	8	5420	79	95	54	36	11	12	15	75	23½	66½	59	8½	52½	18
DV-10	150,000	210	102	9/16-5/8	15	2½	10	7000	85	106	60	42	11	12	15½	85	25	72½	63	8¾	58½	18½
DV-11	250,000	350	130	23/32	25	4	12	10500	Furnished on application													

*Size of sharp edge orifice in ⅛-in. plate through which pump maintains 10-in. vacuum.
†Weights of 25 cycle units will be approximately 33⅓% in excess of weights listed.
‡Dimension I: On left hand side of receiver, 19¼ in.; on right hand side of receiver, 14⅞ in.
§DV-0 discharge pressure, 10 lb.
Note: Dimensions are for 20-lb. pumps only. Dimensions of high pressure pumps furnished on application.

Suggested Specification for Vacuum Pump

Install where indicated on plans a Hoffman-Economy Vacuum Pump type.....having a capacity of.....square feet of direct cast iron radiation or equivalent and capable of discharging against a pressure of 20 pounds per square inch (maximum pressure for standard pumps; special pumps furnished for pressures above 20 pounds per square inch) at the pump. The unit shall consist of a double chamber, horizontal, welded steel receiving tank with float switch and strainer installed in lower part. Receiving tank shall be so constructed that water will not overflow in the event of current failure. Unit shall be equipped with adjustable vacuum control. Motor shall be continuous rated 40 degrees for.....volts..... phase.....cycle alternating current (or..... volts direct current) and shall have a speed not in excess of 1750 r.p.m. and shall be direct connected to a horizontal bronze fitted centrifugal pump by a flexible coupling. Entire unit shall be assembled on a cast iron base ready for installation.

Where auxiliary accumulator tank is required add:

Install where indicated with cover flush with floor one....in. x ....in. Cast Iron Auxiliary Accumulator Tank complete with float switch and lift fitting connecting to pump in manner approved by manufacturer.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Information for Installing Hoffman-Economy Return Line Vacuum Pumps

Setting—Unit should be placed on firm foundation, carefully levelled and evenly supported. Alignment of flexible coupling between motor and pump should be checked.

Return Lines—If possible, have return line above inlet connection on accumulator chamber so that condensate will flow to pump by gravity. This allows pump to be operated on float control only in mild weather or when fires are banked. Condensate can be lifted a considerable height, but lifts should be avoided whenever possible.

If operating with float control only, vacuum will be created during pumping operations, but amount of vacuum will be less than when vacuum control is used.

When return mains come back under floor, an auxiliary accumulator tank is installed with top flush with floor and with connections as illustrated below.

When operated with vacuum control, the pump will elevate condensate from lift pockets in return lines.

On all installations a gate valve should be installed in the return line and provision made for drain to sewer.

Equalizer Connection—An outlet with check valve is provided for equalizer connection to steam header. The purpose of this connection is to equalize vacuum in system and accumulator and prevent condensate from remaining in return lines during night operation or other period when no steam pressure is carried.

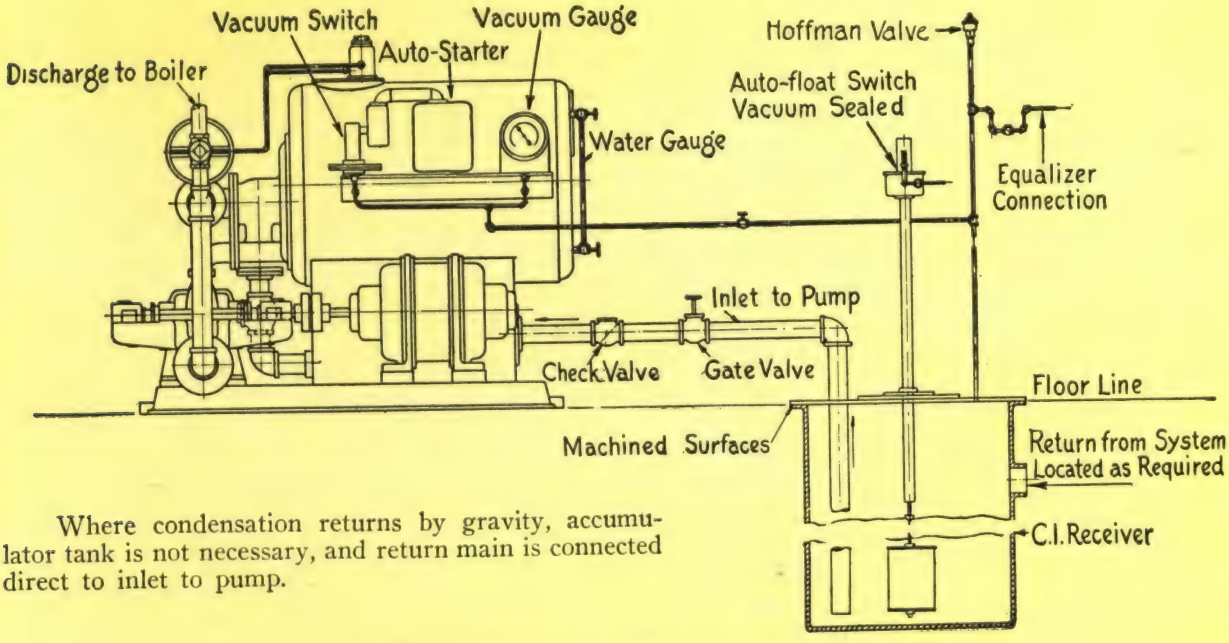
On high pressure or central station jobs, install vent pipe with check valve several feet above return line. Omit connection to header.

Setting of Vacuum Regulators—Vacuum regulators are set at factory to cut in at 3 inches and out at 7 to 8 inches unless otherwise specified. This adjustment may readily be changed after installation.

Information Required with Order

In ordering Hoffman-Economy Return Line Vacuum Pumps, the following information should be furnished.

1. Square feet of direct cast iron radiation or equivalent. (Each foot of Vento, Super-Fin or other blast coil should be figured as the equivalent of 5 to 6 feet of direct radiation).
2. Electric current available—one, two or three phase, number of cycles and volts if alternating current; or voltage only if direct current.
3. Boiler pressure—safety valve setting.
4. Difference in elevation between pump and boiler water line with size and length of intervening piping.



Where condensation returns by gravity, accumulator tank is not necessary, and return main is connected direct to inlet to pump.

Installation Diagram of Return Line Vacuum Pump

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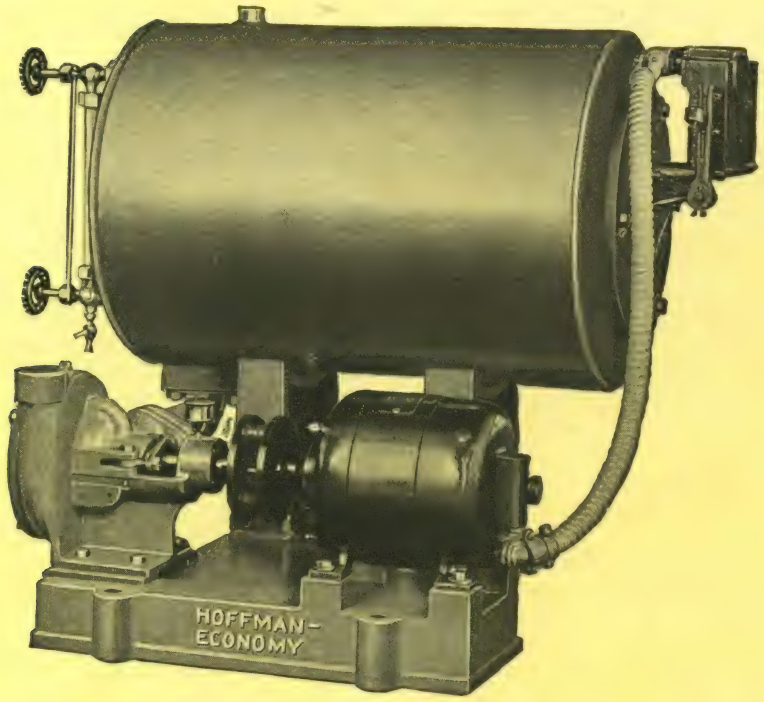
HOFFMAN-ECONOMY PUMPS



Hoffman-Economy Horizontal Condensation Pumps and Receivers

Single and Duplex Units

Horizontal condensation pumps and receivers are used on gravity heating systems and are adapted for all kinds of industrial and commercial installations where condensate will drain to the horizontal receiver.

Hoffman-Economy Horizontal Condensation Pumps and Receivers are carefully designed, sturdily constructed and built to give continued high operating efficiency even after years of service.

Automatic float switch assembly is simple and positive. Pumps are bronze fitted throughout and especially adapted for operation at the high temperatures encountered in condensation pump service.

The entire unit, consisting of pump, motor, tank and tank trimmings, is compactly assembled on a single cast iron base having machined pads to insure perfect alignment.

Improved pump performance makes possible the use of comparatively small motors and consequent low consumption of electric power.

Tested and Guaranteed—Every Hoffman-Economy Condensation Pump and Receiver is carefully tested before shipment for capacity, pressure, etc., and a permanent record retained at the factory. Pump is guaranteed for capacity and against defects for a period of one year.

Low Pressure Units—All low pressure units (0 to 20 pounds per square inch) are furnished in Style "A," and with speeds of 1750 or 1440 r.p.m., according to current available.

Medium and High Pressure Units—Medium and high pressure units (35 to 100 pounds per square inch) are made in Style "B," Style "C" and Style "D." (See table of sizes on pages 33 and 35.) Speeds are 1750 r.p.m. and 3500 r.p.m. For apartment houses, office buildings, etc., where extreme quietness of operation is desired, 1750 r.p.m. units should be selected.

Duplex Units—Consisting of two pumps and motors with a single tank and float switch control, mounted on one base can be furnished when desired.

Motors—Standard motors are used on all units, thus permitting easy replacement without waiting for factory shipment. Motors have 40° continuous temperature rating and are liberally selected to provide ample overload capacity.

Single phase motors 1 hp., 110 volts and 1½ hp., 220 volts and larger, are equipped with magnetic contactors with thermal overloads. Smaller motors are controlled directly from float switch.

Polyphase motors of all sizes are equipped with thermal overload cutouts. Magnetic contactors with overload and no voltage release

Continued on next page

HOFFMAN-ECONOMY PUMPS

are used in sizes 2 hp. and larger. Smaller sizes are controlled directly by float switch.

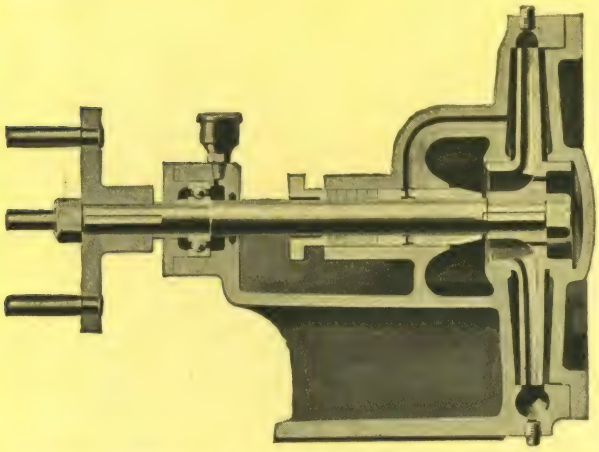
Direct current motors 1 hp. and over have an automatic starter with overload protection. Smaller motors are controlled directly by float switch.

All wiring between automatic controls and motors is carried in flexible metallic conduits.

Pump—All units are equipped with highly efficient, bronze fitted, enclosed impeller centrifugal pumps, especially adapted for operation at the high temperatures encountered in condensation pump service. Pumps have accurately balanced bronze impeller, heavy turned and ground steel shaft and water sealed packing box with bronze gland.

Styles "A," "B" and "C" pumps have vertically split case; Style "D" has horizontally split case.

Style "A" pumps have outboard ball bearing and self-lubricating, renewable bronze stand bearing.



Cross Section of Style "A" Condensation Pump

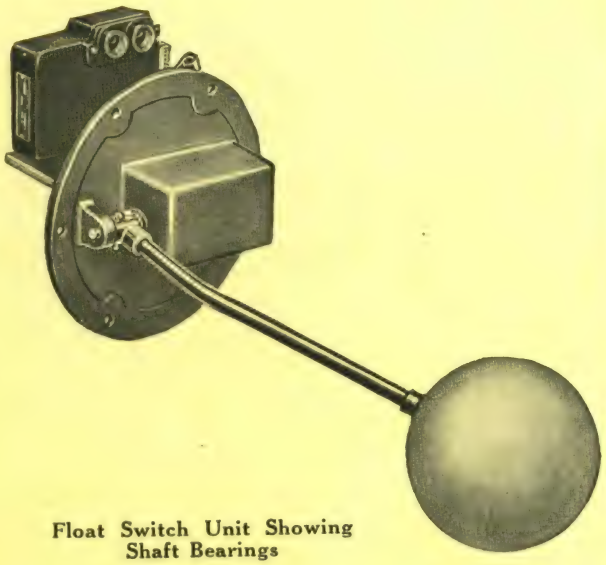
Styles "B" and "C" have double outboard bearings, ring oiling at driving end and ball bearing at opposite end. Both bearings are readily renewable.

Style "D" has double outboard ring oiling bearings; both may easily be renewed if necessary.

Pumps are connected with motor by flexible shaft coupling.

Base Plate—Base plate is of cast iron, heavily ribbed to prevent distortion and to permit bolting to floor without special foundation. Pump and motor are aligned on machined pads and are securely attached to base with cap screws. The cast iron feet on which receiver is mounted are bolted to the base.

Receiver—Receiver is of heavy gauge welded steel securely attached to cast iron feet by anchor bolts welded to the shell. Connection between receiver and pump is arranged to permit expansion.



Float Switch Unit Showing Shaft Bearings

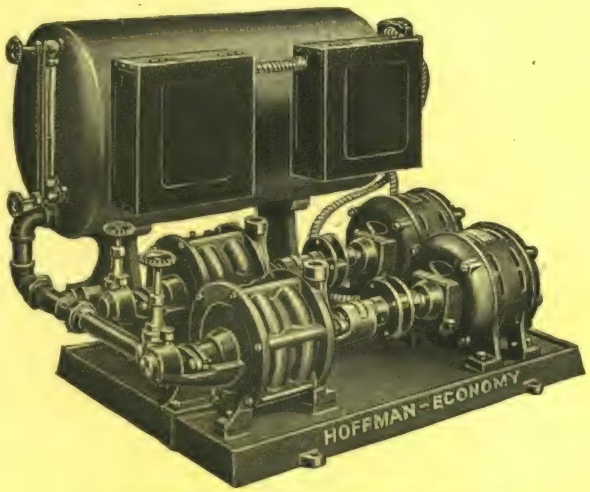
Cast iron receivers can be furnished, if desired, at slight additional cost; but because of lighter weight, standard steel receivers are recommended.

Float Switch Mechanism—Float switch is positive and dependable in starting the motor when condensation collects in receiver. Mechanism can be removed as a unit and is easily adjustable to individual conditions.

Bronze float shaft is firmly supported by two liberal bearings, reducing danger of sticking or binding.

Float switch and operating mechanism are mounted on a cast iron tank head attached to receiver. Float is made of seamless copper tested under high pressure.

The switch itself is an especially constructed spring loaded type, having wiping contacts with double break, designed to prevent arcing.



Standard Duplex Condensation Pump

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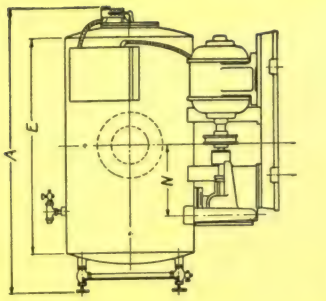
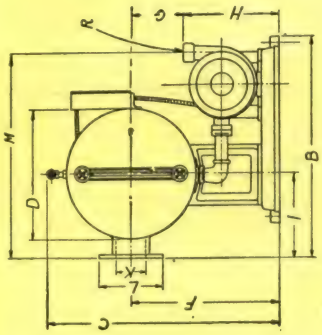
HOFFMAN-ECONOMY PUMPS

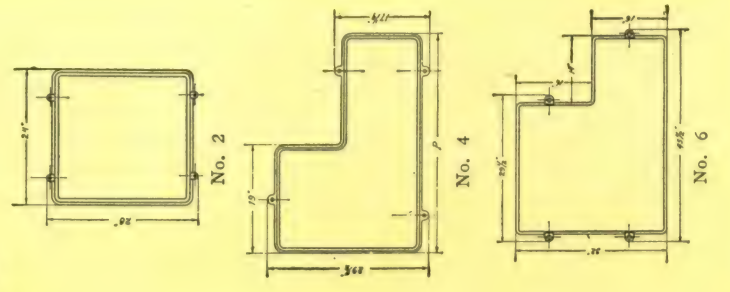
DIMENSION DIAGRAMS

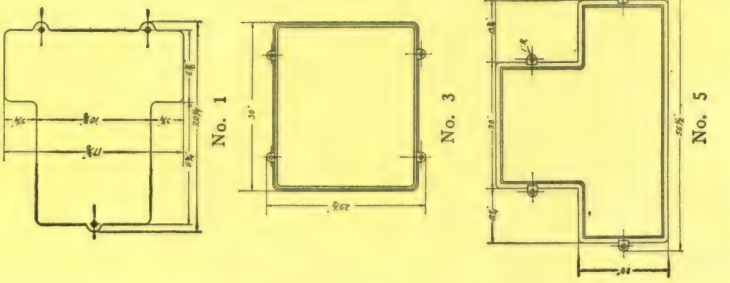
Condensation Pumps Equipped with 110-220-440 Volt—60 Cycle—Single or Polyphase Motors and 110-220 Volt Direct Current Motors



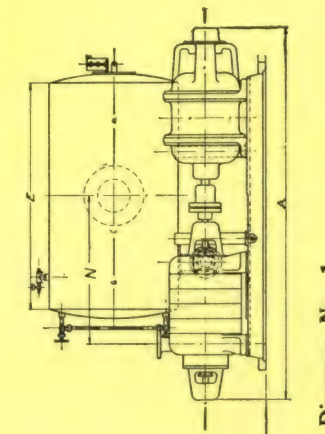
Dimension Diagram No. 4



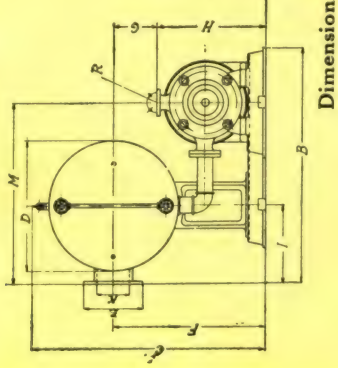


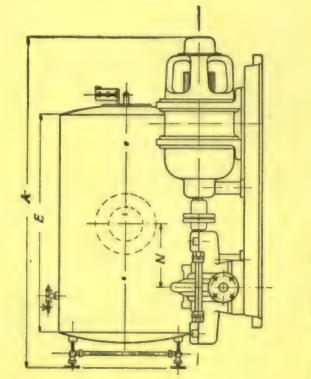


Base Diagrams

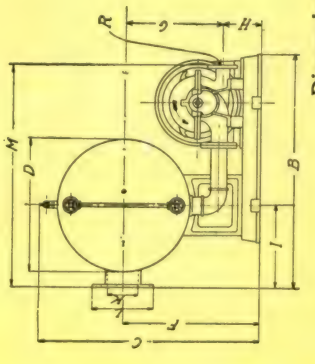


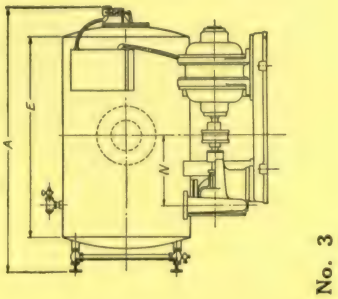
Dimension Diagram No. 1



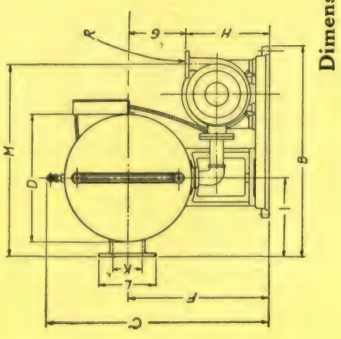


Dimension Diagram No. 2





Dimension Diagram No. 3



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CAPACITIES AND DIMENSIONS

CONDENSATION PUMPS EQUIPPED WITH 110-220-440 VOLT—60 CYCLE—SINGLE OR POLYPHASE MOTORS AND DIRECT CURRENT MOTORS

Pump and Style No.	Capacity, sq. ft. direct c. rad. or equiv.	Capacity, lbs. condensate per hr.*	Discharge pressure, lbs. per sq. in.	Pump capacity,* g. p. m.	Motor hp.	Capacity receiver, gal.	Speed, r.p.m.	Approximate shipping weight, lb.	Dimensions—These dimensions are approximate. Not to be used for construction																		
									Dimension diagr'm	Base diagr'm	A	B	C	D	E	F	G	H	I	K	L	M	N	P	R	No. stages
10A	1,000	250	10	2	¼	10	1,750	250	Fig. 3	Fig. 1	30	25	26	13	18	15½	5¼	10¼	9	2	Cplg.	23⅝	8½	.....	1	1
30A	3,000	750	10	5	¼	13	1,750	250	3	1	32	25½	27	14	20	16	5¾	10¼	9½	2	Cplg.	24⅛	8½	.....	1	1
31A	3,000	750	15	5	½	13	1,750	340	3	2	31	29½	29½	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
32A	3,000	750	20	5	¾	13	1,750	430	3	2	31	29½	29½	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
60A	6,000	1,500	10	12	¼	20	1,750	275	3	1	42	25½	27	14	30	16	5¾	10¼	9½	3	Cplg.	24⅛	8½	.....	1	1
61A	6,000	1,500	15	12	½	20	1,750	360	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
62A	6,000	1,500	20	12	¾	20	1,750	450	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
64B	6,000	1,500	30	12	1	20	1,750	550	4	4	45	31	30	14	30	19¾	5½	14¼	9½	3	Cplg.	24½	3	35	1	2
65B	6,000	1,500	40	12	1½	20	1,750	650	4	4	51	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	3	40½	1	3
65C	6,000	1,500	40	12	1½	20	3,500	525	4	4	42	31	30	14	30	19¾	5½	14¼	9½	3	Cplg.	24½	5¾	35	1	1
66B	6,000	1,500	50	12	2	20	1,750	650	4	4	52	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	¼	40½	1	3
66C	6,000	1,500	50	12	2	20	3,500	550	4	4	44	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	5¾	35	1	1
67B	6,000	1,500	60	12	3	20	1,750	750	4	4	57	31	30	14	30	19¾	4¼	15½	9½	3	Cplg.	24½	2½	40½	1	4
67C	6,000	1,500	60	12	3	20	3,500	600	4	4	45	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	5¾	35	1	1
68C	6,000	1,500	75	12	3	20	3,500	650	4	4	48	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	3	35	1	2
69C	6,000	1,500	100	12	5	20	3,500	700	4	4	51	31	30	14	30	19¾	4¼	15¼	9½	3	Cplg.	24½	3	35	1	2
100A	10,000	2,500	10	20	¼	26	1,750	290	3	1	42	26½	29	16	30	17	6¾	10¼	10½	3½	8½	25⅛	8½	.....	1	1
101A	10,000	2,500	15	20	½	26	1,750	375	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
102A	10,000	2,500	20	20	¾	26	1,750	475	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
103B	10,000	2,500	25	20	1	26	1,750	625	4	4	45	32	33	16	30	20¾	6½	14¼	10½	3½	8½	25½	3	35	1	2
104B	10,000	2,500	30	20	1½	26	1,750	650	4	4	48	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	3	35	1	2
105B	10,000	2,500	40	20	1½	26	1,750	675	4	4	51	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
105C	10,000	2,500	40	20	1½	26	3,500	550	4	4	42	32	33	16	30	20¾	6½	14¼	10½	3½	8½	25½	5¾	35	1	1
106B	10,000	2,500	50	20	2	26	1,750	700	4	4	52	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
106C	10,000	2,500	50	20	2	26	3,500	600	4	4	44	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	5¾	35	1	1
107B	10,000	2,500	60	20	3	26	1,750	775	4	4	57	32	33	16	30	20¾	5¼	15½	10½	3½	8½	25½	2½	40½	1	4
107C	10,000	2,500	60	20	3	26	3,500	650	4	4	45	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	5¾	35	1	1
109C	10,000	2,500	100	20	5	26	3,500	750	4	4	51	32	33	16	30	20¾	5¼	15¼	10½	3½	8½	25½	3	35	1	2
151A	15,000	3,750	15	30	½	33	1,750	400	3	2	41	31½	34½	18	30	21¼	8⅛	13⅛	11½	4	9	28½	9¾	.....	1½	1
152A	15,000	3,750	20	30	¾	33	1,750	525	3	2	41	31½	34½	18	30	21¼	8⅛	13⅛	11½	4	9	28½	9¾	.....	1½	1
153B	15,000	3,750	25	30	1	33	1,750	675	4	4	45	33	35	18	30	21¾	7½	14¼	11½	4	9	26½	3½	35	1	2
155B	15,000	3,750	40	30	2	33	1,750	750	4	4	52	33	35	18	30	21¾	7	14¾	11½	4	9	26½	¾	40½	1	3
155C	15,000	3,750	40	30	2	33	3,500	650	4	4	44	33	35	18	30	21¾	7	14¾	11½	4	9	26½	6¼	35	1	1
157B	15,000	3,750	60	30	3	33	1,750	825	4	4	57	33	35	18	30	21¾	6¼	15½	11½	4	9	26½	2	40½	1	4
157C	15,000	3,750	60	30	3	33	3,500	700	4	4	48	33	35	18	30	21¾	7	14¾	11½	4	9	26½	3½	35	1	2
159C	15,000	3,750	100	30	5	33	3,500	775	4	4	51	33	35	18	30	21¾	6¼	15⅛	11⅛	4	9	26½	3½	35	1	2
200A	20,000	5,000	10	40	½	41	1,750	425	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
201A	20,000	5,000	15	40	¾	41	1,750	450	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
202A	20,000	5,000	20	40	1	41	1,750	550	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
203B	20,000	5,000	25	40	1½	41	1,750	675	4	4	48	34	37	20	30	22¾	8	14¾	12½	4	9	27½	3½	35	1	2
205B	20,000	5,000	40	40	2	41	1,750	750	4	4	52	34	37	20	30	22¾	8	14¾	12½	4	9	27½	¾	40½	1	3
205C	20,000	5,000	40	40	2	41	3,500	650	4	4	44	34	37	20	30	22¾	8	14¾	12½	4	9	27½	6¼	35	1	1
207B	20,000	5,000	60	40	3	41	1,750	625	4	4	57	34	37	20	30	22¾	7¼	15½	12½	4	9	27½	2	40½	1	4
207C	20,000	5,000	60	40	3	41	3,500	700	4	4	48	34	37	20	30	22¾	8	14¾	12½	4	9	27½	3½	35	1	2
209C	20,000	5,000	100	40	5	41	3,500	775	4	4	52	34	37	20	30	22¾	7¼	15½	12½	4	9	27½	¾	40½	1	3
300A	30,000	7,550	10	53	½	49	1,750	500	3	2	48	32½	37½	20	36	24¼	11⅛	13⅛	12½	5	10	29½	12	.....	1½	1
301A	30,000	7,550	15	53	¾	49	1,750	525	3	2	48	32½	36½	20	36	24¼	11⅛	13⅛	12½	5	10	29½	12	.....	1½	1
302A	30,000	7,550	20	53	1	49	1,750	630	3	2	48	32½	36½	20	36	24¼	11⅛	13⅛	12½	5	10	29½	12	.....	1½	1
303A	30,000	7,550	25	53	1½	49	1,750	725	4	3	45	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2" Flg.	1
304A	30,000	7,550	30	53	2	49	1,750	760	4	3	46	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2" Flg.	1
307C	30,000	7,550	60	53	5	49	3,500	1,150	2	6	52	37⅛	36¾	20	36	23¾	17⅜	6⅜	12⅛	5	10	36½	10½	.....	1½ Flg.	1
308C	30,000	7,550	75	53	7½	49	1,750	1,260	1	5	60	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	20¼	.....	1½ Flg.	3
309B	30,000	7,550	100	53	10	49	1,750	1,550	1	5	63	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	20¼	.....	2" Flg.	1
400A	40,000	10,000	10	80	1	59	1,750	725	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
402A	40,000	10,000	20	80	1½	59	1,750	750	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
403A	40,000	10,000	25	80	2	59	1,750	800	4	3	46	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
404A	40,000	10,000	30	80	3	59	1,750	850	4	3	48	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
407D	40,000	10,000	60	80	5	59	3,500	1,400	2	6	52	38½	3 ⁷⁄₈	22	36	24¾	18⅜	6⅜	13½	5	10	37½	10½	.....	1½ Flg.	1
408D	40,000	10,000	75	80	7½	59	3,500	1,400	2	6	55	38½	38¾	22	36	24¾	18⅜	6⅜	13½	5	10	37½	10½	.....	1½ Flg.	1
409B	40,000	10,000	100	80	10	59	1,750	1,550	1	5	63	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	20¼	.....	1½ Flg.	3
700A	70,000	17,500	10	135	2	82	1,750	900	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2" Flg.	1
703A	70,000	17,500	25	135	3	82	1,750	1,000	4	3	49	36	40	24	42	24¼	10	14¼	14½	6	11	32⅛	14¼	.....	2" Flg.	1
705D	70,000	17,500	40	135	7½	82	1,750	1,300	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2" Flg.	1
708D	70,000	17,500	75	135	10	82	3,500	1,400	2	6	63	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	22¼	.....	1½ Flg.	3
709B	70,000	17,500	100	135	10	82	1,750	2,100	1	5	67	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	25	.....	1½ Flg.	4

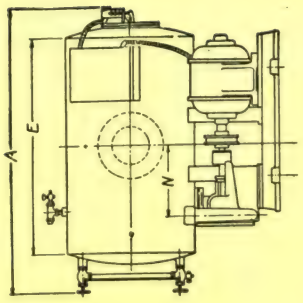
*As an indication of the conservative rating of Hoffman-Economy Pumps—the capacity under continuous operation is four times that given in table.
Where extreme quietness of operation is required select pumps of 1750 r.p.m. instead of 3500 r.p.m. motor speed.

Continued on next page

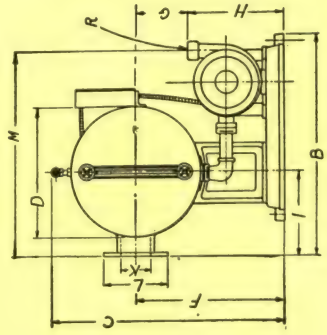
HOFFMAN-ECONOMY PUMPS

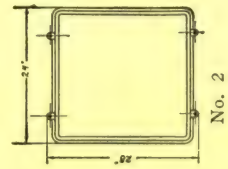
DIMENSION DIAGRAMS

Condensation Pumps Equipped with 110-220-440 Volt, 25 or 50 Cycle, Single or Polyphase Motors



Dimension Diagram No. 4





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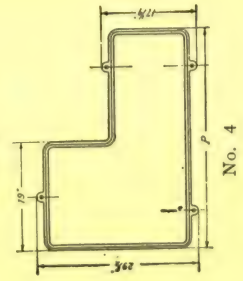

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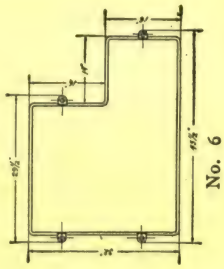

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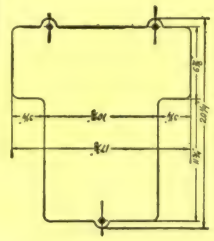

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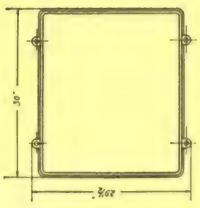

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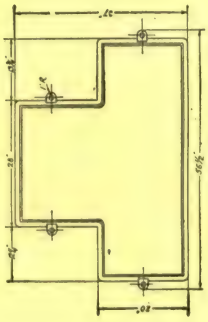
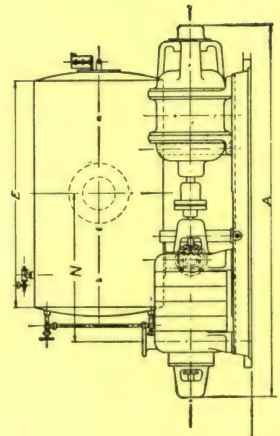


No. 5

Base Diagrams



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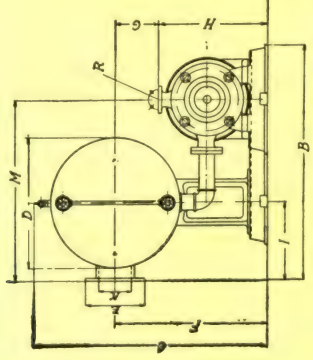

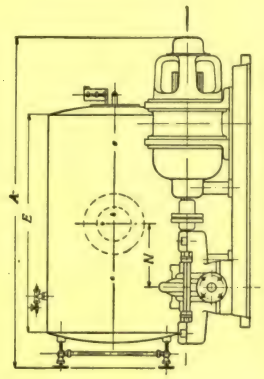

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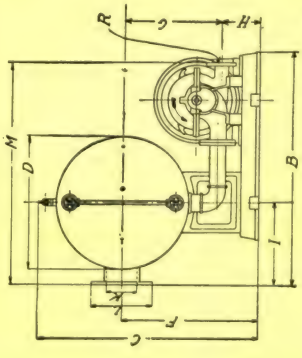

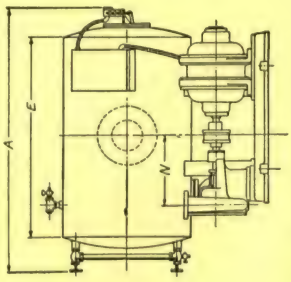

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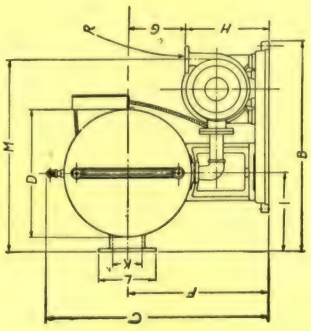

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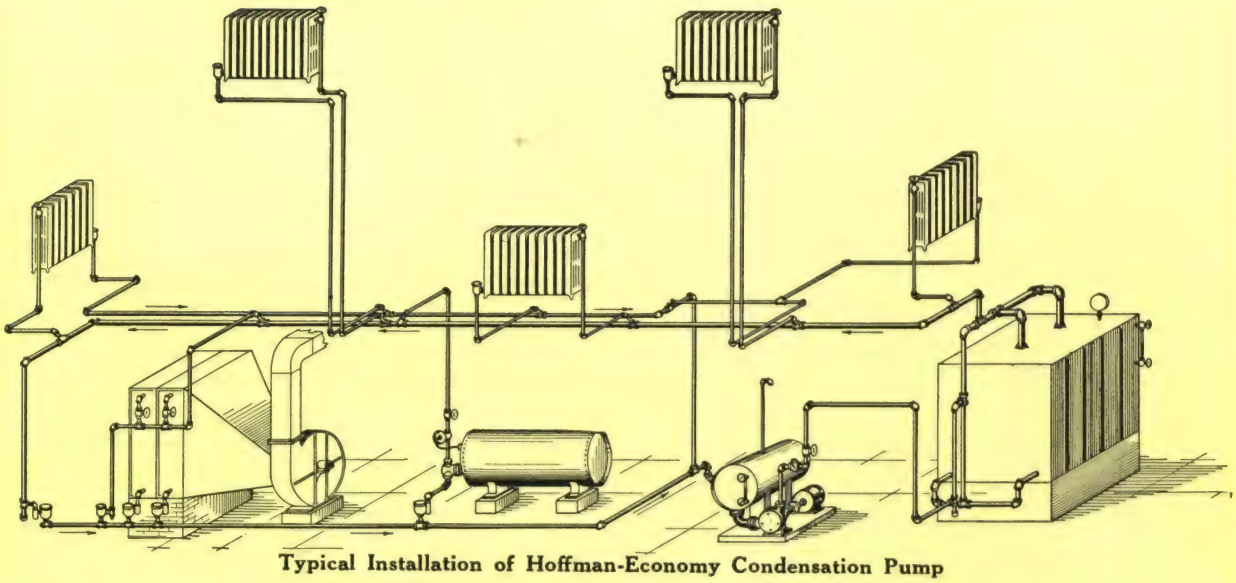
CAPACITIES AND DIMENSIONS
CONDENSATION PUMPS EQUIPPED WITH 110-220-440 VOLT—25 OR 50 CYCLE—SINGLE OR POLYPHASE MOTORS

Pump and Style No.	Capacity, sq. ft. direct c. i. rad. or equiv.	Capacity, lbs. condensate per hr.*	Discharge pressure, lbs. per sq. in.	Pump capacity, g. p. m.*	Motor hp.†	Capacity receiver, gal.	Speed, r.p.m.	Approximate shipping weight, lb.	Dimensions—These dimensions are approximate. Not to be used for construction																		
									Dimension diagr'm	Base diagr'm	A	B	C	D	E	F	G	H	I	K	L	M	N	P	R	No. stages
10A	1,000	250	10	2	¼	10	1,450	330	Fig. 3	Fig. 2	30	28½	28¾	13	18	18¾	5⅝	13⅛	9	2	Cplg.	26	9¼	.....	1½	1
30A	3,000	750	10	5	½	13	1,450	330	3	2	31	29½	29¼	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
31A	3,000	750	15	5	½	13	1,450	450	3	2	31	29½	29¼	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
32A	3,000	750	20	5	¾	13	1,450	570	4	4	41	28	30	14	20	18	5	13	9½	2	Cplg.	24¼	2½	35	1'	2
60A	6,000	1,500	10	12	¼	20	1,450	365	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
61A	6,000	1,500	15	12	½	20	1,450	480	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
62A	6,000	1,500	20	12	¾	20	1,450	600	4	4	45	31	30	14	30	19¾	5½	14¼	9½	3	Cplg.	24½	3	35	1'	2
64B	6,000	1,500	30	12	1	20	1,450	730	4	4	51	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	¼	40½	1'	3
65B	6,000	1,500	40	12	1½	20	1,450	865	4	4	57	31	30	14	30	19¾	4¼	15½	9½	3	Cplg.	24½	2½	40½	1	4
66B	6,000	1,500	50	12	2	20	1,450	865	4	4	63	32	34	14	30	21½	5½	16	9½	3	Cplg.	25½	5½	50	1	5
67B	6,000	1,500	60	12	3	20	1,450	1,000	4	4	68	32	35	14	30	22½	5½	17	9½	3	Cplg.	25½	8¼	50	1	6
100A	10,000	2,500	10	20	¼	26	1,450	385	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
101A	10,000	2,500	15	20	½	26	1,450	500	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
102A	10,000	2,500	20	20	¾	26	1,450	630	4	4	45	32	33	16	30	20¾	6½	14¼	10½	3½	8½	25½	3	35	1	2
103B	10,000	2,500	25	20	1	26	1,450	830	4	4	51	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
104B	10,000	2,500	30	20	1½	26	1,450	865	4	4	51	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
105B	10,000	2,500	40	20	1½	26	1,450	900	4	4	57	32	33	16	30	20¾	5¼	15½	10½	3½	8½	25½	2½	40½	1	4
106B	10,000	2,500	50	20	2	26	1,450	930	4	4	63	33	35	16	30	22½	6½	16	10½	3½	8½	26½	5½	50	1	5
107B	10,000	2,500	60	20	3	26	1,450	1,030	4	4	68	33	36	16	30	23½	6½	17	10½	3½	8½	25½	8¼	50	1	6
151A	15,000	3,750	15	30	½	33	1,450	530	3	2	41	31½	34½	18	30	21¼	8⅛	13⅛	11½	4	9	28½	9¾	.....	1½	1
152A	15,000	3,750	20	30	¾	33	1,450	700	4	3	44	33	36	18	30	21¼	6¾	14½	11½	4	9	29⅛	10	30	2 Flg.	1
153B	15,000	3,750	25	30	1	33	1,450	900	4	4	52	33	35	18	30	21¾	7	14¾	11½	4	9	26½	¾	40½	1	3
155B	15,000	3,750	40	30	2	33	1,450	1,000	4	4	57	33	35	18	30	21¾	6¼	15½	11½	4	9	25½	2	40½	1	4
157B	15,000	3,750	60	30	3	33	1,450	1,100	4	4	68	34	37	18	30	24½	7½	17	11½	4	9	27½	7¾	50	1	6
200A	20,000	5,000	10	40	½	41	1,450	565	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
201A	20,000	5,000	15	40	¾	41	1,450	600	4	3	45	33	36	20	30	22¼	8	14¼	12½	4	9	30⅛	10	.....	2 Flg.	1
202A	20,000	5,000	20	40	1	41	1,450	730	4	3	45	34	36	20	30	22¼	8	14¼	12½	4	9	30⅛	10	.....	2 Flg.	1
203B	20,000	5,000	25	40	1½	41	1,450	900	4	4	52	34	37	20	30	22¾	8	14¾	12½	4	9	27½	¾	40½	1	3
205B	20,000	5,000	40	40	2	41	1,450	1,000	4	4	57	34	37	20	30	22¾	7¼	15½	12½	4	9	27½	2	40½	1	4
207B	20,000	5,000	60	40	3	41	1,450	830	4	4	68	35	38	20	30	24½	7½	17	12½	4	9	28½	7¾	50	1	6
208B	20,000	5,000	75	40	5	41	1,450	1,600	1	5	68	41½	39	20	30	26	5¾	20¼	12½	4	9	31½	20¾	.....	1½ Flg.	4
209C	20,000	5,000	100	40	5	41	1,450	1,030	1	5	68	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	25¾	.....	1½ Flg.	5
300A	30,000	7,550	10	53	½	49	1,450	665	3	2	48	32½	37½	20	36	24¼	11⅛	13⅛	12½	5	10	29½	12	.....	1½	1
301A	30,000	7,550	15	53	¾	49	1,450	700	4	3	45	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2 Flg.	1
302A	30,000	7,550	20	53	1	49	1,450	835	4	3	45	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2 Flg.	1
303A	30,000	7,550	25	53	1½	49	1,450	970	1	5	52	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	17½	.....	1½ Flg.	2
304A	30,000	7,550	30	53	2	49	1,450	1,010	1	5	57	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	17½	.....	1½ Flg.	2
306B	30,000	7,550	50	53	3	49	1,450	1,860	1	5	65	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	20¼	.....	1½ Flg.	3
308C	30,000	7,550	75	53	7½	49	1,450	1,680	1	5	68	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	23	.....	1½ Flg.	4
309B	30,000	7,550	100	53	10	49	1,450	2,060	1	5	68	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	25¾	.....	1½ Flg.	5
400A	40,000	10,000	10	80	1	59	1,450	965	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2 Flg.	1
402A	40,000	10,000	20	80	1½	59	1,450	1,000	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2 Flg.	1
403A	40,000	10,000	25	80	2	59	1,450	1,060	1	5	58	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	17½	.....	1½ Flg.	2
404A	40,000	10,000	30	80	3	59	1,450	1,130	1	5	58	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	17½	.....	1½ Flg.	2
407D	40,000	10,000	60	80	5	59	1,450	1,860	1	5	65	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	20¼	.....	1½ Flg.	3
408D	40,000	10,000	75	80	7½	59	1,450	1,860	1	5	66	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	23	.....	1½ Flg.	4
409B	40,000	10,000	100	80	10	59	1,450	2,060	1	5	69	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	25¾	.....	1½ Flg.	5
700A	70,000	17,500	10	135	2	82	1,450	1,200	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2 Flg.	1
701A	70,000	17,500	15	135	2	82	1,450	1,860	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2 Flg.	1
703A	70,000	17,500	25	135	3	82	1,450	1,335	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2 Flg.	1
705D	70,000	17,500	40	135	7½	82	1,450	1,730	1	5	65	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	25	.....	1½ Flg.	3
708D	70,000	17,500	75	135	10	82	1,450	1,860	2	6	69	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	27¾	.....	1½ Flg.	5

*As an indication of the conservative rating of Hoffman-Economy Pumps—the capacity under continuous operation is four times that given in table.
†Horsepower of 25-cycle motors may vary somewhat from those shown in table.

Continued on next page

HOFFMAN-ECONOMY PUMPS



Typical Installation of Hoffman-Economy Condensation Pump

Information for Installing Hoffman-Economy Horizontal Condensation Pumps

Horizontal condensation pumps and receivers are suitable for use where the radiation is 12 to 18 inches above the floor or foundation upon which the pump is set. If the pump is installed in a pit, proper provision must be made for drainage and ventilation, as it is essential to keep the motor absolutely dry. Vertical underground pumps should be used for draining radiation close to or below the floor level. (See pages 38 and 39.)

All condensation pumps and receivers must be selected to discharge against the pressure at which safety valve is set, plus allowance necessary to overcome pipe friction and difference in level between boiler water line and pump. Unless the pump is capable of discharging against this maximum pressure, there is danger that it will fail to return water to the boiler if the pressure exceeds normal. Hoffman-Economy pumps will discharge against a pressure of at least three pounds over their rating.

All receivers are vented to the atmosphere, and unless especially ordered, are not designed for internal pressures. No responsibility will be assumed by the company if receiver vents are closed for any reason.

If radiators are not equipped with individual traps, it will be necessary to install a trap at inlet of receiver to prevent steam entering receiver and interfering with the pump action. Traps are not regularly furnished with pumps.

High water alarm, bell and batteries can be furnished with any pump at an extra charge.

Information Required with Order

1. Square feet of direct cast iron radiation or equivalent. (Each foot of Vento, Super-Fin or other blast coil is considered equivalent to 5 or 6 feet of direct radiation.)
2. Electric current available—one, two or three phase, number of cycles and volts if alternating current; or voltage only if direct current.
3. Boiler pressure—safety valve setting.
4. Difference in elevation between pump and boiler water line with size and length of intervening piping.

All Hoffman-Economy Pump and Receivers are shipped with pump, motor and automatic control completely assembled. After making necessary electrical connections and provision to prevent steam entering pump, the unit is ready to run.

Suggested Specification for Horizontal Condensation Pump

Install where indicated on plans one size..... Hoffman-Economy Horizontal Condensation Pump and Receiver suitable for.....square feet direct cast iron radiation or equivalent and capable of operating against a pressure of.....pounds per square inch at the pump. Pump shall be of the centrifugal type, with enclosed bronze impeller and so constructed that access may be had to impeller and other interior parts without breaking pipe connections. Shaft shall be run in two renewable bronze bearings, one of which shall be of the ball type. Motor shall be continuous rated 40 degrees and shall be suitable for....volts.... phase.....cycles alternating current (or..... volts direct current) and shall be direct connected to pump by a flexible coupling. Operation of motor shall be controlled by an automatic float switch installed in receiver. All parts shall be assembled on a cast iron base ready for installation.

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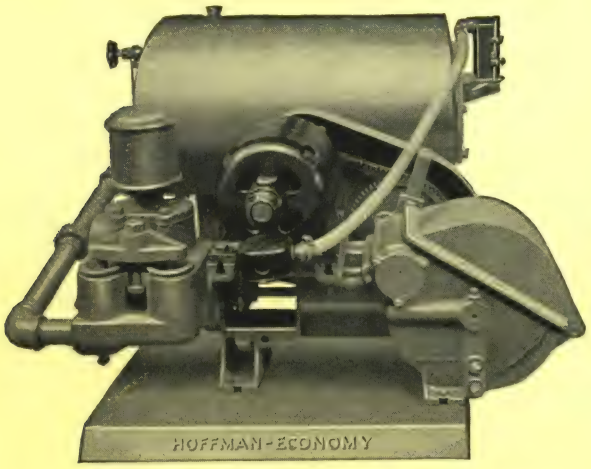
HOFFMAN-ECONOMY PUMPS



Hoffman-Economy Reciprocating Pumps and Receivers

The Hoffman-Economy Reciprocating Pump and Receiver is a dependable unit for use in laundries, cleaning and dyeing plants, greenhouses and other industrial establishments where it is necessary to carry pressure from 50 to 100 pounds and where moderate priced equipment is required.

Reciprocating pumps operate on less power than the centrifugal type, but are not as quiet, due to the slight pulsation at the end of each stroke and the hum from the chain drive. Ordinarily, this is not objectionable, but where extreme quietness is desired, Style "B," "C" or "D" 1750 r.p.m. pumps should be used. (Pg. 30.)

Reciprocating pumps are frequently used on remodeled jobs in which various types of systems have been supplied from the same boiler. In such installations the pump handles the condensate from the entire job and also establishes a low vacuum on the return mains. This vacuum is not capable of control, being incidental to the operation of the unit as a condensation pump. Vacuum may be controlled by manually operated valves.

Construction Details

Pump—Is self-oiling enclosed type with bronze lined cylinders, bronze valve seats and piston rod. It has Timken bearings; cast steel crank shaft driven through accurately cut gears; silent chain drive from pump to motor. *Receiver and Automatic Float Control* are same as used in centrifugal pumps.

Motors—Are standard make, 40° rise continuous duty, 1750 r.p.m. They are ample to start pump under any load and to operate without overheating.

Single phase motors 1 hp., 110 volts and larger are equipped with magnetic contactors with thermal overload. Smaller motors are controlled directly from float switch.

Polyphase motors of all sizes are equipped with thermal overload cutouts. Magnetic contactors with overload and no voltage release are used in 2 hp. size. Smaller sizes are controlled directly from float switch.

Direct current motors 1 hp. and over are equipped with automatic starter having overload protection. Smaller motors are controlled directly by float switch.

Information for Installing

Units are shipped complete with pump, motor, automatic control and receiver with trimmings, all mounted on cast iron base, ready for installation.

It is unsafe to install a gate valve in the discharge line as these pumps are positive. A check valve only should be used.

Information Required with Order

Same as for Horizontal Condensation Pump. See page 36.

STANDARD SIZES

Pump No.	Capacity, sq. ft. direct radiation or equiv.	Capacity, lbs. condensate per hr.	Discharge pressure lbs. per sq. in.	Pump cap. g.p.m.	Motor hp.	Receiver capacity, gal.	Approx. shipping weight, lb.
R- 11	1,000	250	50	2	½	9	500
R- 12	1,000	250	100	2	¾	9	600
R- 31	3,000	750	50	5	½	13	575
R- 32	3,000	750	100	5	¾	13	625
R- 61	6,000	1,500	50	10	½	20	700
R- 62	6,000	1,500	100	10	1	20	725
R-101	10,000	2,500	50	16	1	26	900
R-102	10,000	2,500	100	16	2	26	950

Continued on next page

HOFFMAN-ECONOMY PUMPS

Hoffman-Economy Vertical Underground Pumps and Receivers

Hoffman-Economy Vertical Underground Pumps and Receivers are used where returns are located below floor level or otherwise too low for horizontal pumps. To save floor space, they may be installed flush with floor so as to occupy only space enough for the motor and control.

Duplex Units—Two pumps with individual motors may be installed in a single tank of larger size if desired.

High Pressure Units—Where it is necessary to use underground pumps on high pressure jobs, a horizontal booster pump is furnished. Information furnished on request.

Construction Details

Pump—Pump is a special vertical centrifugal pump with enclosed bronze impeller of the non-overloading type, machined all over and balanced.

Pump shaft is ball bearing, mounted in dust-proof housing. Lower bearing is self-lubricating and easily renewable without removing impeller from shaft or dismantling pump. Shaft is protected in lower bearing from wear by renewable sleeve, turned, ground and locked to shaft.

Flexible shaft coupling connects pump and motor.

Base—Both pump and motor are mounted on base plate, permitting removal of pump without disturbing receiver cover. Motor is aligned by means of shoulder and recess.

Receiver—Receiver is of heavy cast iron suitable for underground use without danger of corrosion.

Float Control Mechanism—Float switch is of same design as used in horizontal pumps. Float is removable without disturbing pumps.

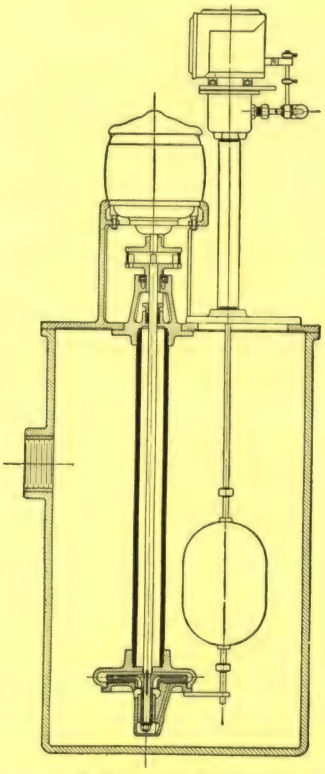
Motors—Motors are standard make, continuous rated 40 degrees, 1750 r.p.m.

Single phase 1 hp., 110 volts and 1½ hp., 220 volt motors are equipped with automatic starters having thermal overloads. Smaller motors are controlled directly from float switch.

All polyphase motors are equipped with thermal overload cutouts. Magnetic contactors with overload and no voltage release are used in 2 hp. sizes and larger. Smaller sizes are controlled directly by float switch.

Direct current motors 1 hp. and over have automatic starters with overload protection. Smaller motors are controlled directly by float switch.

Vertical Underground Unit



Cross Section of Vertical Underground Pump

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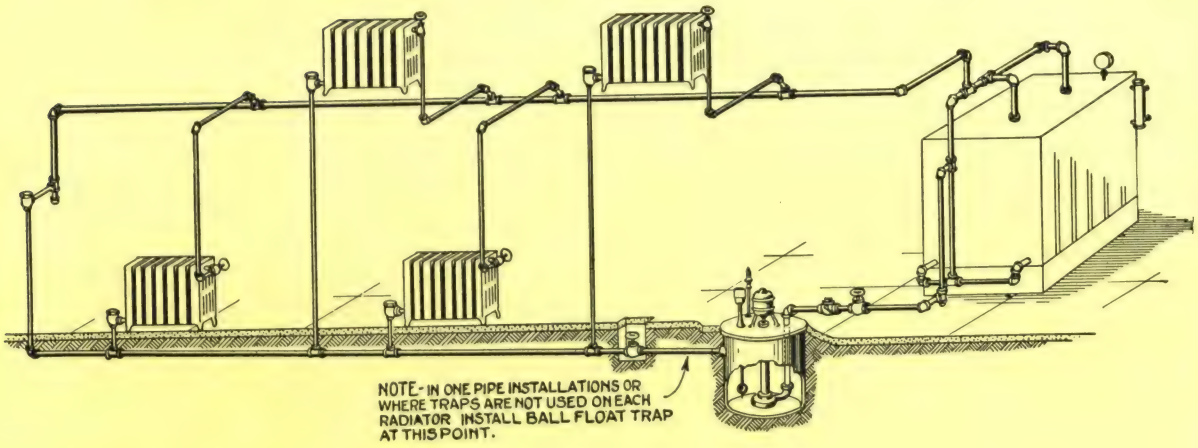
HOFFMAN-ECONOMY PUMPS



Typical Installation of Underground Unit

Information for Installing

Units are shipped with cast iron tank with one inlet, vertical pump and motor with full automatic control, completely wired.

Standard tanks have single inlet with center located 9 inches below top cover. Other location of tapping may be obtained without extra charge; additional inlets will be furnished at slight extra cost.

In installing unit, if radiators are not equipped with individual traps, a float trap should be installed in return main at receiver to prevent entrance of steam.

Information Required with Order

1. Square feet of direct cast iron radiation or equivalent.
2. Electric current available.
3. Boiler pressure—safety valve setting.
4. Difference in elevation between pump and boiler water line with size and length of intervening piping.
5. Distance from floor to center of return main.

Suggested Specification for Vertical Underground Pump

Install where indicated on plans a Hoffman-Economy Underground Condensation Pump and Cast Iron Receiver No.....complete with vertical bronze fitted centrifugal pump suspended from receiver cover. Pump shall be so constructed that bearings may be renewed without removing impeller from shaft or shaft from pump. Shaft shall be protected from bearing wear by a removable sleeve. Receiver shall be equipped with an automatic float switch for controlling motor and shall be removable without disturbing pump or pipe connections. Pump shall be directly connected to motor by a flexible shaft coupling. Motor shall be 40 degree continuously rated, and shall be suitable for..... volts..... cycle.....phase alternating current (or.....volts direct current) and shall be mounted on a machined tripod cast integral with pump base.

Vertical Underground Pumps and Receivers

STANDARD SIZES

Pump No.	Diameter inlet conn., in.	Diameter outlet conn., in.	Hgt. above floor, in.	Capacity, sq. ft. direct c.i.rad. or equiv.	Capacity, lb. condensate per hr.	Discharge pressure, lb. per sq. in.	Pump cap. g.p.m.	Motor hp.	Receiver dimensions, in.	Approx. shipping weight, lb.
U- 30	3	1¼	24	3,000	750	10	6	¼	16 x 30	445
U- 31	3	1¼	44			15		½	20 x 30	750
U- 32	3	1¼	44			20		¾	20 x 30	780
U- 50	3	1¼	24	5,000	1,250	10	10	¼	16 x 30	445
U- 51	3	1¼	44			15		½	20 x 30	750
U- 52	3	1¼	44			20		¾	20 x 30	780
U- 80	3	1¼	24	8,000	2,000	10	16	¼	18 x 30	490
U- 81	3	1¼	44			15		½	20 x 30	750
U- 82	3	1¼	44			20		¾	20 x 30	780
U-120	4	1½	44	12,000	3,000	10	24	½	24 x 36	960
U-122	4	1½	44			20		¾	24 x 36	990
U-200	4	1½	44	20,000	5,000	10	40	½	24 x 36	960
U-201	4	1½	44			15		¾	24 x 36	990
U-202	4	1½	44			20		1	24 x 36	1,080
U-300	5	2	44	30,000	7,500	10	60	1	30 x 36	1,200
U-301	5	2	44			15		1½	30 x 36	1,290
U-302	5	2	44			20		2	30 x 36	1,330

All 25-cycle units operate at 1450 r.p.m. Weights will be approximately one-third greater than shown. Receivers furnished with 25-cycle units may be larger than shown in table.

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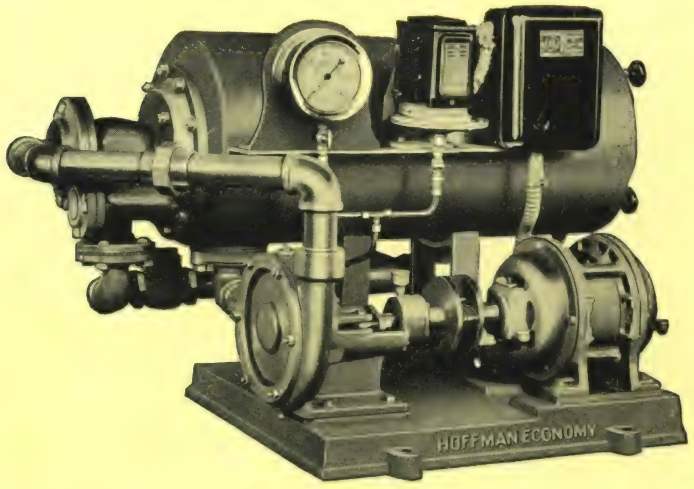
HOFFMAN-ECONOMY PUMPS



Hoffman-Economy Air Line Vacuum Pumps

The Hoffman-Economy Air Line Vacuum Pump is a highly efficient unit for the removal of air from gravity heating installations such as "Paul" or other systems equipped with air line valves. The pump removes air only and does not handle condensate nor act as a boiler feed pump.

Construction Details

Pump—Sizes AL-1 to AL-4 are equipped with single suction, enclosed impellers, bronze fitted centrifugal pumps with outboard ball bearings.

Sizes AL-5 to AL-9 are equipped with double suction, horizontal split case, bronze fitted centrifugal pumps.

All pumps have removable cover which gives access to all working parts without breaking pipe connections.

Jet Vacuum Producer—Jet type vacuum producer is of same design as used in Hoffman-Economy Return Line Vacuum Pumps. (See page 25.)

Tank and Base—Tank is of heavy gauge welded steel and both tank and motor are rigidly bolted to cast iron base with machined pads to insure accurate alignment of unit.

Piping between tank, vacuum producer and pump is completely assembled at factory and unit is shipped wired and ready for installation. All wiring is in strict accordance with National Electrical Code.

Motors—Standard make motors are used on all units, permitting the obtaining of replacements from local stocks without waiting for factory shipment.

Single phase motors 1½ hp. and larger are equipped with magnetic contactors in addition to vacuum controllers. Overload protection is provided wherever contactors are used.

Polyphase motors are equipped with thermal overload cutouts in sizes under 1½ hp. In larger sizes magnetic contactors with both overload and no voltage release are furnished in addition to the vacuum regulator.

Direct current motors of 1 hp. and under are compound wound, self-starting type. Above 1 hp. automatic starters are furnished in addition to vacuum regulators.

Vacuum Regulator—Vacuum regulator is set to cut in at 3 inches and out at 8 inches when unit leaves the factory, but may easily be adjusted to a higher or lower vacuum if desired.

Duplex Units—All sizes are available in both single and duplex units. Duplex unit consists of a single tank with two pumps, two motors and automatic starters.

Information Required with Order

1. Square feet of direct cast iron radiation or equivalent.
2. Electric current available—one, two or three phase, number of cycles and volts if alternating current; or voltage only if direct current.

STANDARD SIZES

Pump No.	Capacity, sq. ft. direct radiation	Air capacity, cu. ft. per min.	Motor hp.	Approx shipping weight, lb.
AL-1	4,000	1¾	¾	500
AL-2	8,000	4	1	600
AL-3	12,000	6	1½	750
AL-4	20,000	10	2	900
AL-5	30,000	15	3	1,000
AL-6	40,000	20	5	1,000
AL-7	60,000	30	5	1,200
AL-8	80,000	40	7½	1,400
AL-9	150,000	70	10	1,600

Continued on next page

Return Line Vacuum Systems

Equipped with

No. 7 Hoffman Adjustable Modulating Valves and Hoffman Traps or Return Line Valves

When installing Vacuum Pumps it is necessary to meet two requirements:

1. The distribution of steam should be uniform.
2. No steam should be present in the return main.

The No. 7 Hoffman Adjustable Modulating Valve meets the first requirement, in that it permits the Heating Contractor to externally adjust the port area of each valve to admit the proper amount of steam to the radiator. If branches to certain radiators are over-size, a port adjustment will aid in balancing up the steam distribution, or if pipes are not properly reamed an increase in port diameter counteracts the unbalancing of flow, due to the restricted pipe area. If it is required that certain radiators receive steam before others, this can be accomplished by port adjustment of the No. 7 Valve.

The Hoffman Traps or Return Line Valves comply with the second condition. No steam is permitted to pass into the return main, but air and condensate are freely discharged, thus enabling the radiator to give off its maximum amount of heat.

These two valves are, therefore, necessary to obtain best possible results in systems using Return Line Vacuum Pumps.

The foregoing pages illustrate and describe our products.

For further information regarding their application or typical details showing proper installation, write direct to HOFFMAN SPECIALTY COMPANY, INC., Waterbury, Conn.

We are specialists in the design and manufacture of devices for the handling of Steam, Air and Condensation, and welcome the opportunity to assist in solving such problems.

HOFFMAN SPECIALTY CO., INC.
Waterbury, Conn.
U. S. A.

Printed in U. S. A.

WILLIAM S. HAINES & COMPANY

Manufacturers of Steam Heating Specialties

Twelfth and Buttonwood Streets

PHILADELPHIA, PA.

Products

HAINES VACUUM HEATING SYSTEMS and AUTOMATIC VAPOR SYSTEMS, consisting of Haines Thermostatic Traps, Automatic Air Traps, Graduated Supply Valves, Damper Regulators and all Specialties used in the systems.

Vacuum System of Steam Heating

The architect and the engineer are sufficiently familiar with the principle, operation and general piping arrangement of the vacuum heating system to make it unnecessary to detail them here.

It is generally conceded that the vacuum system of steam heating, properly installed and equipped, is the most efficient and economical heating system that can be used in connection with large buildings of any description.

When vacuum heating systems fail to function properly it is seldom the fault of the piping design, or layout. Almost invariably the trouble is with the equipment. The most important equipment, the very heart of a vacuum heating system, is the return line trap, whose function is to pass all of the water of condensation and the air from the radiating surfaces and drip points without permitting the escape of steam to the return line. Haines traps do just this and so insure the successful and economical operation of the system.

Haines Thermostatic Traps

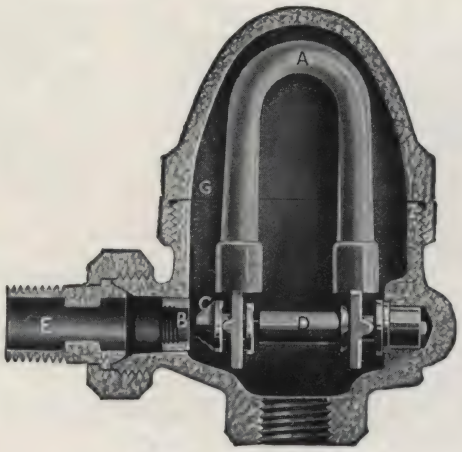
All Haines thermostatic traps, whether they are made for service at below atmospheric pressure or at pressure in excess of 100 lb. per sq. in. employ as their operating member a specially constructed bourbon tube, a principle as positive and accurate as that which actuates your steam gauge. In more than 30 years this company has not changed the principle of the operating member. Time has proven its positiveness and durability.

Construction—The tube itself is of tempered steel, charged with a volatile liquid. It is the expansion or contraction of this liquid that furnishes the operating power. The thermostatic tube is mounted vertically on a horizontal valve motion. The end opposite the valve is anchored, hence, the travel of the tube either opens or closes the valve piece.

This thermostat is sensitive to a temperature change of 1° F. It is mounted outboard the valve seat closing the valve against the flow of steam. This arrangement prevents fouling of the trap due to scale or other foreign matter in the system and permits thorough draining of the unit to which it is attached.

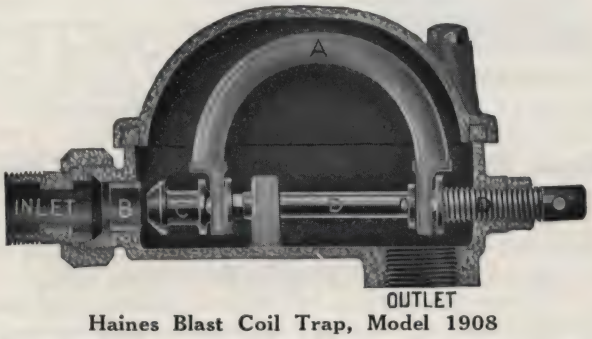
Advantages—With Haines Traps—

Not a particle of steam gets away.
Nothing that ought to stay in gets out.
Nothing that ought to get out stays in.



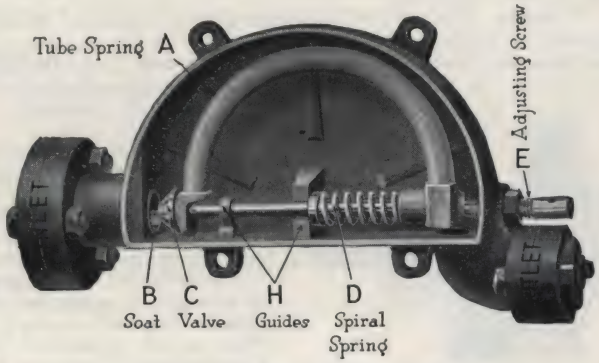
Haines Vento Trap

Recommended for vacuum, vapor and low pressure heating systems



Haines Blast Coil Trap, Model 1908

Recommended for any conditions where working pressure does not exceed 50 lbs.



Haines High Pressure Trap

ILLINOIS ENGINEERING COMPANY

Steam Heating and Power Specialties

GENERAL OFFICE AND FACTORY

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BALTIMORE, MD., 522 Park Avenue
BOSTON, MASS., 65 Franklin Street
BUFFALO, N. Y., 61 Carroll Street
CINCINNATI, OHIO, 111 E. 4th Street
CLEVELAND, OHIO, Rockefeller Building
COLUMBUS, OHIO, 299 Park Street, South
DALLAS, TEX., 720 Mercantile Bank Building
DAYTON, OHIO, 915 Reibold Building
DENVER, COLO., 2971 Irving Street
DETROIT, MICH., 2051 W. Lafayette Boulevard, and 216 Coe Terminal Building
EL PASO, TEX., 800 East Overland Street
ERIE, PA., 507 Cherry Street
GRAND RAPIDS, MICH., 208 Federal Square Building
GREENSBORO, N. C., Box 1223
HARRISBURG, PA., 600 N. Second Street
HOUSTON, TEX., 839 Electric Building, 710 Bankers Mortgage Building
INDIANAPOLIS, IND., 122 E. Michigan Street
KANSAS CITY, KAN.
LITTLE ROCK, ARK., 822 Home Insurance Building
LOS ANGELES, CAL., 1224 So. San Pedro Street
MEMPHIS, TENN., 246 Court Avenue
MILWAUKEE, WIS., 346 Fourth Street
MINNEAPOLIS, MINN., 874 Northwestern Bank Building
KNOXVILLE, TENN.
NEW ORLEANS, LA., 833 Howard Avenue
NEW YORK, N. Y., 3514 Grand Central Terminal, and 149 Broadway
OKLAHOMA CITY, OKLA., 315½ No. Harvey Street
OMAHA, NEB., Woodmen of the World Building
PEORIA, ILL., Peoria Life Building
PHILADELPHIA, PA., 5 So. 18th Street
PITTSBURGH, PA., Columbia Bank Building,
PORTLAND, ORE., Worcester Building
RICHMOND, VA., 7 No. 6th Street
ROCHESTER, N. Y., 29 Cobbs Hill Drive
ST. LOUIS, MO., First National Life Building
SALT LAKE CITY, UTAH, McIntyre Building
SAN FRANCISCO, CAL., 357 9th Street
SCRANTON, PA., 119 Franklin Avenue
SEATTLE, WASH., 2028 Second Avenue
SOUTH BEND, IND., 1130 Diamond Avenue
SPOKANE, WASH., 219 Riverside Avenue
TOLEDO, OHIO, 1817 No. 13th Street
TORONTO, ONT., 144 Jarvis Street
WICHITA FALLS, TEX., 607 No. Scott Street
YOUNGSTOWN, OHIO, 414 Mahoning Bank Building

Products

VACUUM and VAPOR HEATING SYSTEM SPECIALTIES; AUTOMATIC STEAM POWER SPECIALTIES; VALVES, including: Pressure Reducing, Pressure Regulator, Back Pressure, Balanced, Non-return; STEAM and OIL SEPARATORS; STEAM TRAPS.

Also manufacturers of Automatic Pump Governors, Return Traps, Expansion Joints, etc.

Engineering Service

We suggest that you save time and effort by calling on our Engineering Department to make recommendations as to apparatus and its proper installation for any particular job, on the basis of guaranteed results.

Our line of steam and heating specialties includes several hundred items which are shown in detail together with sizes, capacities, and dimensions in our series of bulletins. We will be pleased to send the proper bulletin to cover specialties for any requirement.

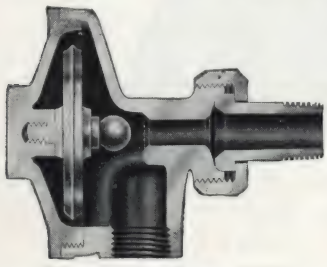
Illinois Steam Heating Systems: Vacuum, Vapor, Modulating, and Thermal-Zone Control

The Illinois Heating Systems are the highest development of modern heating and are the result of over 25 years of specialized work in the heating field.

We manufacture a full line of vacuum and vapor specialties and all necessary accessories, such as vacuum pump governors, suction strainers, air liberating tanks, vent seal valves, expansion joints, etc., also steam specialties.

We maintain an Engineering Department to assist engineers and users in the proper installation and operation of our devices.

Thermo Radiator Trap—All Illinois systems, whether vacuum or vapor, use our Thermo trap on all radiators. It has many exclusive advantages, as can be seen from the illustration. It is the original vertical seat trap which avoids trouble from stoppage by dirt.



Thermo Radiator Trap

Diaphragm is carefully made of 90,000-lb. tensile strength phosphor-bronze and the durability is such that, under our three-year guarantee, the number of renewals is practically nil. The margin of strength is such that the Thermo trap will operate on 75-lb. steam pressure. The Thermo trap is sensitive and positive in operation.

SIZES, CAPACITIES AND DIMENSIONS OF THERMO TRAPS

No.	Size, in.	Capacity, sq. ft., direct radiation	Pipe connections, in.	Weight, lb.	End of inlet to center of outlet, in.	Center of inlet to face of outlet, in.
1	½	100	½	2	2½	1¾
2	½	200	½	3	2½	1¾
3	¾	750	¾	4	2¾	2½

Modulating Valve—The Illinois modulating supply valve controls the supply of steam to the radiator by only a half turn of handle from closed position to full open. This gives ready and easy control of the temperature of the room.

This valve is packless—permanently packed—has heat insulated handle of Bakelite. The seat discs are genuine J.D. discs and the valve will close tight against 50-lb. steam pressure. Full nickeled with polished trimmings and black Bakelite handle, either lever type or mushroom wheel.

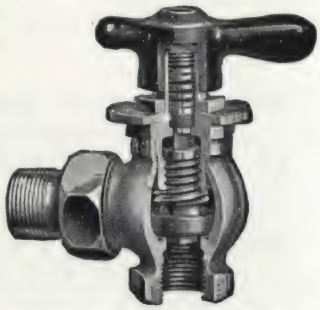
Specifications and Information—Standard specifications for Illinois Heating Systems sent on request.

Write for Bulletins No. 14 and No. 22 for details.

SIZES, CAPACITIES AND DIMENSIONS OF MODULATING VALVES

Size, in.	Capacity, sq. ft.	Center of inlet to end of tailpiece, in.	Center of tailpiece to face, in.	Wt. lb.
¾	100	2⅝	1⅜	2
1	200	3⅛	1 9/16	2¾
1¼	300	3½	1¾	4½
1½	400	4	2	5
2	600	4¾	2⅜	6½

Lock shield pattern valves furnished on order. Special inserts giving fixed capacity to valve furnished on special order at additional price. Extension swivel valve stems, at additional price.



Modulating Supply Valve, Lever Type

Thermal-Zone Control Systems

Installed in branch mains and controlled by thermostat set in zone or section heated by the branch main; the valve will shut off when zone is up to temperature and open when temperature at thermostat falls.

Buildings may be zoned as follows: As to occupancy; as to time (Program and Cycle); geographic location; exposure, wind, sun, etc.

These valves in addition, can also be arranged to control the operation of fuel burner and vacuum pump. Can also give push button control from panel board in engineer's or superintendent's office.

An Illinois Zone Control Valve will pay for its installation in one or two heating seasons.

Write for Bulletin 61.

Illinois Thermal-Zone Control Valve

Continued on next page

Eclipse Steam Specialties

We manufacture the Eclipse steam specialties established by the John Davis Co. Many of these devices have been on the market over 35 years, and many of the standard steam specialties in general use found their origin in the pioneer Eclipse line.

The Eclipse steam specialties include: pressure reducing valves; back pressure valves; atmospheric relief valves; non-return stop and check valves; steam traps; oil and steam separators, all types; balanced valves; pump governors, etc.

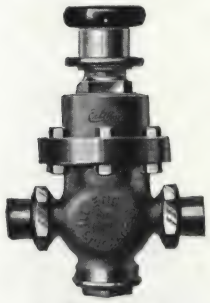
Pressure Reducing Valves

Vacuum Type Reducing Valve

For all pressures and services. The cumulative experience of 35 years is embodied in the design of these valves.

The Eclipse vacuum type reducing valve will regulate and hold the reduced pressure within a 4-oz. limit. It will reduce from an initial pressure as high as 150 lb. to any reduced pressure from 5 to ¼ lb. This valve is ideal for use in vacuum heating systems where a constant low pressure is desired, and it is used on thousands of important buildings.

Master Type Pressure Regulator



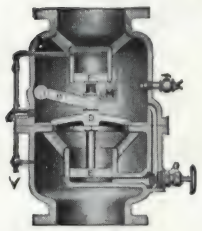
Pressure Regulator

For exacting requirements, such as tire and rubber vulcanizing, chemical process pressure control, and wherever high pressure steam must be accurately reduced in varying amount to any steady lower pressure.

It will reduce initial pressure up to 300 lb. down to any lower pressure greater than 5 lb., and does not build up pressure on a closed or dead end line.

Made of bronze with monel metal valves and seats.

Back Pressure Valves



Combination Back Pressure and Relief Valve

Back pressure valves of all types are furnished including the following:

Combination atmospheric relief and back pressure valves for plants operating both condensing and non-condensing, or wherever precise regulation of back pressure is desired. Built under Hockfeldt patents (see illustration).

Atmospheric relief valves for safeguarding engines and turbines run condensing.

The above valves built in sizes from 4 to 30 in., inclusive.

Balanced, bevel-seated back pressure valves, both spring controlled or lever and weight controlled.

Steam and Oil Separators

Type O Separator Removable Baffle

Eclipse steam separators are made in both horizontal and vertical type, also *special receiver separators* for standard or extra heavy pressures.

Eclipse oil separators are furnished in the horizontal type and have a removable baffle plate to facilitate cleaning of baffle and keeping the separator's efficiency at the highest point.

These separators have been in use for a number of years and are giving complete satisfaction. They are designed with unusually large baffle and interior port areas to insure complete and positive elimination.

Illinois Series 17 Combination Blast Trap

Combines all the advantages of our well-known Series 18 and 36 Combination Blast Traps for condensate drainage, together with the compactness of a thermo trap of similar capacity.

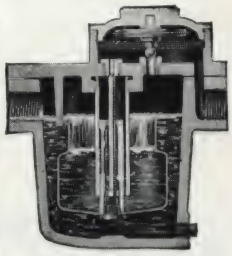
Unsurpassed for draining unit ventilators, unit heaters, indirect heaters, process heaters, domestic water heaters; for service in dry kilns, etc., and for dripping mains and risers.

Blast Trap Series 17

Ideal for use on unit ventilators in school rooms where traps must have sufficient capacity for rapid elimination of water and air from the units, and yet be compact enough for proper installation.

Maximum working pressure of 10 lb. Capacity: 200 lb. of condensate per hour. Furnished in ¾-in. tapping in either nickel plate or plain black finish. Height over all: 6½ in. Face to face inlet to outlet: 4¼ in. Shipping weight: 5 lb.

Illinois Series 18 Blast Trap

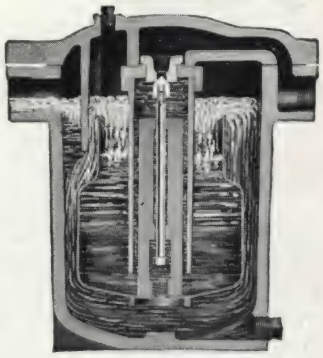


Blast Trap Series 18

Bucket type with thermostatically controlled air vent by-pass in cover. Positive in operation with large air venting capacity. Ideal for draining ventilating units, unit heaters, etc., where it is desirable to vent quickly the accumulated air from the main as well as handle the water of condensation.

Pressure: 2, 5 and 10 lb. per sq. in. Capacities: 350, 650 and 850 lb. per hour. Weight: 16 lb. Regularly furnished with ¾-in. tapping. May be furnished in 1 in. if wanted.

Steam Traps



Improved Steam Trap

The Illinois Eclipse steam trap has an improved valve action, that makes it the outstanding trap of the day.

Valve is always either wide open or tight shut at all times; no intermediate positions; never cracked on seat. Absolutely steamtight. Wire drawing, scoring or cutting of valve or seat are impossible.

This important advantage is secured by the valve stem not being attached to the bucket. While the valve is actuated by the bucket the valve does not move or synchronize with the bucket, but valve remains tightly closed until positively and instantly operated by the final movement of the bucket.

Note these superior features:

Instantaneous valve action—either wide open or tight shut.
Simple—only two moving parts—no pins or levers.
Cannot air-bind—automatically vents.
Cannot blow steam—always water sealed.
Surface discharge—flushing out floating grease and sludge.
Greater capacity.
Monel metal valves and seats.
Removable top—inspection easy without disturbing piping.
Sizes ½ to 2 in. inclusive, for pressures from 2 to 250 lb.
Backed by 35 years' experience and a positive guarantee.
Shipped prepaid anywhere on 60 days' free trial.

Tests

All Eclipse valves and traps are actually steam tested under working steam pressures before shipment.

Bulletins

Write for any of the following bulletins:

Bulletin No. 14—"Steam Heating Specialties."
Bulletin No. 22—"Illinois Vapor System of Heating."
Bulletin No. 46—"Non-return valves."
Bulletin No. 104—"Pressure Reducing Valves."
Bulletin No. 204—"Back Pressure and Relief Valves."
Bulletin No. 34—"Eclipse Steam Traps."
Bulletin No. 54—"Separators—Oil and Steam."
Bulletin No. 704—"Eclipse Pump Governors, Balanced Valves."
Bulletin No. 61—"Illinois Thermal-Zone Control."

THE McALEAR MFG. CO.

Manufacturers of Heating and Power Specialties

1901-1907 South Western Avenue, CHICAGO, ILL.

SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

Products

VAPOR and VACUUM HEATING SPECIALTIES: Including Simplex and Duplex Water Feeders, Combination Water Feeders with Low Water Cut-Out Switch, Radiator Traps, Radiator Valves, Air Eliminators and Boiler Return Traps, Air Traps, Air Vents, Radiator Hangers, and Vapor and Pressure Control Valves.

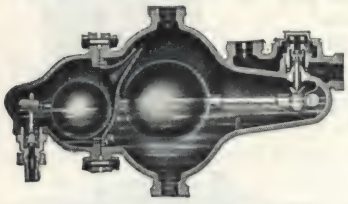
POWER PLANT SPECIALTIES: Pressure Reducing Valves for steam, water and air, Back Pressure Valves, Steam Traps, Liquid Level Controllers, Dirt Strainers, Vacuum and Pressure Relief Valves, Float Valves, Balanced Lever Valves, Condensation Receiver and Pump Governors, Non-Return Valves, Oil Separators, Grease Traps and Exhaust Head.

Also a full and complete line of Gas and Oil Specialties.

Catalogue No. 30

Catalogue describes the complete line of specialties. Bulletin K-3 describes McAlear Water Feeders and Controllers. Bulletin R-1 describes the McAlear Universal Radiator Hangers. Sent on application.

Direct-to-Boiler Water Feeders

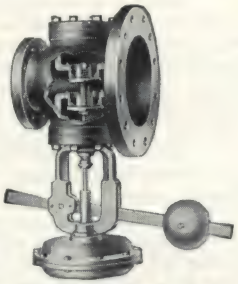


No. 826 Duplex Water Feeder

Manufactured both Simplex and Duplex and made as one unit with pressure and low water cut-out switches for automatically controlling stoker, gas or oil burner installations. Working parts of non-corrosive material, heavy seamless copper floats. Make-up water flows direct to boiler.

Reducing Valves

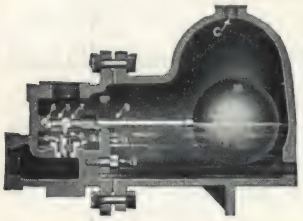
Constructed in either the diaphragm, weight and lever type, spring weighted diaphragm type, or the pilot operated type. Made with either single or double seats, and with expanded outlets when desired. For all practical working conditions.



No. 155 Reducing Valve

Ball Float Steam Traps

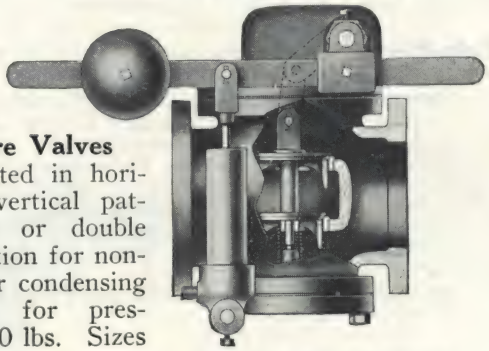
No. 717 (illustrated) is invaluable for low pressure drip connections. Can be used on pressures up to 125 lbs. It has large capacity, equipped with accessible valve construction, deep water seal, and thermostatic element when used for blast trap duty. Sizes ½ to 3 in. Also other types for steam pressures up to 250 lbs.



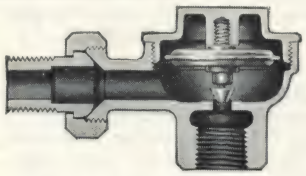
No. 717 Steam Trap

Back Pressure Valves

Constructed in horizontal and vertical patterns, single or double seat construction for non-condensing or condensing service—and for pressures up to 60 lbs. Sizes 2½ to 20 in.



No. 615 Back Pressure Valve



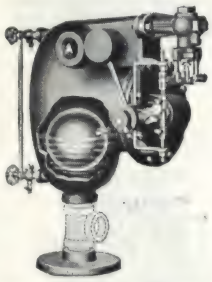
No. 10 Radiator Trap

Radiator Traps

Constructed in several sizes and patterns. Thermostatic elements made of best quality bronze metal. Traps are self-cleaning and absolutely noiseless in operation. Suitable for pressure from partial vacuum to 15 lbs.

Air Eliminators and Return Traps

Working pressures up to 25 lbs. Suitable for use in connection with any vapor or low pressure steam heating system. It is designed especially for returning the water of condensation direct to the boiler at high temperatures, irrespective of pressure or vacuum carried on boiler or system, and at the same time discharging the air to atmosphere as fast as it accumulates. Constructed in sizes for any amount of radiation up to 24,000 ft.



No. 786 Air Eliminator and Return Trap

No. 15 Automatic Air Valve

Automatic Air Valves

Used for venting low pressure and vapor heating systems and for discharging the air from mains, risers, pipe coils, direct and indirect radiators, vento coils, sterilizing apparatus, or any equipment from which air must be relieved. Working pressures No. 14, 15, 16 up to 15 lbs., No. 17 up to 25 lbs.

Universal Radiator Hangers

Low installation cost makes these hangers by far the most economical. Convertible on job to meet all conditions. Suspend radiator either 1¾ or 2½ in. from wall. Fully adjustable. Made of extra heavy steel stampings with malleable iron hooks. For all tube type and wall radiators.

Radiator Hanger

JAS. P.

MARSH

& COMPANY

JAS. P. MARSH & COMPANY

ESTABLISHED 1865

2073 SOUTHPORT AVENUE
CHICAGO, ILL.

DIVISION OF
COMMERCIAL INSTRUMENT CORPORATION

BRANCHES

551 Fifth Avenue
NEW YORK, N. Y.

Bendix Building
LOS ANGELES, CAL.

2539 Pennsylvania Avenue
WASHINGTON, D. C.

Sales Offices in Principal Cities

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JAS. P. MARSH & COMPANY

INTRODUCTORY

In presenting this latest edition of the JAS. P. MARSH & COMPANY heating catalogue to our many friends in the heating industry, we do so in the hope that our endeavor to introduce the new and modern heating specialties shown herein will meet with the same spontaneous approval that has been accorded Marsh products in the past.

It has always been the policy of JAS. P. MARSH & COMPANY to meet the ever-increasing demand for efficient heating and industrial specialties. Our engineering and design departments are continually striving to attain this end.

We are always at your service in an endeavor to assist you in solving your problems and welcome the opportunity of co-operating with you.

THE SCOPE OF THIS CATALOGUE

This catalogue is designed for the use of architects, contractors and heating engineers. The material herein has been organized around the various systems of heating made up of Marsh System Units. To that end, the bulletins embodying data on each system have been made complete. In addition to a thorough description of the function and operation of each system, complete data is given on all the Marsh System Units composing it. Separate bulletins are also included on valves and traps which represent the most important parts of each system. There is also a bulletin on Marsh Gauges and Instrument Panels.

GENERAL INDEX

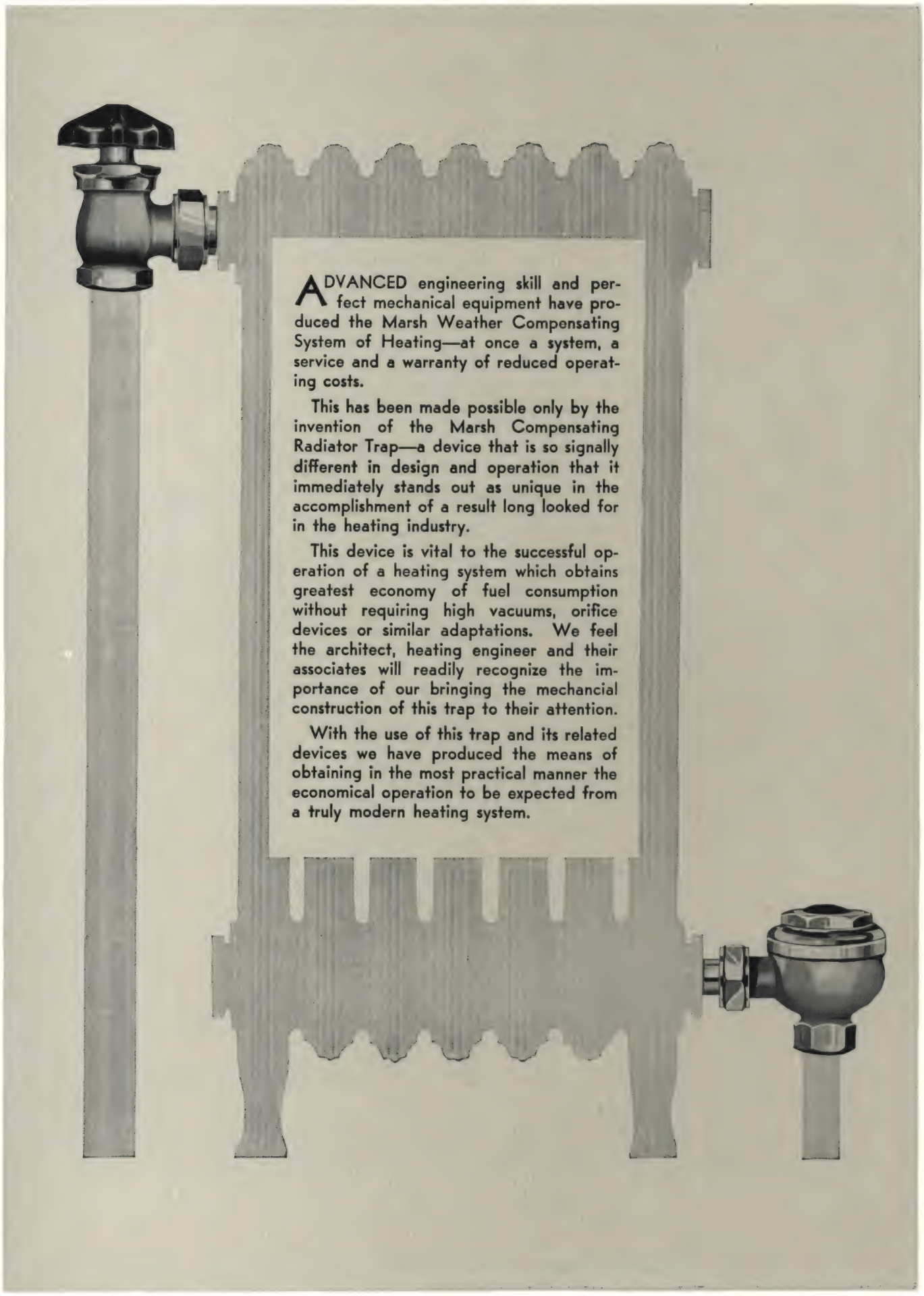
	Bulletin	Sweet's Page
Marsh Weather Compensating System of Heating	50	D5605
Marsh Standard Vacuum System of Heating	75	D5627
Marsh Vapor System of Heating	100	D5641
Marsh One Pipe Vacuum System of Heating	125	D5655
Marsh System Unit Radiator Valves	150	D5663
Marsh System Unit Traps	175	D5671
Marsh Gauges and Instrument Panels	200	D5681

THE MARSH WEATHER COMPENSATING SYSTEM OF HEATING

Bulletin No. 50

for Apartment Commercial and Public Buildings

JAS. P. MARSH & COMPANY
CHICAGO



ADVANCED engineering skill and perfect mechanical equipment have produced the Marsh Weather Compensating System of Heating—at once a system, a service and a warranty of reduced operating costs.

This has been made possible only by the invention of the Marsh Compensating Radiator Trap—a device that is so signally different in design and operation that it immediately stands out as unique in the accomplishment of a result long looked for in the heating industry.

This device is vital to the successful operation of a heating system which obtains greatest economy of fuel consumption without requiring high vacuums, orifice devices or similar adaptations. We feel the architect, heating engineer and their associates will readily recognize the importance of our bringing the mechancial construction of this trap to their attention.

With the use of this trap and its related devices we have produced the means of obtaining in the most practical manner the economical operation to be expected from a truly modern heating system.

THE MARSH WEATHER COMPENSATING SYSTEM OF HEATING

Preamble

FOR the past decade, heating engineers the world over have been attempting to produce a means of preventing the waste of heat in buildings. Heretofore, steam has been delivered to the radiators at a constant pressure and volume, regardless of the amount of heat necessary to meet the requirements of varying outside temperatures, resulting in a needless waste of fuel.

In order to heat a building properly, a given amount of radiation is installed to overcome the amount of heat which is lost, that is, the amount of heat which passes through the inside walls, through windows, doors and cracks, into the outside atmosphere. This amount of radiation is carefully calculated to meet the severest weather conditions to maintain a comfortable temperature within the building, usually based upon an operating steam pressure ranging from 1 to 3 pounds gauge. But, while sufficient radiation has been installed to heat the building to a comfortable temperature during severe cold weather, no provision has been made to meet the heat demands of mild spring and fall weather when but little heat is required to balance the heat loss of the building.

Marsh Weather Compensating System of Heating

Accordingly, when the weather is mild the system delivers too much heat. Unless some means is provided to restrict the amount of heat delivered to a radiator, which the radiator in turn delivers to the room, the rooms are overheated and a resultant fuel waste occurs. This means of control in its simplest form lies in placing individual shut-off valves on each radiator. That simple means would be effective provided the occupants of the room would operate those valves, closing them entirely and opening them as the demand required or by so partially closing a gradual type of valve as to permit only a restricted amount of steam to pass into each radiator. That we know the individual occupant cannot be depended upon to do.

Expensive Remedies

Of course, there are available a number of means of automatically controlling individual rooms only. However, the more efficient ones are very costly to install in a new building, and almost prohibitive for placement in an existing structure. Maintenance is likewise very expensive.

Under ideal operating conditions such controls usually function to maintain temperatures. However, it is possible for the occupant of a room so controlled to nullify the effect of the thermostatic control of a radiator by opening a window, thereby permitting the radiator to deliver its full capacity of heat. This weakness, plus the first cost of these methods, makes their contribution to economy only a small percentage of the normal waste.

Fuel Waste

The result is that the rooms are overheated. Generally, this condition is met by the occupant, who, upon sensing the overheated condition of the room, proceeds to open a window to lower the temperature of the room. Consequently, the heat produced by the radiator passes to the outside and fuel is wasted.

In rare cases, such a condition is overcome by the operating engineer, who must give his entire time to the heating system in order to regulate the fire in the boiler to generate only sufficient steam to supply the demand for heat to correspond to existing weather conditions. However, even though the operating engineer regulates the firing of a boiler, there are conditions that cannot be governed at the source of generation.

It is a common occurrence for the outside temperature to rise or drop to a noticeable degree in an hour, due to a change in direction or increase in velocity of wind movement. In an ordinary vacuum system, the engineer cannot regulate the volume or temperature of steam intended to meet the heat demand in a building where one side of the building is subjected to the heat-giving rays of the sun, nor can he regulate the amount of steam to be supplied to the opposite side of the same building which is shaded from the sun and possibly subjected to a brisk wind, which in the latter case would require more heat than the side favored with sun rays.

The engineer will, however, govern the generation of steam to supply the heat demand of that portion of the building where the most heat is required, which in this instance would be the shaded side. The ultimate result is the overheating of the sunny side of the building.

The U. S. Weather Bureau publishes data on outside temperatures for various localities throughout the United States which will indicate that heat is required 210 to 240 days out of the entire year, depending upon the locality. Of this period,

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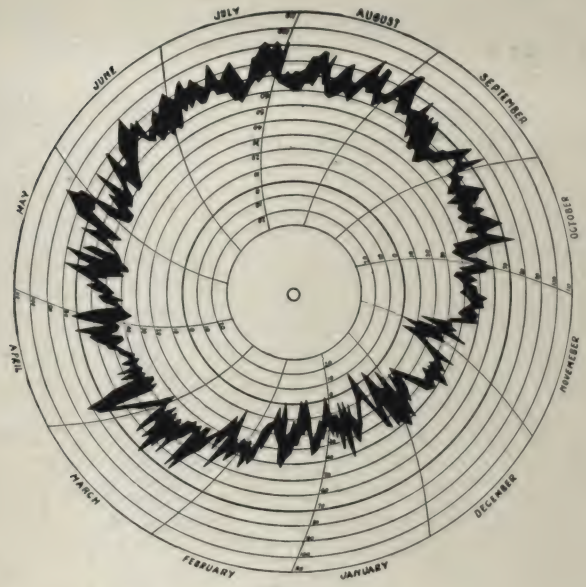


Fig. 1
1929-1930 Temperature Chart of Chicago Area

weather reports indicate that but 5 per cent is subjected to severe weather conditions that demand a maximum heat load, while heat may be supplied well under maximum heat load for the remaining 95 per cent of this period (see Fig. 1).

During the latter named period, the engineer operating an ordinary vacuum system is obliged to supply steam to the radiators in the building at practically the same temperature and volume as he does when the outside weather demands a maximum heat load. It is during this period that the engineer should be able to effect a fuel saving, had he the means to do so.

The Marsh Weather Compensating System

In the Marsh Weather Compensating System of Heating, this is not only feasible, but has also been proven practical on so many occasions that it is the most modern fuel saving system on the market today.

The Marsh Weather Compensating System of Heating accomplishes its results by compensating the volume and the temperature of the steam in the entire heating system and by limiting the amount of steam which each radiator can consume—all in accordance with weather requirements. This eliminates the waste of heat that results when a window is permitted to remain open more than is required by the need of ventilation.

The Marsh Weather Compensating System is a two pipe vacuum system similar in most points to the ordinary return line vacuum system. Steam may be supplied either by means of a boiler as the generating unit, or from an outside source. As in the ordinary vacuum system of heating, a vacuum pump is employed to create circulation and to withdraw the water of condensation from the system and return it to the boiler or steam supply unit.

Compensating Control

In the main supply system is placed a Marsh Compensating Supply Control which can be operated manually, semi-automatically or thermostatically fully automatic as desired. This control governs the pressure (or vacuum) and regulates the amount and temperature of the steam distributed throughout the system. On manually operated compensating control this is done by means of a lever and weight—on the semi-automatic, by means of a thermostatically controlled motor valve in conjunction with a similar lever and weight that requires, at the most, six or eight simple adjustments during the entire heating season. For full automatic control, a series of thermostats operates a motorized valve.

The temperature of the steam (and therefore the volume of radiator space which a given amount of steam will fill), which governs the heat output of a radiator, is thus regulated according to prevailing weather conditions.

Considering the benefits derived, the cost of the Marsh Weather Compensating System of Heating beyond that of the conventional return line vacuum system is nominal. The total cost of installation, including all materials and labor, will be but very little over that of the standard type of return line vacuum system, depending upon the type of Marsh Weather Compensating System selected.

A Guarantee of Economy

JAS. P. MARSH & COMPANY *guarantees (with a satisfactory warranty) that the total fuel consumption will be at least 25 per cent less than the amount of fuel or steam consumed by a standard vacuum system of heating. The yearly savings are equivalent to approximately the entire difference in cost between a Marsh Weather Compensating System of Heating and the standard vacuum system.*

Installed in a new building, it will yield to the owner a return of from not less than 50 to 100 per cent per year on the additional investment. Installation in an existing structure necessitates the removal of certain of the old style valves and somewhat increases the cost. However, even in such case the total cost does not exceed such an amount that will net the owner a yearly return of at least 33⅓ per cent on his investment.

The installation of a Marsh Weather Compensating System of Heating includes our engineering service, expert supervision of installation and operation, and guaranteed care for a period of five years. During that period JAS. P. MARSH & COMPANY will supervise the operation of the heating system and will maintain and service the equipment at no expense to the owners.

While the written guarantee is for a period of five years only, the entire system—including the component devices—is good for the life of the building in which it is installed.

Where desired, arrangements can be made with JAS. P. MARSH & COMPANY for additional period maintenance at a nominal yearly fee.

Continued on next page

Elementary Principles upon Which the Marsh Weather Compensating System Is Based

Effect of Altitude upon Boiling Points of Water

The air surrounding us has weight and exercises a pressure (14.7 pounds per square inch at sea level and 32° F.), and because of that weight, it exercises a very definite pressure upon every surface with which it is in contact. It is due to this force that water at sea level will not boil until a temperature of 212° F. has been reached, while at a higher altitude where the force of the atmosphere is less, water will boil at a much lower temperature. Citing Denver as an example, which is at an altitude where the force of the atmosphere is less, water will boil at a much lower temperature. Denver is at an altitude of approximately 5280 feet (24.45 inches mercury barometer) above sea level. Water will boil at a temperature approximately 201° F., while at sea level (29.92 inches mercury barometer) water boils at 212° F.

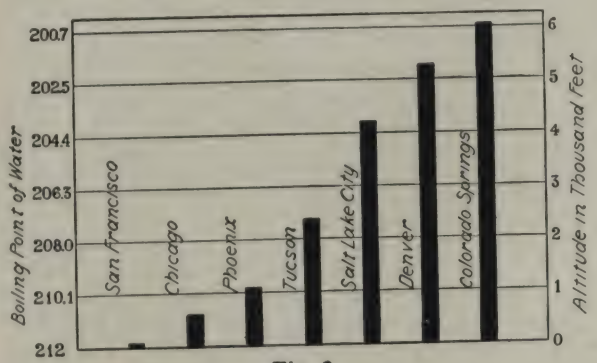


Fig. 2
Showing Difference in Boiling Points of Water at Different Altitudes

Effect of Atmospheric Pressure upon Boiling Points of Water

It was not until the invention of the vacuum pump that the theories set down by Torricelli* were put into use so far as heating systems were concerned. In 1882 an engineer conceived the idea that by reducing the pressure of the atmosphere contained in a heating system, water would boil at a lower temperature. Consequently, a pump was constructed having a unit rotating upon an axis, and by means of this rotating unit, air was expelled from the system, or as it is commonly known today, "created a vacuum." By removing the air from the system, the force of the atmosphere upon the surface of the water in a steam generating unit was reduced, allowing water to boil at a lower temperature. And since a given amount of air is removed from this unit, steam is allowed to expand to replace the space taken up by air, hence, it is generally known that a greater volume of steam can be generated from one pound of water under vacuum than can be generated at atmospheric pressure, or above.

*In 1644, Torricelli, an Italian physicist, constructed the first mercury barometer after experiments with atmospheric pressure on water.

Effect of Pressure upon Volume and Temperature of Steam

The effect of pressure upon volume and temperature of steam may be visualized by referring to Fig. 2. The temperature at which water will boil depends entirely upon the pressure exerted upon the surface of the water, likewise, volume of the steam also depends upon pressure, whether from a foreign source or created by the steam itself.

For example, assume that a quantity of water is placed in a closed vessel, and that a pressure of 1 pound per square inch has been induced into the vessel from an outside source. With sufficient heat applied under the vessel, the liquid would not boil and start forming into steam until a temperature of 215° F. had been reached, and when the entire 1 pound of water had been evaporated into steam, this steam would occupy a space equal to 25.2 cubic feet as indicated by "A," Fig. 3. If the pressure in the same vessel is reduced to 0 pound or atmospheric pressure, water would evaporate into steam at 212° F., and the pound of water entirely evaporated into steam would as steam occupy a space of 26.79 cubic feet as in "B." Had the pressure in the vessel been reduced from 0 pound to 5 inches of vacuum (2.457 pounds absolute below atmospheric pressure) evaporation would have taken

Continued on next page

place at 202.92° F. and the steam generated from 1 pound of water would occupy a space equal to 31.77 cubic feet as indicated in "C," and by further reducing the pressure to 15 inches of vacuum, water would have evaporated at 178.91° F., the space occupied by steam generated from the original pound of water would be 51.3 cubic feet, as in "D," in other words 1 pound of water evaporated into steam at 15 inches of vacuum will, as steam, fill approximately twice the space at 1 pound pressure. It is evident then, that as pressure increases volume of steam decreases, and as pressure decreases volume of steam increases.

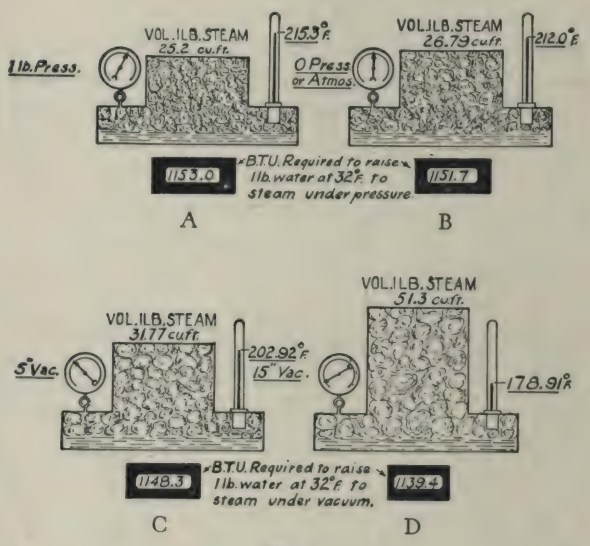


Fig. 3

In direct proportion, the amount of heat required to generate steam also varies with that of pressure, as indicated in Fig. 3. The amount of heat required to evaporate one pound of water under an induced pressure of one pound per square inch (see "A," Fig. 3) is much greater than the amount of heat required to evaporate the same pound of water in vessel "C," in which the pressure has been reduced to 5 inches of vacuum. This is due to the fact that in vessel "A" sufficient energy or heat must be absorbed by the water to overcome the pressure exerted upon the surface of the water which will tend to prevent the molecular expansion of water until the amount of energy is added to the water to equal that of the pressure upon the water. In vessel "C," there is less pressure to overcome, therefore a lesser amount of energy is to be added to the water to overcome the existing pressure. Expressed in B.t.u.* the energy expended to evaporate the water (the initial temperature of water assumed at 32° F.) in vessel "A" would be 1153 B.t.u., while the B.t.u. required to evaporate the water in vessel "C" would be 1148.3 B.t.u. The relation between pressure of steam and heat may be expressed: as pressure increases the amount of heat increases; as pressure is decreased, the amount of heat required decreases proportionately.

From the above discussion, several axioms are brought to mind:

1. As pressure increases, volume of steam decreases.
2. As pressure decreases, volume of steam increases.
3. As pressure increases, heat required increases.
4. As pressure decreases, heat required decreases.
5. As heat increases, pressure increases.
6. As heat decreases, pressure decreases.

By summing the totals of these axioms, one may readily comprehend that to generate steam at pressures at or below atmosphere will require much less fuel than to generate steam above atmospheric pressure.

Flexibility

The Marsh Weather Compensating System of Heating employing this principle, in conjunction with the limiting effect of the Marsh Compensating Trap upon the individual radiator, has such flexible features that the volume and temperature of steam delivered to the radiators are directly proportioned to correspond with the heat demand required for prevailing weather conditions. Controlling the temperature of steam distributed to the system and automatically maintaining a required volume of low temperature steam in the radiators, tends to effect a fuel saving that has been tried and proven with astounding results.

In applying these same principles of the various properties of steam to the operation of the heating system it follows that any heating system having a certain internal cubical content will fill proportionately with the pressure carried on the system. To illustrate, say a pound of steam at 1 pound pressure gauge will fill a certain amount of radiation or volume of its cubical content. Then at atmospheric, or 0 pound gauge, the same pound of steam will fill a greater amount of radiation, and that in turn, steam at say 5 inches of vacuum, having assumed a still greater volume will fill a greater cubical content.

Effects of Variation

In the Marsh Weather Compensating System of Heating steam under varying pressures has three direct effects of variation due to changing pressures.

First, varying the pressure of steam varies the volume of this steam and the cubical content which a given amount of steam will fill.

Second, varying the temperature means a variation of the B.t.u. content of a given space filled with steam.

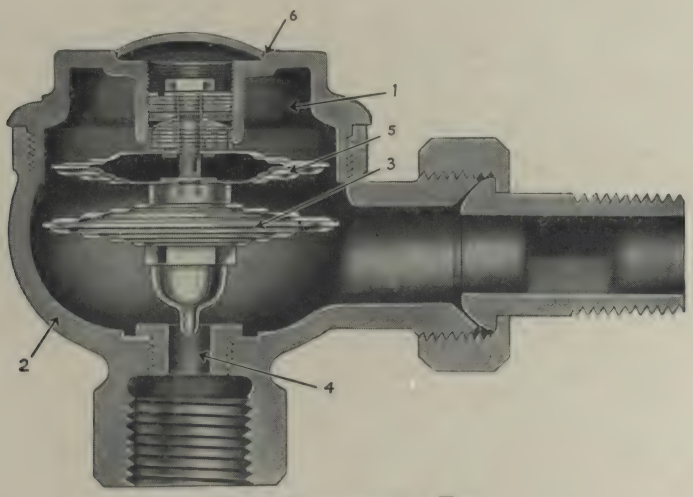
Third, as a direct action upon the Marsh Compensating Radiator Trap, it controls the amount of a given radiator which can consume steam or which is available for heating purposes.

*The symbol B.t.u. is an abbreviation for British thermal unit. It is defined as the mean amount of heat required to raise the temperature of 1 pound of water 1° F., therefore to heat a pound of water from 32° F. to 40° F. will require 8 B.t.u.

Continued on next page

"Compensating"

The invention of the Marsh Compensating Radiator Trap has brought to the heating profession a new principle of operation—that of utilizing air which is ever present in all heating systems. Heretofore, the prime object in vacuum heating systems was to purge the system of air as quickly as possible, but the Marsh Compensating Radiator Trap makes use of a portion of the air present in the radiator.



Marsh Compensating Trap

In construction, the compensating radiator trap consists of a diaphragm assembly (1) inserted into a body (2). The diaphragm assembly incorporates two distinct types of diaphragms.

The lower diaphragm (3) is identical to that of the Marsh No. 1 Series Thermostatic Traps, that is, this diaphragm is filled with a volatile fluid as the motor element and responds to the heat of steam to open or close the outlet orifice of the trap.

The upper diaphragm (5) communicates with atmosphere through leakage in the top escutcheon (6) of the trap, and is so arranged that it operates independently of the lower diaphragm.

Under conditions of steam pressure ranging from 0 pound gauge upwards, the lower diaphragm (3) functions as in an ordinary Marsh Radiator Trap closing the valve against passage of steam at corresponding temperatures.

With steam in the radiator under vacuum conditions and at correspondingly lower temperatures, the heat in contact with the lower diaphragm (3) is not sufficient to entirely close the trap, and the upper diaphragm (5), operated by the difference in pressure between the vacuum existing on the outside of the diaphragm and atmospheric pressure existing within, expands, carrying the lower diaphragm and valve piece downward to the closed position.

The two diaphragms actuated by their respective forces are so related in their operation that under all conditions of vacuum at which the heating system operates they combine to close the trap against passage of steam at corresponding temperatures.

In the process of steam condensing and through natural infiltration, air and other non-condensed gases become entrained within the radiator and, being heavier than steam, tend to settle toward the bottom of the radiator and as the trap closes under the lower temperatures after passing off condensate, these gases are entrained within the radiator occupying a certain portion of the same with the corresponding exclusion of steam from such portions. (See Fig. 4, following pages.) With the system operating under vacuum, as the temperature at which the trap opens and closes varies with the vacuum in the radiator, the portion of the radiator filled with these gases varies as the portion of the radiator available for steam decresaes or increases.

This process, which is the foundation of this new Marsh System, has been designated as "Compensating."

Continued on next page

Application of These Principles to Various Weather Conditions

The five graphs comprising Fig. 4 illustrate the application of these principles of controlling the pressure, the volume and the temperature of steam and the percentage of a radiator available for heating in the Marsh Weather Compensating System and the relation of same to maintaining the temperature to which the building is to be heated, with five typical outside temperatures.

A—Zero Weather

By referring to Fig. No. 4, the Graph A shown will illustrate the application of these principles of controlling, the pressure, volume, temperature of steam and the percentage of a radiator available for heating and the relation of same to maintaining a constant temperature within a room at 70° F. with the outside temperature varying. Graph A indicates an outside temperature of 0° F. and a required inside temperature of 70° F. Assuming a radiator of 100 square feet in size and based upon raising the temperature with this radiator from 0° to 70° F. it is necessary to circulate steam throughout the system at 1 pound pressure. At this gauge pressure 1 pound of generated steam will assume a volume of 25.2 cubic feet and have a corresponding temperature of 215.3° F. Assuming the normal efficiency at this temperature of 99 per cent, this 100 square foot radiator will have a heat emission capacity of 23,763 B.t.u. per hour, which is a sufficient heat emission to maintain a constant temperature within the room of 70° with zero outside temperature.

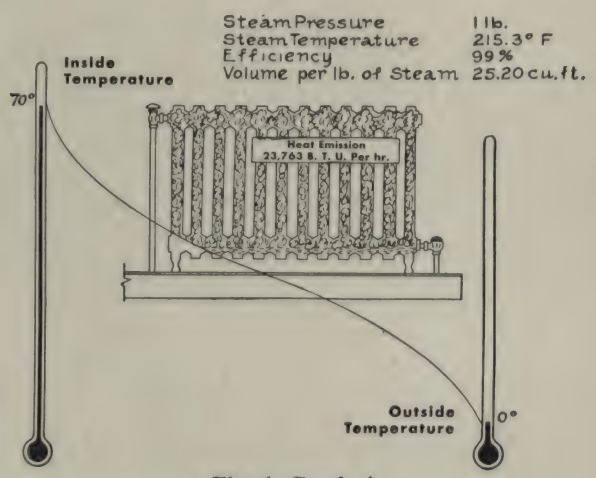


Fig. 4, Graph A

B—10° Above Zero

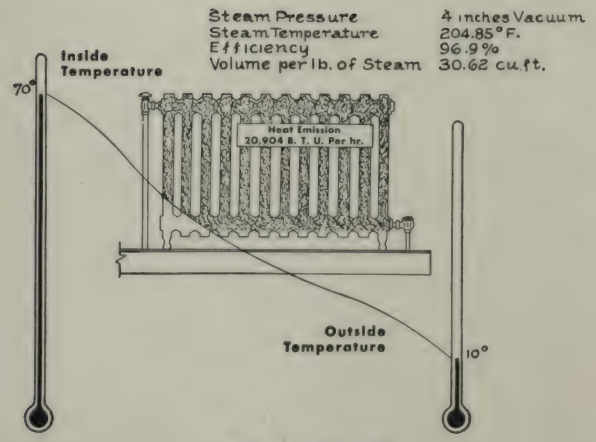


Fig. 4, Graph B

In Graph B we illustrate a condition of outside temperature at 10° F. above zero and the desire to maintain an inside temperature of 70° F. with the same radiator of 100 square feet. In the Marsh Weather Compensating System of Heating this result is arrived at by circulating steam throughout the system at a steam pressure of 4-inch vacuum gauge. At this pressure 1 pound of generated steam assumes a volume of 30.62 cubic feet with a corresponding temperature of 204.85° F. and due to the action of the steam under the sub-atmospheric pressure of 4 inches, the Marsh Compensating Trap has now functioned to reduce the efficiency of the radiator so that only 96.9 per cent of same is available for heat content or heat emission. Due to the greater volume of a pound of steam, and to the decrease in the amount of the radiator which is available for heating purposes, we now have a corresponding lower B.t.u. content in the radiator and as a result the heat emission capacity of the radiator has been reduced to 20,904 B.t.u. per hour.

Continued on next page

C—25° Above Zero

Assuming that the outside temperature has risen to a marked degree, say 25° F. above zero, the compensating action of the Marsh Compensating Radiator Trap is illustrated in Graph C. In order to maintain an inside temperature of 70° F. at the outside temperature given, the Marsh Weather Compensating System of Heating obtains this result by circulating steam throughout the system at a pressure of 10 inches vacuum. Steam generated under 10 inches vacuum will have a corresponding volume of 39.16 cubic feet per pound of steam, having a relative temperature of 192.19° F. The Marsh Compensating Radiator Trap under these conditions will automatically compensate the radiator so that only 85 per cent of the entire radiator is available for heating purposes, the remaining 15 per cent being rendered inefficient due to the action of the trap. Still assuming the radiator to be 100 square feet, and with 15 per cent of this radiator not available for heating purposes, the total heat emission for the entire radiator will be 16,515 B.t.u. per hour. This heat emission is equivalent to heat loss of the room under existing outside temperatures.

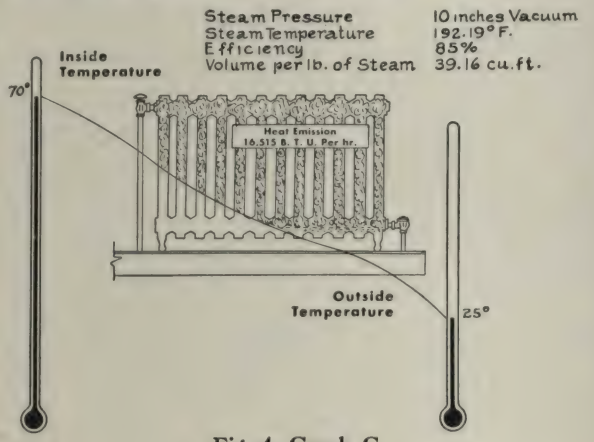


Fig. 4, Graph C

D—40° Above Zero

The same principles as explained above still apply should the outside temperature register 40° above zero (Graph D) and it will be noted that there is a marked degree of inefficiency of the radiator at this outside temperature. Under the given conditions, steam is circulated at 12-inch vacuum to the entire system. Steam at 12-inch vacuum will have a temperature of 187.21° and the volume of 1 pound of steam will be equivalent to 42.27 cubic feet.

The Marsh Compensating Radiator Trap under these conditions will automatically compensate the radiator so that now only 70 per cent of the entire radiator is available for heating purposes, the remaining 30 per cent being rendered inefficient due to the action of the trap. Still assuming the radiator to be 100 square feet in size and with 30 per cent of this radiator not available for heating purposes the total heat emission for the entire radiator will be 12,730 B.t.u. per hour. This heat emission is equivalent to the heat loss of the room under existing outside temperatures.

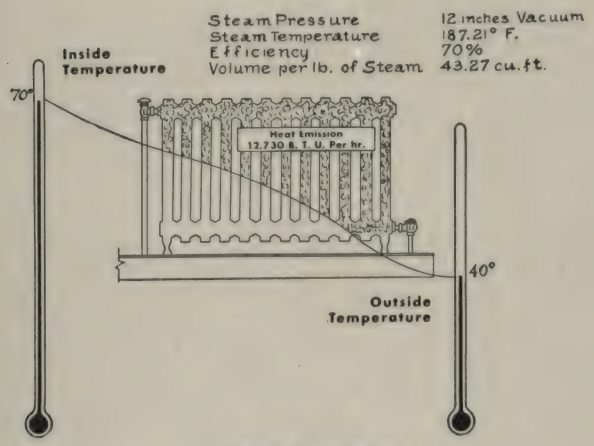


Fig. 4, Graph D

E—55° Above Zero

When outside temperatures resemble that of a mild spring or fall day, say 55° above zero, it is evident that very little heat loss occurs, and therefore the heat output of a radiator must be correspondingly reduced. When such a condition occurs, the steam as supplied to a Marsh Weather Compensating System of Heating is at a pressure of 15 inches of vacuum, having a volume of 51.3 cubic feet per pound of steam and a temperature of 178.91° F. The Marsh Compensating Radiator Trap under these conditions will automatically compensate the radiator so that now only 50 per cent of the entire radiator is available for heating purposes, the remaining 50 per cent being rendered inefficient due to the action of the trap. Still assuming the radiator to be 100 square feet in size and with 50 per cent of this radiator not available for heating purposes the total heat emission for the entire radiator will be 8,440 B.t.u. per hour. This heat emission is equivalent to the heat loss of the room.

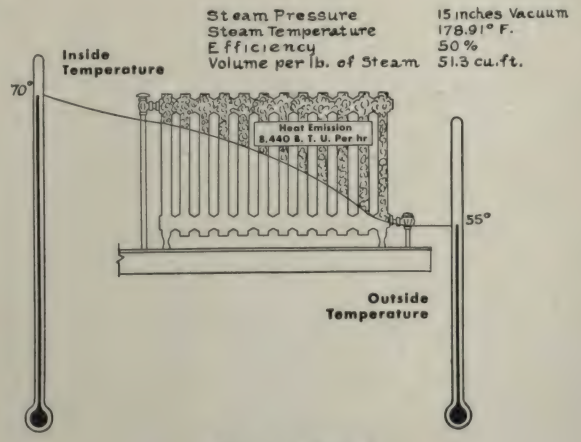


Fig. 4, Graph E

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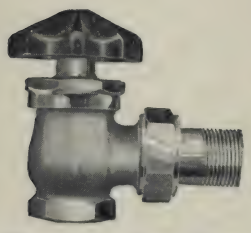
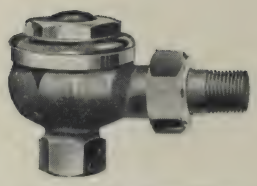
Typical Installation Marsh Weather Compensating System of Heating

Showing Customary Arrangement of Marsh System Units

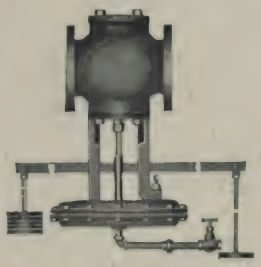


Type W Radiator Valve

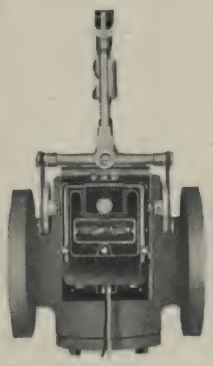


Type W Radiator Trap

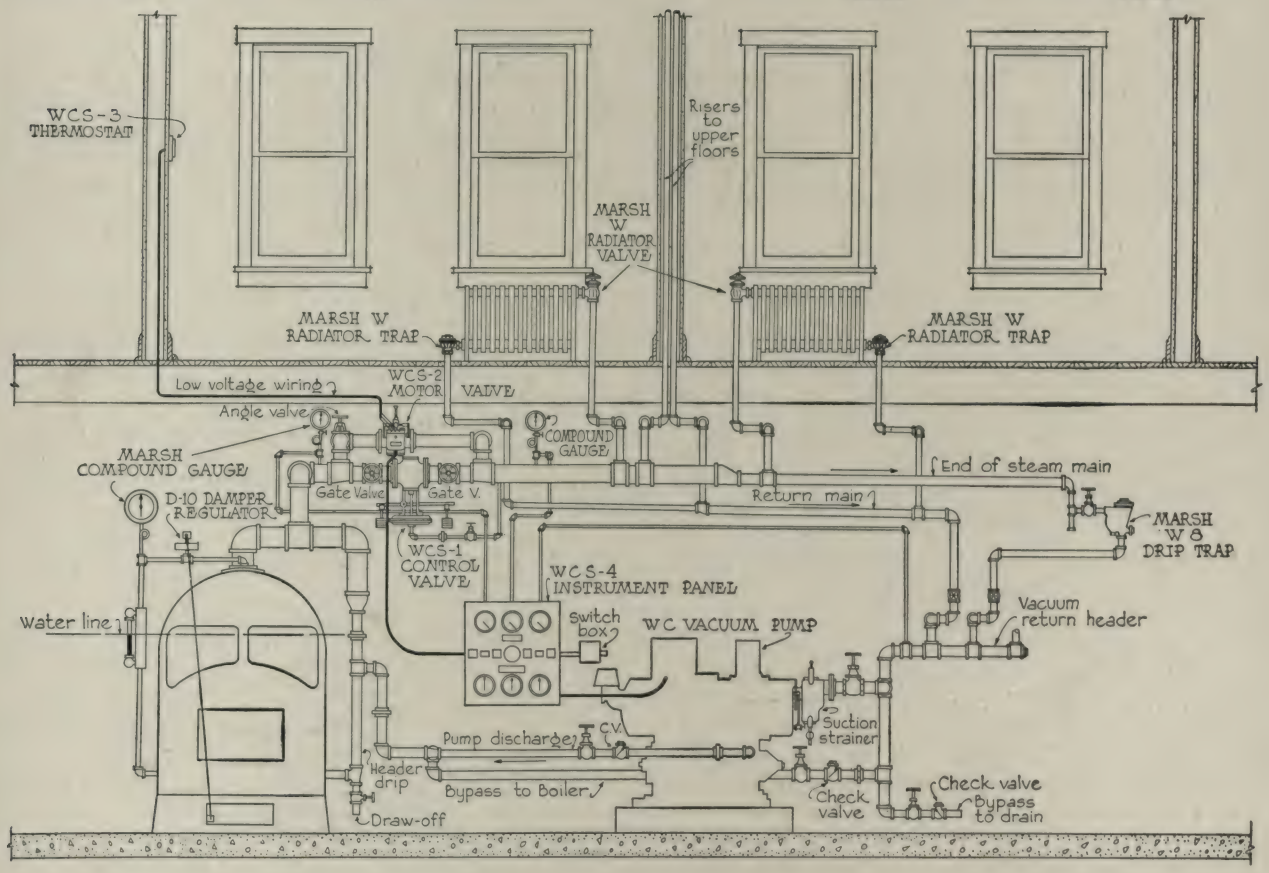
Type W Thermostat



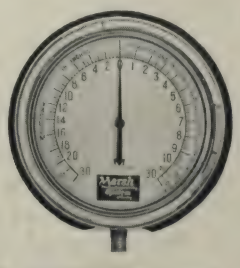
Type W Supply Control Valve



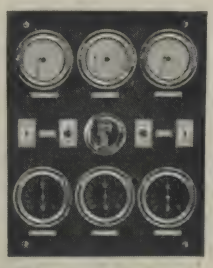
Type W Motorized Valve



Type W Damper Regulator



Type W Compound Gauge



Type W Control Panel

Type No. W-8 Drip Trap

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Description of Operation of the Marsh Weather Compensating System of Heating

The Marsh Weather Compensating System of Heating is a two pipe vacuum system operating at pressures ranging from above atmosphere to sub-atmospheric pressures as low as 15 inches of vacuum, which are varied according to prevailing weather conditions. It utilizes equipment which makes it possible to generate and circulate steam under vacuum, which, coupled with the operation of the Marsh Compensating Radiator Trap, gives perfect modulation of the radiator under all operating conditions.

The piping for a Marsh Weather Compensating System is practically the same as for an ordinary vacuum system. A series of steam and return piping is utilized to transmit steam to and return condensation and air from the radiating units. Standard trade practices as to pipe sizes, boilers, radiation and other appurtenances are followed. Steam may be supplied from a boiler plant integral with the building or from outside sources.

The system is applicable to all types of modern radiating units and may be used in conjunction with unit heaters, ventilating systems, and air conditioning apparatus.

The installation of the Compensating Radiator Valve and Trap completes the radiating unit.

The steam supply system is fitted with one or a series of compensating control valves, the type and number of which depend upon the type of building to which the system is applied. These valves control the flow and pressure of the steam into the supply system and the radiation.

The return line system follows back to a vacuum pump which is employed to create circulation and to withdraw the water of condensation from the system and return it to the boiler plant. This pump also functions to withdraw from the system such air and gases which are not utilized in the Compensating Process.

Control panels are equipped with indicating, recording and controlling instruments. Incorporated in the make-up of the control panel is the Marsh Compensating Governor which regulates the operation of the vacuum pump,

In addition to this the panel also contains switches for the operation of the various electrical units.

Zoned Type Marsh Weather Compensating Systems of Heating

Zoning, as applied to a heating system, means that the system is divided into individual circuits or zones, each zone supplying the required amount of heat to meet the demands of that particular zone, operated as a separate system in itself. This means that the correct amount of heat can be supplied to meet the conditions of outside weather to which any portion of the building is subjected. Buildings often have one side exposed to a prevailing wind, in which case, the side of the building facing this direction requires more heat than the opposite side. To meet this condition the zone supplying heat to that particular side of the building operates at a slightly higher pressure than in the other sides of the building, supplying an amount of heat to balance heat loss caused by the wind.

Sun rays likewise have a direct effect upon heating systems. A portion of a building favored by sun rays will require less heat from the system, while the shaded side of the building will require more. Where this holds true, the portion of the building favored by sun rays is operated at a lesser pressure than the shaded portions, taking advantage of the sun heat and preventing overheating.

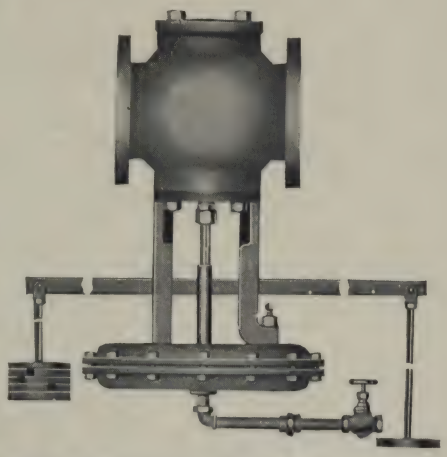
Continued on next page

Marsh Manually Controlled Weather Compensating System of Heating

On this type of system the operating engineer so manipulates the lever weights on the supply control as to obtain the desired pressure or vacuum. On coal fired boilers the pressure within the boiler is regulated by a sensitive damper regulator and where oil or gas is used devices are included with the equipment which can be regulated so as to carry the required pressure or vacuum. As an example assuming that the outside temperature is equivalent to that of a mild spring or fall day the operating engineer adjusts the weights on the supply control to pass only sufficient steam so as to maintain the desired vacuum in the house side of the supply system.

At this depth of vacuum the volume of steam circulated will be sufficient to care for existing heat demands eliminating overheating in the building, with the resultant fuel saving.

When the weather becomes colder the weights are adjusted so that the amount of steam and the vacuum in the supply system is regulated accordingly. In severe weather the weights are adjusted so pressures above atmosphere are carried in the supply system, depending upon the severity of the weather conditions.



Type W Diaphragm Supply Control Valve

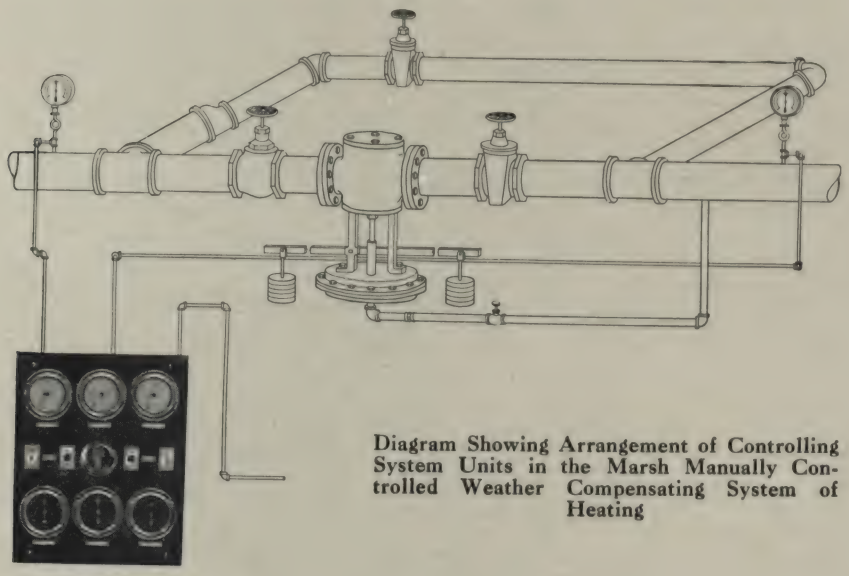


Diagram Showing Arrangement of Controlling System Units in the Marsh Manually Controlled Weather Compensating System of Heating

Marsh Semi-Automatic Weather Compensating System of Heating

This type of Marsh Weather Compensating System of Heating includes a control consisting of a Compensating sub-atmospheric supply valve and motorized by-pass valve operated by a thermostat.

The sub-atmospheric supply valve is located in the supply main proper with a three valve by-pass in which is located the motorized valve, which in turn is actuated by a thermostat located in a key position.

Continued on next page

The Compensating supply valve is so adjusted that the pressure or vacuum of steam necessary to obtain circulation at the desired temperature corresponds to that of 15 degrees above the average temperature as reported by the U. S. Weather Bureau in each particular locality. To illustrate assume a locality with an average yearly temperature of 35 degrees above zero, the adjustment on the Compensating sub-atmospheric control valve is set to the equivalent of 50 degrees.

Under these conditions the Compensating sub-atmospheric supply valve would supply sufficient steam to the system to maintain the desired inside temperature.

However, when the outside temperature drops in turn, affecting the demand for heat within the building, the thermostat will act, causing the Compensating motorized by-pass valve to open to supply the additional steam necessary.

Where desired, manual switches are provided on the control panel so that the automatic control may be opened entirely for quick heating up periods.

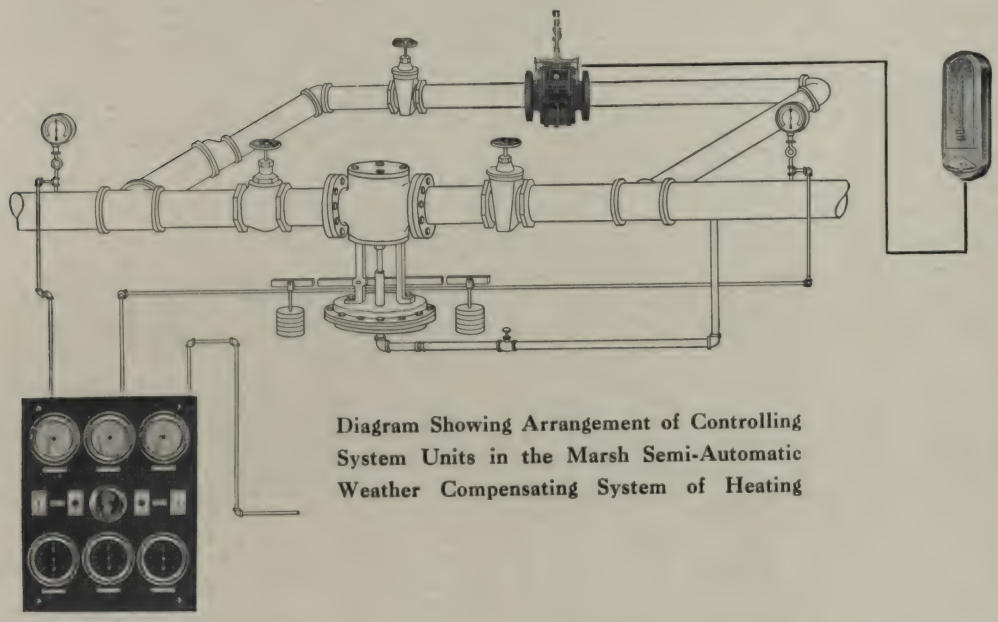


Diagram Showing Arrangement of Controlling System Units in the Marsh Semi-Automatic Weather Compensating System of Heating

In this type of system the number of adjustments required are few for the average heating season. The extent of the adjustments is to remove or add a small weight to lever arm of compensating supply valve.

Marsh Automatic Weather Compensating System of Heating

Where entirely automatic operation is desired the Automatic Weather Compensating System of Heating is supplied.

In this system supply control consists of a Compensating supply valve entirely actuated by a series of thermostats and motors.

A series of outside thermostats each operating within a given range controls the Compensating supply valve to allow the proper amount of steam for each range of temperature to enter the system. An inside thermostat acts as a master to control the action of the outside thermostats.

Where desired, manual switches are provided on the control panel so that the compensating supply valve may be fully opened for quick heating up periods.

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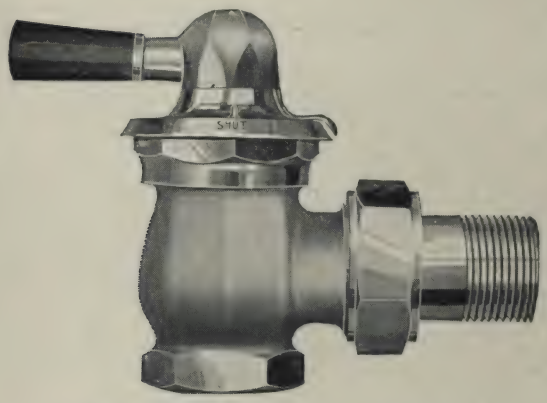
Marsh Weather Compensating System Units

The following pages are devoted to a description of the necessary System Units and their application to the various types of Marsh Weather Compensating Systems of Heating. Realizing that any system of heating is no better than the units of which enter into the building of it, JAS. P. MARSH & COMPANY has utilized its many years of experience to develop the necessary perfection of these units to assure an unfailing and accurate delivery of heat.

The Marsh Weather Compensating System Units described in the following pages are most modern in design and in principle of operation. Beauty is featured in these units where beauty is essential, yet efficiency in operation and sturdiness in design has been the prime object in the production of the system units comprising the various types of Marsh Weather Compensating Systems of Heating. The controlling system units described have been designed to meet the demands of modern methods of heating, providing ease and simplicity in operation and permitting the system to be operated flexibly to provide the correct amount of heat as prevailing weather conditions demand.



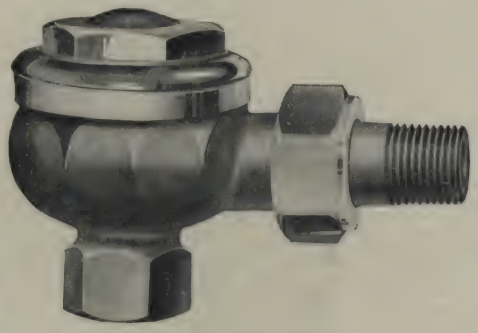
Type W Radiator Valve

The purpose of the Type W Radiator Valve is to allow the room occupant to either prevent the admission of steam altogether or allow the steam to enter in amounts that are taken care of, according to the weather, by the operation of the weather compensating system.

The octagonal body lines of the Type W Radiator Valve blend perfectly with the body lines found in the modern tubular radiator, and as installed in combination with the Type W Radiator Trap, has a pleasing effect. The Type W Radiator Valve stands out in pleasing relief in a two-tone chrome finish; the body in satin chrome and the bonnet and tailpiece in polished chrome. A handle crowns the Type W Radiator Valve, lending itself to easy opening or closing of the valve.

The interior construction of this valve is unique, utilizing two monel metal discs and two stainless steel discs as the packless feature, which makes possible the elimination of the conventional spring, composition packing glands, bellows or multiple diaphragms found in most radiator valves today.

Data on valve extensions and other accessories are given in bulletin No. 150.



Type W Radiator Trap

One of the most important system units incorporated into all types of Marsh Weather Compensating Systems of Heating is the Type W Compensating Radiator Trap. Upon it falls the duty of constantly restricting the heat output of the radiator so that regardless of outside weather conditions the heat output of the radiator will balance that of heat demand. The compensating effect of the Type W Compensating Radiator Trap has been acknowledged as an outstanding development in heating systems.

A careful study of the octagonal body lines of the Type W Compensating Radiator Trap will show a pronounced similarity to the body lines of the modern tubular radiator; likewise, its contour resembles that of the Type W Radiator Valve. As installed on the radiator in combination with the Type W Radiator Valve, it not only performs its compensating action but also tends to beautify the radiator, which as a whole blends with modern interior decorations.

The Type W Compensating Radiator Trap is finished in two-tone chrome; the body in a satin finish chrome and the bonnet and tailpiece in polished chrome.

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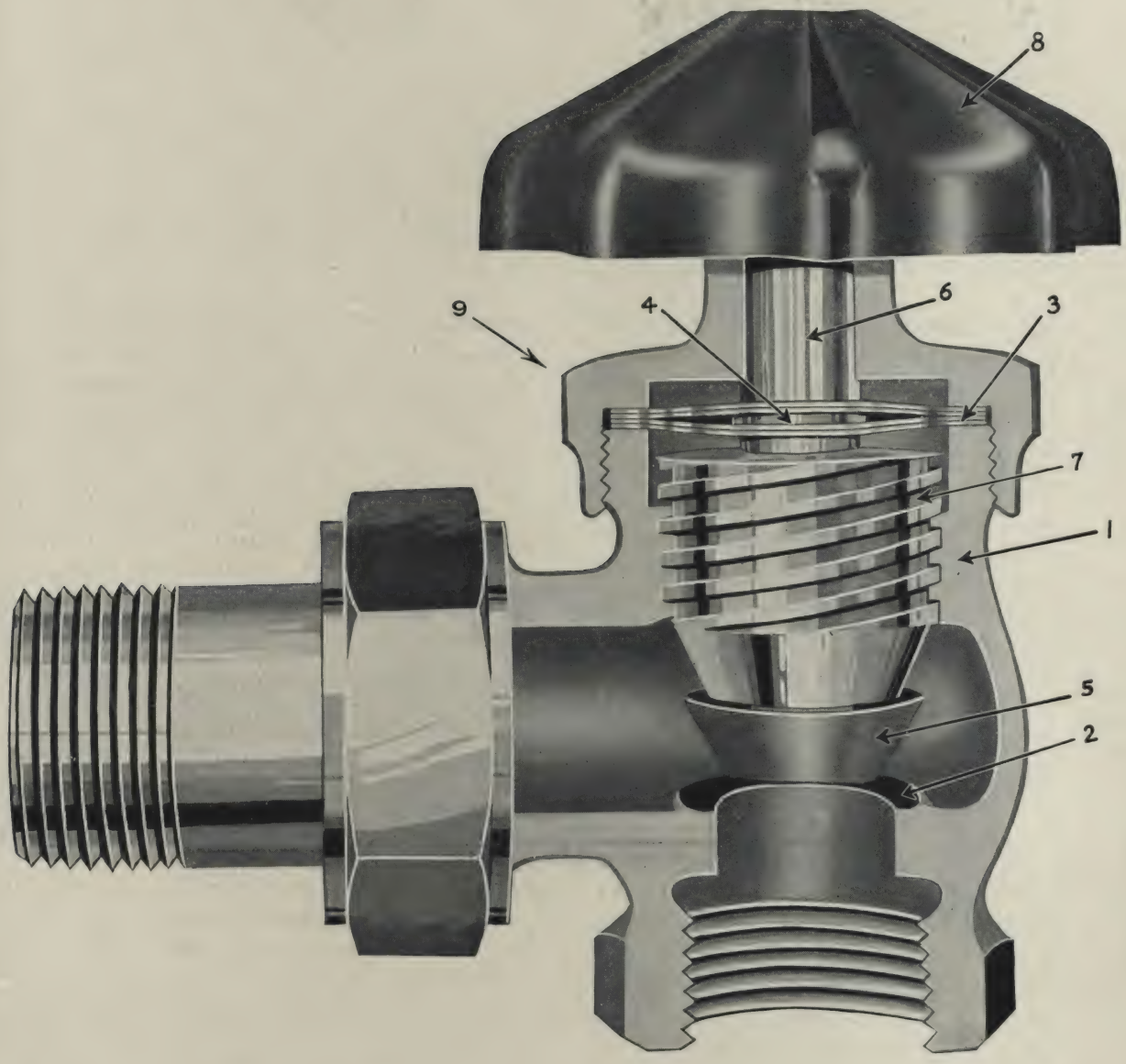
View Showing Interior and Construction of the Marsh System Unit Packless Radiator Valve



1—Valve Body
2—Valve Seat
3—Metalflex Sealing Discs
4—Stem Collar
5—Flexcone Valve Disc
6—Valve Stem
7—Thrust Screw
8—Bakelite Handle
9—Valve Bonnet

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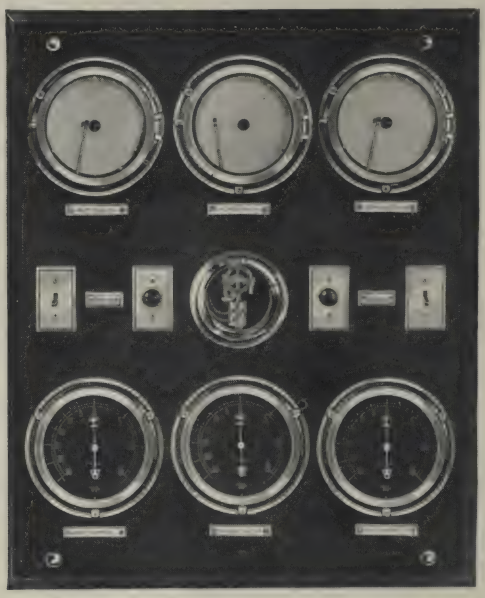


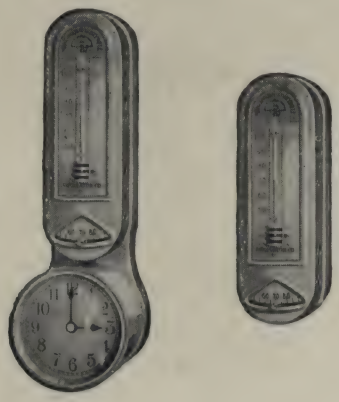
Compensating Control Panel

Control panels for use on Marsh Weather Compensating Systems of Heating are designed to met the requirements of individual installations, primarily intended to indicate to the operator of the system the conditions under which the system is operating at the time of observation, likewise serving as the controlling unit to maintain the required differential between supply and return systems.

Marsh Recording Gauges are employed to provide the operating engineer with a permanent record of the pressures carried on the initial steam supply line, the house supply line and the depth of vacuum carried on the return system. For observation purposes, Marsh Indicating Gauges are included on the control panel to correspond to the recording gauges, permitting the operator to determine at a glance the conditions existing in the supply and return systems.

As the control unit, each control panel is equipped with a Marsh Weather Compensating Governor together with a Marsh Mercury-to-Mercury Switch. The governor is self-adjusted, and equipped with lock box and key to prevent unauthorized persons to tamper with adjustment. Knock-out boxes are provided for conduit to street service and for conduit from mercury switch to vacuum pump. Bulls-eye lights and snap switches are included to indicate to the operator the "on" and "off" positions of vacuum pump. All connections to gauges and governor are piped up with copper tubing, requiring a minimum of piping to be installed on the job.

Where desired manual switches are provided on the control panel so that the automatic supply control may be opened entirely for quick heating up periods.



Type WC Thermostats

Marsh Semi-Automatic and Full Automatic Weather Compensating Systems of Heating utilize the Type WC Thermostat as the temperature regulating medium, and by automatically maintaining the required temperature contribute to the conservation of fuel. The actuating means of the thermostat is a bimetallic strip of such sensitivity that a temperature change of 1 degree causes operation of motor included in its circuit. Equipped with an indicating spirit thermometer to show operating engineer the existing temperature condition in the building. Key adjustment enables the required temperature to be set at any point between 50° F. and 90° F., the key adjusting feature preventing unauthorized parties changing the indicator setting.

On semi-automatic systems, one thermostat is required for each circuit or zone of supply piping, specified as:

WCS-3 Thermostat

The thermostat on the semi-automatic system is located at a point where the mean conditions exist, termed as the "key position."

On the full automatic system, a thermostat identical to that used on the semi-automatic system is located at a key position and is designated as the WCA-3A Thermostat. In addition to the inside thermostat, the full automatic system employs a system of thermostats located on the outside of the building, comprising several thermostats having various temperature settings to correspond to weather conditions in that locality. The entire group of thermostats are protected by a marine box, permanently set and locked in the box to prevent tampering with adjustments.

This group of thermostats with marine box is specified as:

WCA-3 Multiple Thermostat Box

Type WC Thermostats are arranged for stand- and three-wire low voltage wiring.

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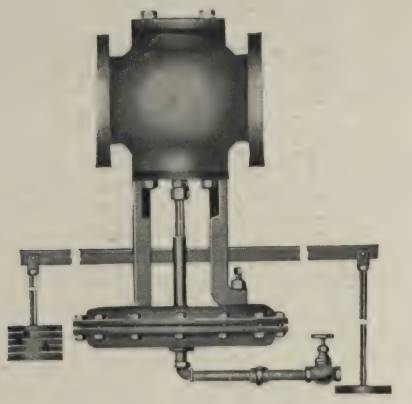
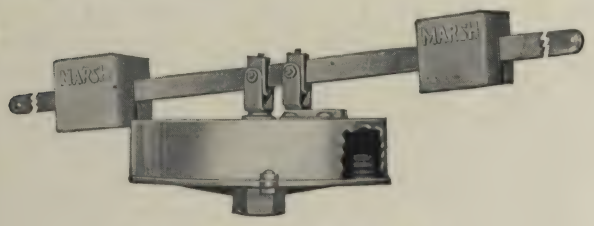


Type WC Diaphragm Supply Control Valve

A sub-atmospheric control valve employed on most types of Weather Compensating Systems of Heating. In general, the valve body and diaphragm chamber is of cast iron with standard drilled flanged ends. Extra large valve port is obtained by a double valve arrangement, having bronze seats and guides rigidly attached to the diaphragm by a brass post. Diaphragm is of a special composition rubber of very large proportions, which makes possible a close regulation of pressures. As a protection against over-pressure in the supply side of the system, an equalizing connection is provided in the base of the diaphragm chamber. This equalizing pipe should be installed in the *bottom* of the supply pipe on the reduced side of the system, and it is equally important that the equalizing pipe be filled with water at least 3 inches above top of the diaphragm chamber before being put in operation to prevent steam coming in contact with the diaphragm.

The adjustment of this valve is obtained by an arrangement of fulcrum arms and weights, which in turn actuate the double valves. A correct adjustment for a given pressure may be obtained by the removal or addition of the weights supplied with this valve. Type WC Diaphragm Control Valves furnished in sizes 2 to 18 inches, standard flanged ends, complete with companion flanges and bolts, faced and drilled.

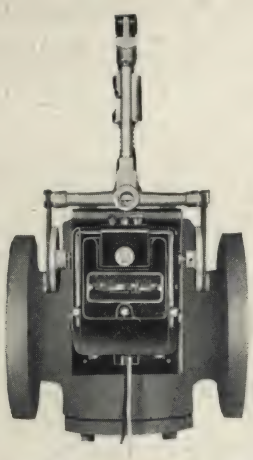
On Manual Control Weather Compensating Systems of Heating the WCM-1 Diaphragm Control Valve is employed.



Boiler Damper Regulator

This device functions to control the dampers on hand fired coal boilers. A lever arm is automatically actuated to control the dampers.

In stoker, oil or gas fired boilers Marsh Merkustat Regulators are provided.

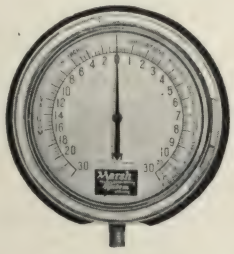


Type WC Motor Valve

The valve proper is a balanced valve having a sturdy motor mounted thereon to open or close the valve according to the action of the thermostat. Motor is arranged to operate on 110 volt, 60 cycle alternating current, having an automatic feature of reducing the current to low voltage for the thermostat circuit, eliminating a transformer to reduce the current to low voltage. An arrangement of gears, eccentric cams and levers allows a complete opening or closing of the valve in 30 seconds. Valve proper has cast iron body, double bronze seat and guides, and other trimmings of bronze.

On full automatic weather compensating systems of heating, the WCA-2 Motor Valve is used. The valve proper is a WC-1 Control Valve equipped with sensitive diaphragm, lever and weights, illustrated in this section. The same type WC Motor is used on this valve as is used on the WCS-2 Motor Valve, designed to actuate according to variations in temperature recorded by thermostats located in the WCA-3 Multiple Thermostat Box.

Both Type WCS-2 and Type WCA-2 Motor Valves can be furnished in sizes from 2 to 18 inches, flanged ends complete with companion flanges and bolts, faced and drilled.



Type W Indicating Gauge

This instrument is provided as a regular part of all Marsh Weather Compensating Systems for installation on the house side of supply and return systems, also for installation on boilers. Pressure is graduated to 10 pounds in magnified reading and retarded to 30 pounds. Vacuum is graduated to 20 inches in magnified readings and retarded to 30 inches.

Continued on next page

Marsh Type W Drip Traps

Marsh No. W-8 Drip Trap

This trap is continuous in discharge and is designed to quickly remove condensation and air from drip points on steam mains, steam risers, steam coils, or blast heaters, or for any like service within the capacity of the trap.

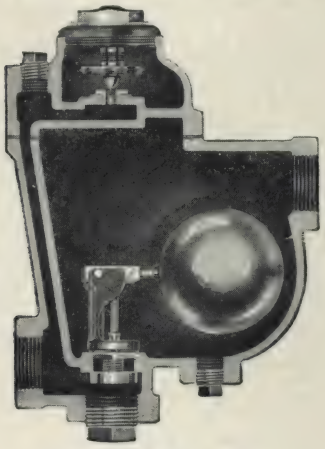
The design permits a deep water seal on the discharge valve. This water discharge valve is float controlled and located at a low point in the bottom of the trap and air is removed through a thermostatically controlled port in the cap of the trap. The by-pass member used is the standard assembly as in the No. W-1 compensating radiator trap. Normally air is discharged through a port directly to the outlet connections of the trap. In cases where the trap may be required to discharge to a wet return the air discharge may be connected to a dry return from a special opening tapped in the cap of the trap.

Body of trap is provided with one 1¼-inch tapped inlet and two 1¼-inch tapped outlet openings. These openings are located so as to permit direct connection both to inlet and from outlets.

The trap may be suspended directly in the piping and no other supports are necessary. The compensating element screws directly in the cap of the trap and is interchangeable with the element from our No. W-1 compensating radiator trap.

All interior parts are of forged bronze castings with the exception of the float which is a seamless copper float tested for a working pressure of 25 pounds per square inch.

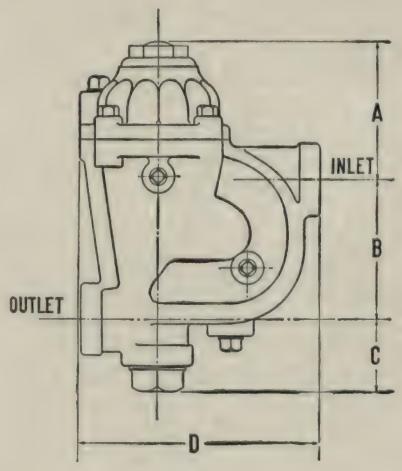
Copper asbestos gaskets are used throughout which avoid the necessity of supplying new gaskets whenever trap may be opened for inspection or repair.



No. W-8 Drip Trap

CONNECTION SIZES
1¼-in. Inlet
1¼-in. Outlet

DIMENSIONS
A—4⅜ in.
B—4⅛ in.
C—2¼ in.
D—7 1/16 in.



Marsh No. W-12 Drip Trap

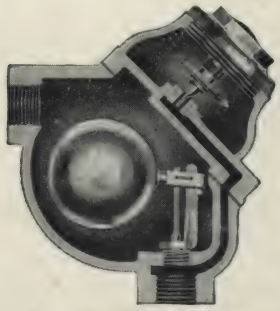
Designed for removal or air and condensation from short steam mains, branches or riser. Unit heaters, steam coils, etc., are within the limits of the capacity of the trap.

The size and weight of the trap permits its installation in the piping without any other means of support.

Condensation is removed through a float operated valve located at the lowest point inside the trap body. Air removal is located in the cap of the trap. Air passes through a passageway and out through the trap outlet.

Body of trap is of cast iron and all interior parts are of forged steam bronze, copper and monel metal.

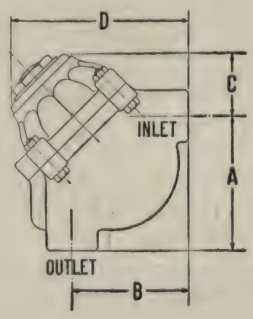
The by-pass member is interchangeable with the member of the standard No. W-1 compensating radiator trap.



No. W-12 Drip Trap

CONNECTION SIZES
¾-in. Inlet
¾-in. Outlet

DIMENSIONS
A—4½ in.
B—3⅞ in.
C—1⅞ in.
D—6 in.



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Marsh Type W Heavy Duty Traps

Marsh No. W-9 Heavy Duty Trap

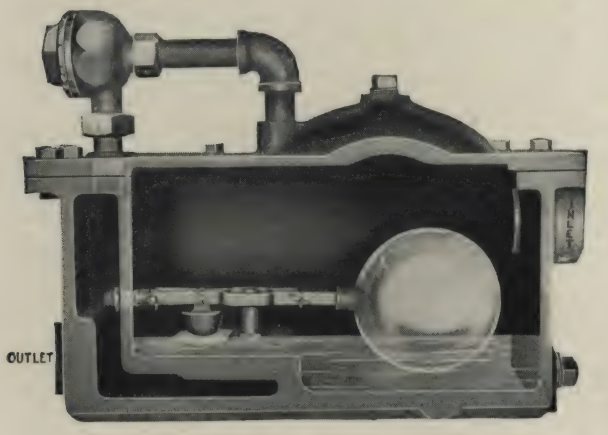
The Marsh No. W-9 Heavy Duty Trap has a wide field in which it may be applied to equipment using steam as a heating element. This trap was designed especially for services where very large volumes of water and air must be taken care of as rapidly as possible, adding greatly to the efficient operation of the equipment upon which it is applied during the initial starting-up period.

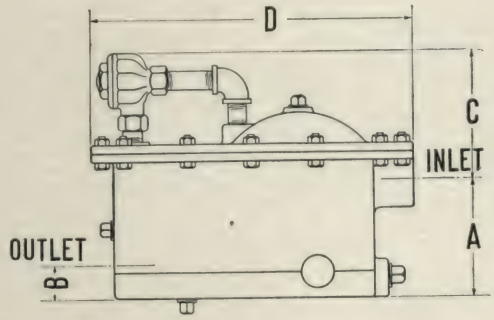
The Marsh No. W-9 Heavy Duty Trap may be applied to any service requiring this type of trap, where the discharge of the trap is connected directly into the vacuum return line, such as main risers, bleeder lines, large unit heaters and occasionally, vento. In the case of vento heaters and hot water storage heaters, steam is usually supplied by individual supply lines directly from the source of supply at pressures ranging from 1 to 10 pounds. Such equipment must be treated differently in so far as return lines are concerned.

Usually, the returns from these units are handled through standard heavy duty traps directly into a condensation pump instead of discharging into a vacuum return line, primarily because hot condensate discharged into the vacuum return line will cause the condensate to flash back into steam. Where such an arrangement is incorporated into a Marsh Weather Compensating System of Heating, a standard Marsh No. 9 Heavy Duty Trap is used.

Where the system can be so designed that vento neaters are supplied with steam ranging from 2 pounds to sub-atmospheric pressures, the condensate can be discharged into the vacuum return line in the same manner as condensate from the direct radiation. In such cases, the Marsh No. W-9 Heavy Duty Trap is utilized having a No. W-1 Compensating Trap incorporated into the air by-pass.

In construction the Marsh No. W-9 Heavy Duty Trap is built to not only handle large volumes of water and air but is also designed to withstand heavy duty service. The body proper is of heavy cast iron, equipped with a removable cover. Extra proportions of metal are placed at the inlet and outlet stress points and it is also equipped with a plugged connection for draining. The entire float mechanism is of non-corrosive metals and so arranged to permit through passage of water. The ball float is of large proportions of heavy copper, designed to withstand pressures up to 25 pounds. The valve and valve seats are so arranged that at all times they are water sealed and likewise prevent accumulation of dirt interfering with a tight seat. As an integral part of the cover the Marsh No. W-1 Compensating Trap is incorporated as a means of eliminating accumulated air. This unit is rigidly attached to the cover permitting the entire cover and Compensating trap to be taken off should it be necessary to remove the cover for cleaning.





Spec. Symbol	Size	A	B	C	D
W-9-C W-9-D	1 ″ 1¼″	5½″	1½″	5 1/16″	14½″
W-9-E W-9-F	1½″ 2 ″	5⅝″	1¾″	6½″	16¼″

Marsh Compensating Return Line Regulating Equipment

This equipment permits vento heaters, hot water storage heaters, etc., which are operated at higher pressures, to be connected directly into the return line of a Weather Compensating System without the installation of a condensation pump.

The equipment consists of a standard No. 9 Series Heavy Duty Trap, a float and valve accumulator tank and a vacuum regulator, the latter installed in a by-pass around the accumulator. One set is installed for each group of pressure heating units.

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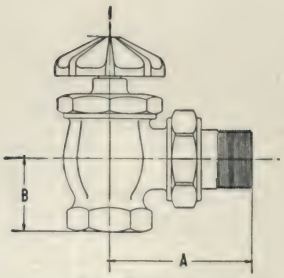
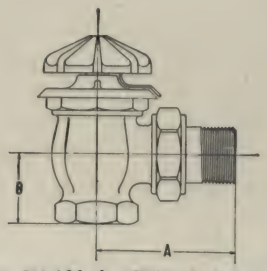
Patterns and Roughing-in Dimensions of Marsh Type W Radiator Valves



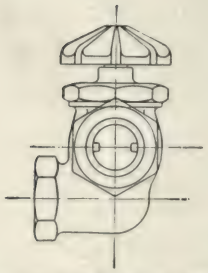
No. W-100-A (Angle)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	1 3/16"
¾"	2⅞"	1 3/16"
1 "	3⅛"	1 3/16"
1¼"	3⅝"	1¾"
1½"	3⅞"	1½"
2 "	4⅜"	2⅜"



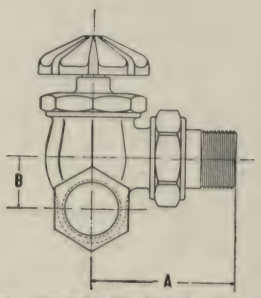
No. W-101-A (Wheel Angle—Graduated)



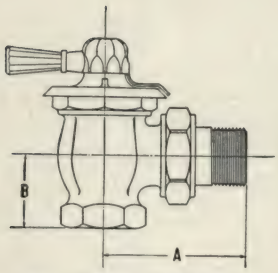
No. W-100-L (Left Hand Corner)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	¾"
¾"	2⅞"	27/32"
1 "	3⅛"	⅞"
1¼"	3⅝"	1⅛"
1½"	3⅞"	1¼"
2 "	4⅜"	1½"



No. W-100-R (Right Hand Corner)



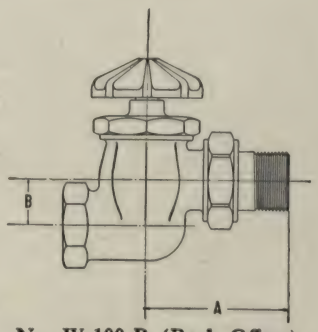
No. W-102-A (Lever Handle)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	1 3/16"
¾"	2⅞"	1 3/16"
1 "	3⅛"	1 3/16"
1¼"	3⅝"	1¾"
1½"	3⅞"	1½"
2 "	4⅜"	2⅜"

DIMENSIONS IN INCHES

Sizes	A	B
½"	1⅜"	2⅜"
¾"	1⅜"	2⅞"
1 "	1 1/16"	3⅛"
1¼"	2 "	3⅝"
1½"	2⅜"	3⅞"
2 "	3 1/16"	4⅜"



No. W-100-B (Back Offset)

Explanation of Dimensional Tables

Type No. W-101 (Wheel Handle) and Type No. W-102 (Lever Handle) Graduated Valves as made in left hand corner pattern, right hand corner pattern and back offset pattern have the same roughing-in dimensions shown above for the Type W-100 Valves in these patterns. Roughing-in dimensions for Type Nos. W-103 Lock and Shield Packless Valves and W-104 Lock and Shield Graduated Valves in all patterns are the same as Type No. W-100.

TYPES AND PATTERNS OF MARSH SYSTEM UNIT RADIATOR VALVES

Type	Pattern	Symbol
Wheel Handle	Angle	W-100-A
Wheel Handle	Left Hand Corner	W-100-L
Wheel Handle	Right Hand Corner	W-100-R
Wheel Handle	Back Offset	W-100-B
Wheel Handle Graduated	Angle	W-101-A
Wheel Handle Graduated	Left Hand Corner	W-101-L
Wheel Handle Graduated	Right Hand Corner	W-101-R
Wheel Handle Graduated	Back Offset	W-101-B

Type	Pattern	Symbol
Lever Handle Graduated	Angle	W-102-A
Lever Handle Graduated	Left Hand Corner	W-102-L
Lever Handle Graduated	Right Hand Corner	W-102-R
Lever Handle Graduated	Back Offset	W-102-B
Lock and Shield	Angle	W-103-A
Lock and Shield	Left Hand Corner	W-103-L
Lock and Shield	Right Hand Corner	W-103-R
Lock and Shield	Back Offset	W-103-B

Note: Lock and shield construction can also be supplied in the graduated type valve—specified as No. W-104—in any pattern listed above.

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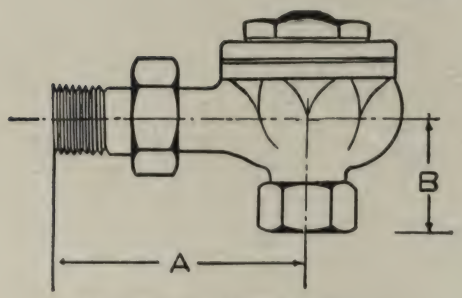
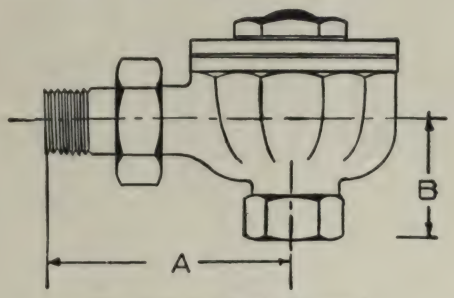
Patterns and Roughing-in Dimensions of Marsh Type W Radiator Traps



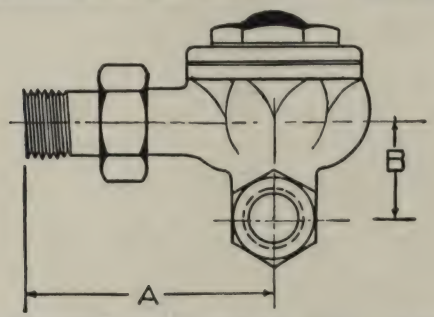
No. W-1-A (Angle Pattern)

Size	Capacity	A	B
½"	150 sq. ft.	3¼"	1½"



No. W-2-A (Angle Pattern)

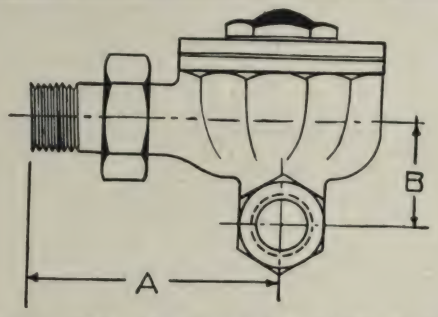
Size	Capacity	A	B
½"	200 sq. ft.	3½"	1 7/16"



No. W-1-R (Right Hand) and No. W-1-L (Left Hand Corner Pattern)

Size	Capacity	A	B
½"	150 sq. ft.	3¼"	1¼"

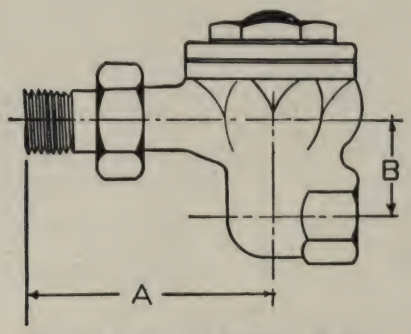
Dimensions on right and left hand patterns are identical.



No. W-2-R (Right Hand) and No. W-2-L (Left Hand Corner Pattern)

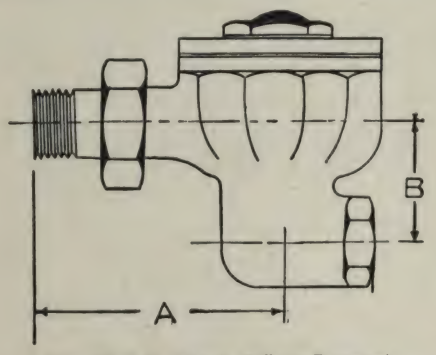
Size	Capacity	A	B
½"	200 sq. ft.	3¾"	1¼"

Dimensions on right and left hand patterns are identical.



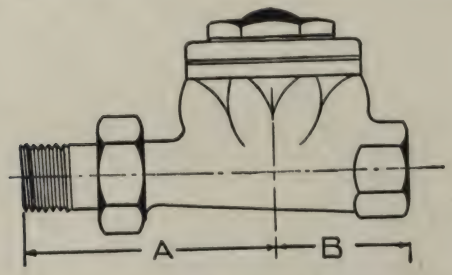
No. W-1-B (Back Offset Pattern)

Size	Capacity	A	B	C
½"	150 sq. ft.	3¼"	1¼"	1⅛"



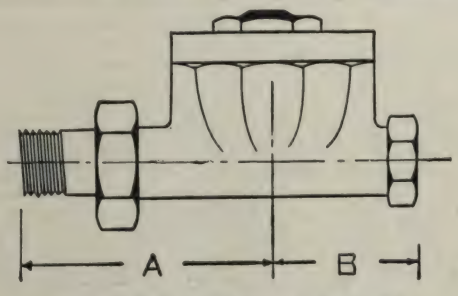
No. W-2-B (Back Offset Pattern)

Size	Capacity	A	B	C
½"	200 sq. ft.	3⅞"	1¼"	1⅜"



No. W-1-S (Straightway Pattern)

Size	Capacity	A	B
½"	150 sq. ft.	3¼"	1¾"



No. W-2-S (Straightway Pattern)

Size	Capacity	A	B
½"	200 sq. ft.	3¾"	2"

Continued on next page

Typical Specification for Marsh Weather Compensating System of Heating

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with standard practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete installation of a Marsh Weather Compensating System of Heating as hereinafter specified and as shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Boiler shall be a .... with guaranteed rating for .... sq. ft. of radiation and shall contain .... sq. ft. of heating surface. Boiler shall be installed upon suitable foundation and equipped with all connections and trimmings. For automatic stoker, oil or gas-fired boilers provision shall be made for connection of this apparatus to boiler in accordance with manufacturer's instructions.

4. Smoke Pipe—Connect boiler to chimney with suitable smoke pipe of ..... gauge black steel, of size as recommended by boiler manufacturer.

5. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure a complete and successful operation of the system. Joints to be made up with a paste consisting of Portland cement and boiled linseed oil applied to male threads only. Provision to be made for expansion in all mains, risers and branches.

Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam opening, same to be dripped to return header through a bleeder. All spring pieces to mains shall be taken out of top of mains at 45 deg. on upfeed systems and out of bottom of steam mains at 90 deg. on downfeed systems.

Supply mains shall be graded to ½ in. in 10 ft. away from boiler and dripped through Type W Drip Traps. Runouts or branches to radiators or risers to be graded not less than 1 in. in 10 ft. towards supply mains.

Return mains shall be graded 1 in. in 10 ft. in direction of flow and shall be free from sags or pockets. No loop connections shall be used in return mains.

6. Floor Plates—Where pipes project through finished floors, ceilings or walls provide approved nickel plated floor or ceiling plates.

7. Vacuum Pump—Furnish and install vacuum pump as supplied by Jas. P. Marsh & Co. as shown on plan. Pump to have capacity of ..... sq. ft. of radiation, to be full automatic for .... volts, ... phase, ... cycle, to be duplex unit consisting of two pumps with their respective motors, one receiving tank, necessary float and automatic control, check valves, gate valves, switches, etc., for complete installation ready to run. Vacuum pumps shall be of air capacity and equipped with Marsh Compensating Controls to automatically maintain the necessary difference in pressure between supply and return with maximum of 15 in. of vacuum in supply side when full load of radiation is on.

8. Supply Control Valves—This contractor shall furnish and install supply control valves as furnished by Jas. P. Marsh & Co. and as shown on drawings. These valves shall be valved and by-passed as shown on plan. Where motorized by-pass valves are installed they shall be connected up ready to run, including all necessary wiring.

9. Control Panels—Install where shown on plans Marsh control panel having all necessary recording and indicating instruments and compensating governor, with all necessary switches and wiring and auxiliary piping completely installed by this contractor.

Where thermostats are used they shall be installed as recommended by Jas. P. Marsh & Co. and completely wired up to their respective motors.

10. Radiator Traps—Each radiator shall be provided with a Marsh Type W Compensating Radiator Trap of proper size as manufactured by Jas. P. Marsh & Co.

TAPPING SCHEDULE

Sqt. ft.	Valve	Trap
0– 30	½" Type W	½" No. W-1
31– 80	¾" Type W	½" No. W-1
81–125	1 " Type W	½" No. W-1
126–175	1¼" Type W	½" No. W-2
176–250	1½" Type W	½" No. W-2

11. Radiator Valves—Each radiator shall be equipped with a Jas. P. Marsh & Co. Type W Flexcone Radiator Valve of proper capacity.

12. Radiation—Furnish and install radiation shown on plan. All radiation to be of approved make. Radiation shall be washed and cleaned at the factory and shipped equipped with wooden plugs in supply and return ends.

13. Hot Water Heaters—Returns from this equipment shall be either handled separately by a condensation pump direct to the boilers or shall be dripped into the vacuum return to heavy duty traps in accordance with manufacturer's instructions.

14. Ventilating Apparatus—Steam coils in connection with this type of apparatus shall be handled generally as is the hot water heating equipment.

15. Covering—Cover all steam mains and spring pieces with 1 in. thick asbestos sectional covering. Cover all fittings with asbestos cement. All piping run on outside walls or within 18 in. of same shall be covered with ½ in. thick asbestos covering. Cover boiler as specified by boiler manufacturer. Smoke pipe is to be covered with asbestos blocks wired on and finished smooth with coat of asbestos cement.

16. Painting—Where painting is included on this contract all exposed piping and radiators in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed. Exposed parts on boiler to be given two coats of graphite paint.

17. Check Valves—Check valves shall be horizontal type with brass disc, best grade obtainable. They shall be installed where called for by plans and shall be tested for tightness before final connections are made.

18. Text for Tightness—The system when finished shall be tested for tightness in presence of a representative of Jas. P. Marsh & Co. A drop of 10 in. of vacuum in one hour will be allowed, measured from a maximum of 15 in. of vacuum secured when system is filled with steam. At this point the steam supply valve shall be closed, the pump stopped and at the end of an hour 5 in. of vacuum shall remain in the steam side of the system.

19. Guarantee—The heating contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise, with a vacuum of 15 in. in steam main. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season and that defect is due to faulty material or poor workmanship, the heating contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

20. Inspection—Jas. P. Marsh & Co. will have a representative come on the job from time to time for inspection work and any instructions given by him in writing regarding changes shall be considered a part of this specification. The heating contractor must lend any assistance necessary in connection with these inspections.

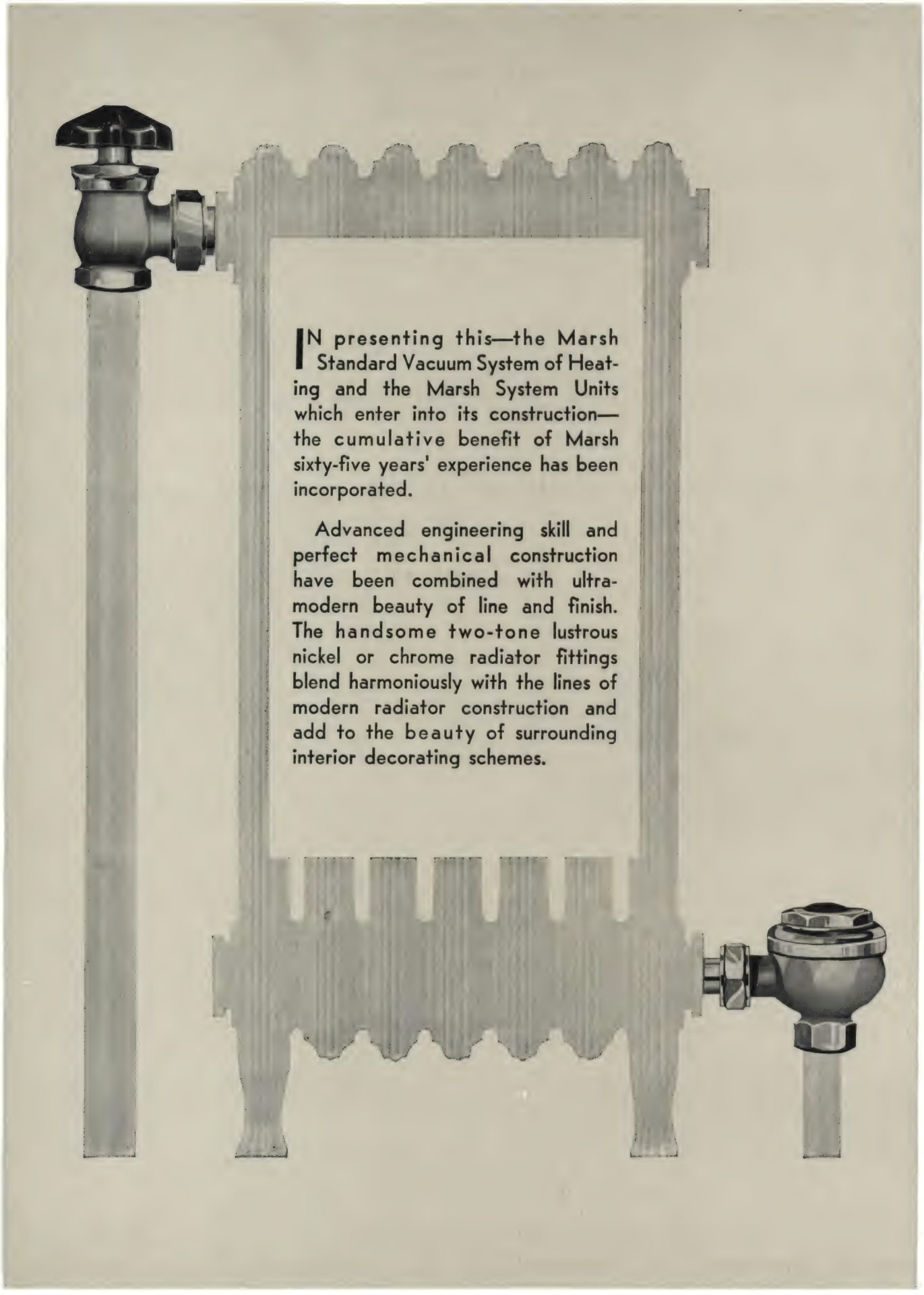
21. Finally—The true intent and meaning of these specifications is to bring about the satisfactory installation of a Marsh Weather Compensating System of Heating and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work. Upon satisfactory completion and inspection, Jas. P. Marsh & Co. will issue to the heating contractor a certificate certifying correct installation and operation of the Marsh Compensating equipment, which certificate shall be executed in duplicate, one copy to be delivered by heating contractor to the architect.

THE MARSH STANDARD VACUUM SYSTEM OF HEATING

Bulletin No. 75

for Apartment Commercial and Public Buildings

JAS. P. MARSH & COMPANY
CHICAGO



IN presenting this—the Marsh Standard Vacuum System of Heating and the Marsh System Units which enter into its construction—the cumulative benefit of Marsh sixty-five years' experience has been incorporated.

Advanced engineering skill and perfect mechanical construction have been combined with ultra-modern beauty of line and finish. The handsome two-tone lustrous nickel or chrome radiator fittings blend harmoniously with the lines of modern radiator construction and add to the beauty of surrounding interior decorating schemes.

THE MARSH STANDARD VACUUM SYSTEM OF HEATING

THE Marsh Standard Vacuum System of Heating is a two pipe system, especially adaptable to the larger type of apartment buildings, office buildings, hospitals, and public buildings. With this type of system it is possible to circulate steam at low pressures, obtaining rapid circulation.

In this system it is necessary to mechanically create a vacuum on the return line, by means of a steam or electrically driven vacuum pump. The purpose of the vacuum pump is twofold: to purge the system of air, thereby reducing the pressure in the return lines, and to return the water of condensation back to the boiler. The system may be designed upfeed or downfeed, that is, to supply the radiators with steam from mains in the basement or by carrying a main riser to the attic and from there supplying the radiators with downfeed risers. Steam may be supplied from a boiler, central station, or by utilizing exhaust steam.

Design and Operation

In general this system is comprised of a generating unit, a system of supply mains and risers, a system of return lines connected to a vacuum pump. In operation steam is supplied from a steam header on the boiler, or from an outside source, as the case may be. Previous to the initial firing-up period the vacuum pump is started in order to purge the system of air present and by so doing steam will circulate rapidly throughout the supply mains. The supply mains are pitched in such a manner that water condensing in these mains will flow towards a terminus of the main and there it is dripped by a float and thermostatic drip trap. The result is that all accumulated air and water passes into the return line without allowing steam to enter the return system. From the supply mains a branch is taken off to supply the risers with steam, and in return the risers supply individual radiators through Marsh Packless Radiator Valves which can be controlled to supply the necessary amount of steam to produce the required amount of heat. As the steam enters the radiator it condenses. After giving up its heat to the radiator it is carried off into the return line through a Marsh System Unit Thermostatic Radiator Trap. After the radiator has been purged of all present air and water, steam comes in contact with the thermostatic element in the radiator trap, which in turn will expand to close off the trap, thus preventing steam from entering the return line. The water of condensation and air is automatically returned to the vacuum pump, due to the vacuum created in the return lines. As the air and water enter the receiving tank of the vacuum pump the air and water are separated, the air being expelled into atmosphere, the water returned by centrifugal force into the boiler.

Piping

It is important that both supply and return piping be graded not less than 1 inch in 20 feet so that the water of condensation will flow by gravity to the drip trap or the vacuum pump, as the case might be. Likewise great stress is placed upon the fact that the branches to supply and return risers and runouts to the radiators be graded not less than 1 inch in 5 feet, otherwise pockets will occur in the piping where water accumulates and prevent circulation and often cause hammering noises. It is likewise important that mains, risers and runouts be provided with some means of expansion. This is usually taken care of by providing a "swing" so that when expansion occurs the motion will be absorbed in the swing joint. And on up or downfeed systems the risers should be provided with an expansion joint or with an anchor so that the stress will be divided into two sections instead of one. It is equally important that runouts to radiators or offsets arranged in concrete grout be provided with sufficient means of expansion.

While radiators and piping may be located below the level of the vacuum pump it is not advisable. In such a case it is necessary to install a lift fitting at the vacuum pump, the purpose of which is to lift the water and air to the level of the suction strainer on the vacuum pump. Such a method greatly reduces the efficiency of the system and where possible we recommend that an accumulator tank be installed in lieu of the lift fitting. However, where lifts cannot be avoided the height of the lift should be kept down to a minimum.

A mistake is often made by covering the return mains in the basement. This should never be done inasmuch as covering the return mains will tend to retain the heat present in the water of condensation in the return main. The vacuum return line being covered, water cannot be cooled by circulating air and, therefore, due to its heat content under a vacuum, will cause the water to flash back into steam, thus killing the vacuum

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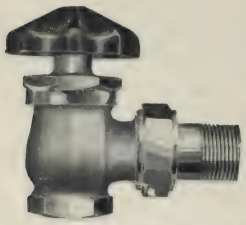
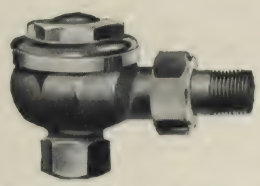
Typical Installation
Marsh Standard Vacuum System of Heating

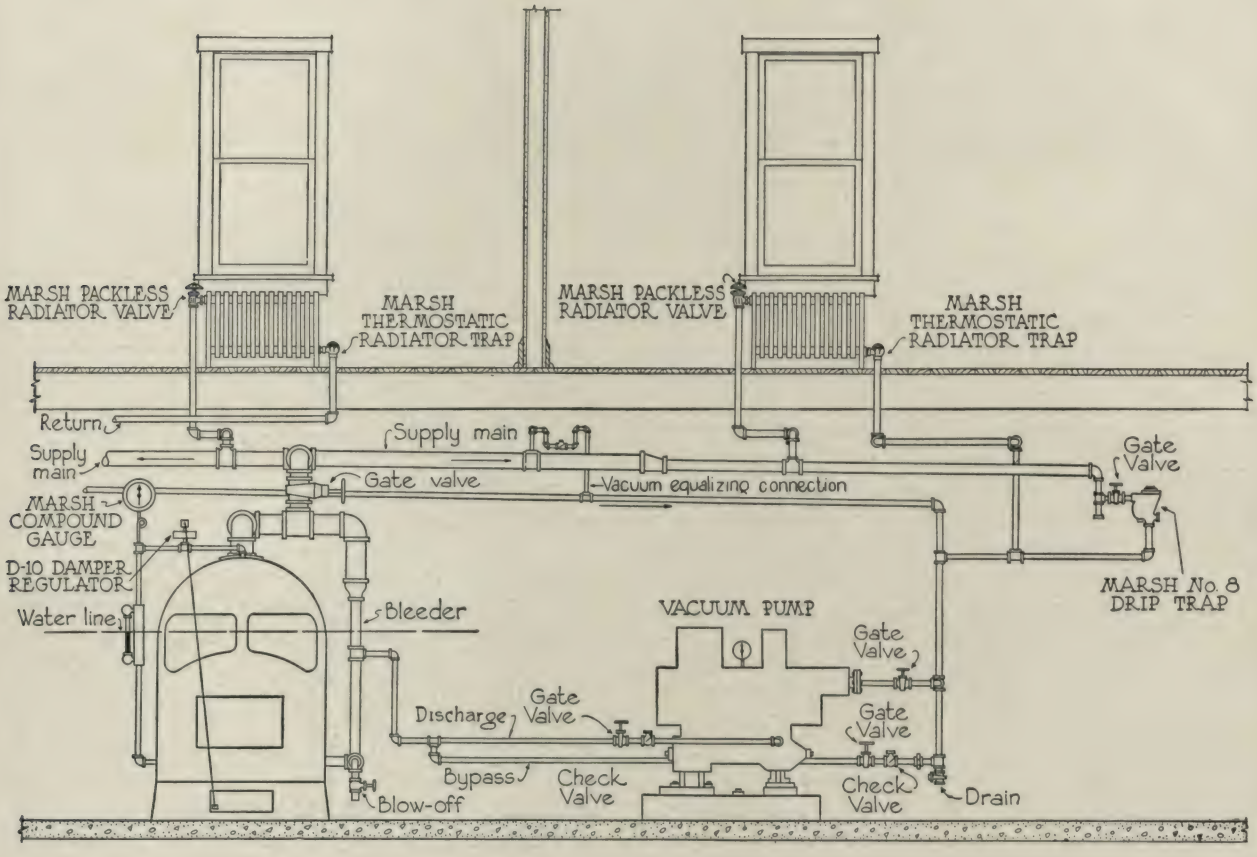
Showing Customary Arrangement of Marsh System Units

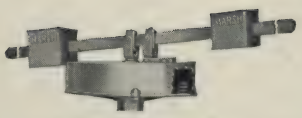


Marsh System Unit Radiator Valve

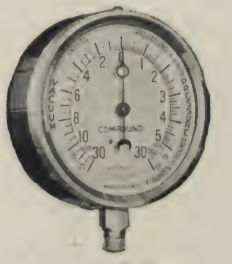


Marsh System Unit Radiator Trap

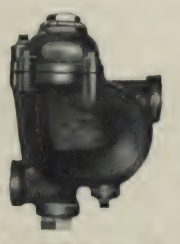




Damper Regulator



Compound Gauge



Marsh System Unit No. 8 Drip Trap

Marsh System Unit No. 12 Drip Trap

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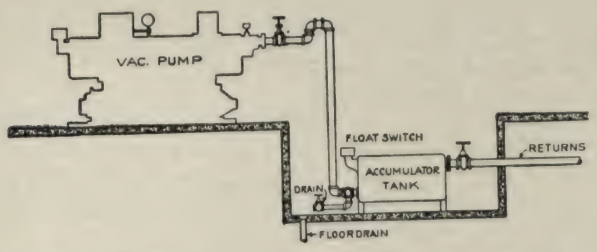


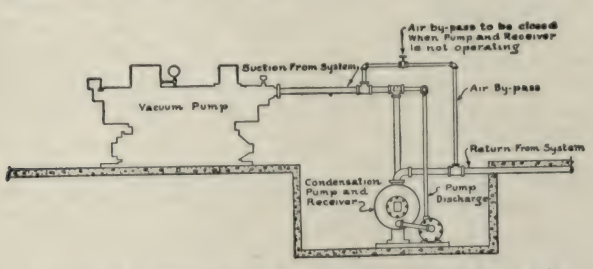
Installation Showing Accumulator Tank Substituted for Lift Fitting

present in the return line. Return piping should be left uncovered so that during its travel back to the vacuum pump, condensation will undergo a cooling process.

In operation the occasion frequently arises when, during the shut-down period, a natural vacuum is created in the boiler and supply lines exceeding that in the return system. Under this condition the water and air present in the return lines will be retarded to such a degree that they will not flow by gravity back to the vacuum pump. Result: the system becomes clogged up with water. To overcome this condition the Marsh Vacuum Systems employ an equalizing connection between the supply lines and the return lines. This device is intended to equalize any difference in vacuum between the supply and return systems which will tend to liberate the entrained water and air and permit it to flow by gravity to its terminus.

The arrangement of downfeed systems is somewhat different from that of an upfeed system. In the downfeed system the trunk line supplies steam to mains located in some advantageous point near the roof and from there the steam is distributed through downfeed risers terminating in the basement. In order to take care of the water and air in these downfeed risers an individual drip trap must be placed at the base of each riser, which will allow passage of all water and air into a return line but prevent passage of steam. Another method is to collect all the individual downfeed risers into a common header or "bleeder line" which acts as an accumulator for the various risers. A system of piping is connected to the various risers and pitched towards the boiler room, at which point the bleeder line is dripped through a float and thermostatic drip trap. In this manner considerable piping is avoided and it has been found to be more easily accessible for cleaning due to the fact that in the latter there are but one or two traps to clean where in the former there may be quite a number to clean.

Also on this type of system where a main riser is employed it is important that this line either be dripped through a sufficient capacity float and thermostatic drip trap or by dripping it through a wet return direct to the boiler return header.



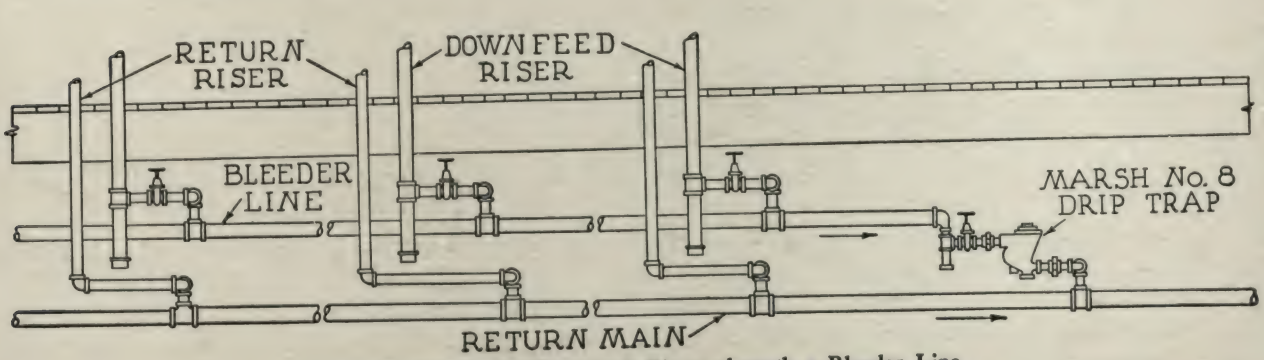
Method of Installing Booster Pump to Eliminate Lift

Hot Water Heaters and Vento

Occasionally on buildings employing this type of system, the system of ventilating utilizes Vento heaters as a medium for heating forced air. Where this type of heater is employed stress is laid upon air elimination. Manufacturers of Vento heaters usually recommend that heaters having 13 sections or less are to be equipped with an air line vent to handle air only and where the heaters have more than 13 sections that they be provided with a center vent in addition to the vent at the return outlet. The air line header should always be connected in the vacuum return line on the pump side of the drip trap.

Return piping from the return outlet of these heaters should always be full size of the opening and afterwards reduced should the occasion warrant. It is always advisable to provide the return from these heaters with a dirt strainer or a scale pocket as well as a swing check valve on some horizontal line between the drip trap and the return outlet. See diagram on following page.

Practically all modern buildings are equipped with hot water storage tanks heated by steam supplied from the heating boiler. Hot water storage tank should be located near the boiler.



Method of Dripping Downfeed Risers through a Bleeder Line

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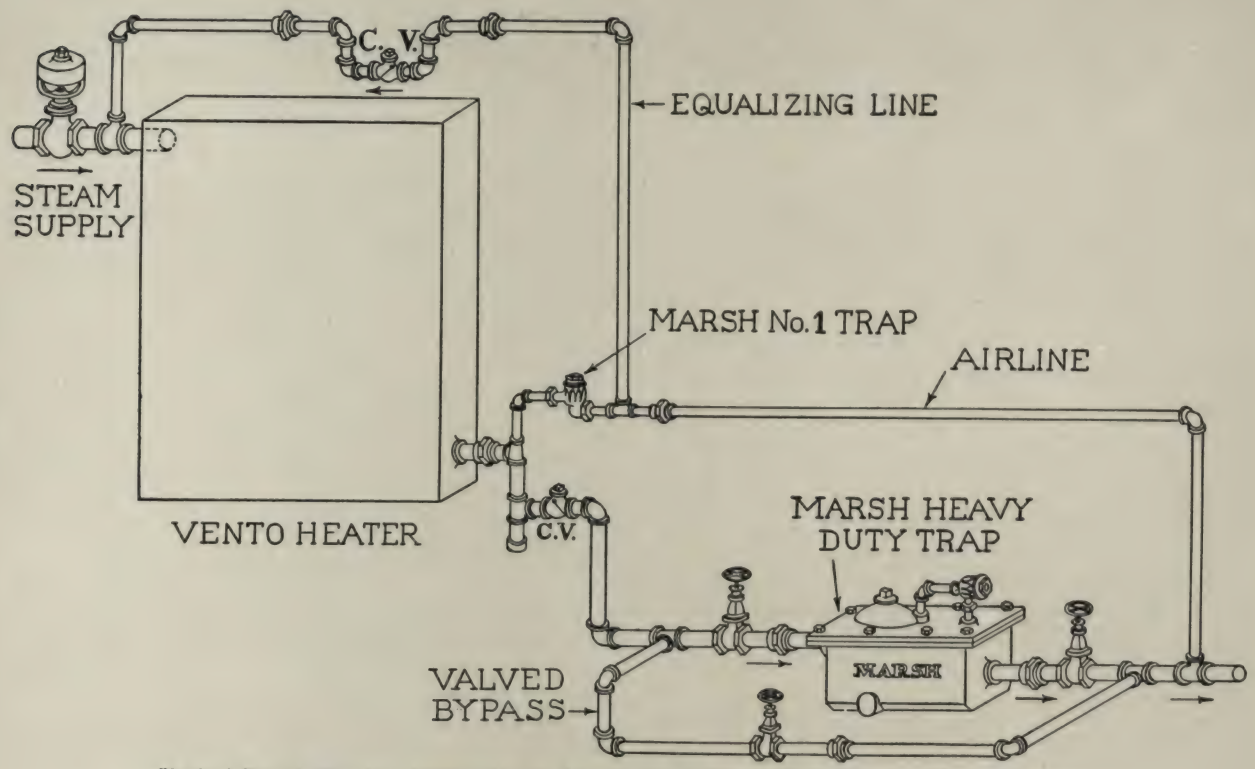


Typical Detail Showing Application of Marsh No. 9 Heavy Duty Trap to Vento Heaters

On both Vento and hot water heaters it is very important that the drip trap employed be of ample size to take care of the demands placed upon it during the initial start-up period. During the start-up period the amount of condensation is much greater and the traps should therefore be based upon the amount of condensation emitted during this period. See lower right hand drawing.

Vacuum Pump

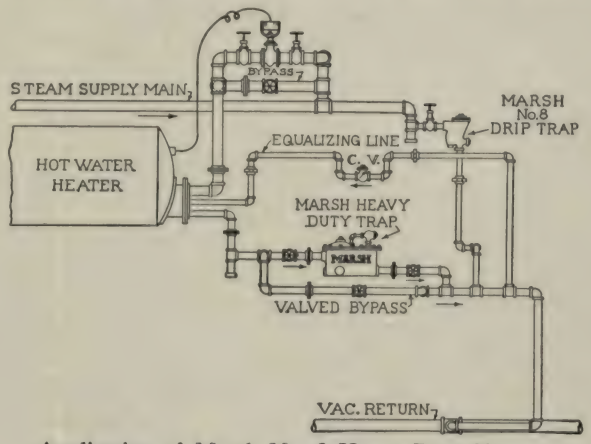
A very important factor in this type of heating is the vacuum pump. Its function is to keep the return line free from air and water and therefore the capacity of the pump should be calculated to handle not only the water of condensation but also air. As a general rule these two factors are taken into consideration by pump manufacturers and the manufacturers' ratings in square feet of equivalent direct radiation may be used safely.

However, for all practical purposes the condensation rate can be estimated at 0.25 pound of water per square foot of direct radiation and the air volume to be handled as 0.30 cubic foot of air per 100 square feet of direct radiation.

As previously stated the system should be designed so that lifts can be avoided, but where the design of the building necessitates a lift it is advisable to use an accumulator tank. Vacuum pumps should always be provided with a by-pass so that the system may be run without the pump if the occasion should arise. The discharge pressure of the pump should be sufficiently well above the intended pressure to be carried in the boiler.

Valve and Trap Capacity

Marsh Packless Radiator Valves are designed to give a full capacity steam flow and for selection of sizes for a given size radiator the sizes shown in the typical specifications may be used. Likewise, the Marsh Thermostatic Radiator Traps are designed to expel the maximum amount of condensation and air and the sizes as shown in the typical specifications may be used.



Application of Marsh No. 9 Heavy Duty Trap to Hot Water Heaters

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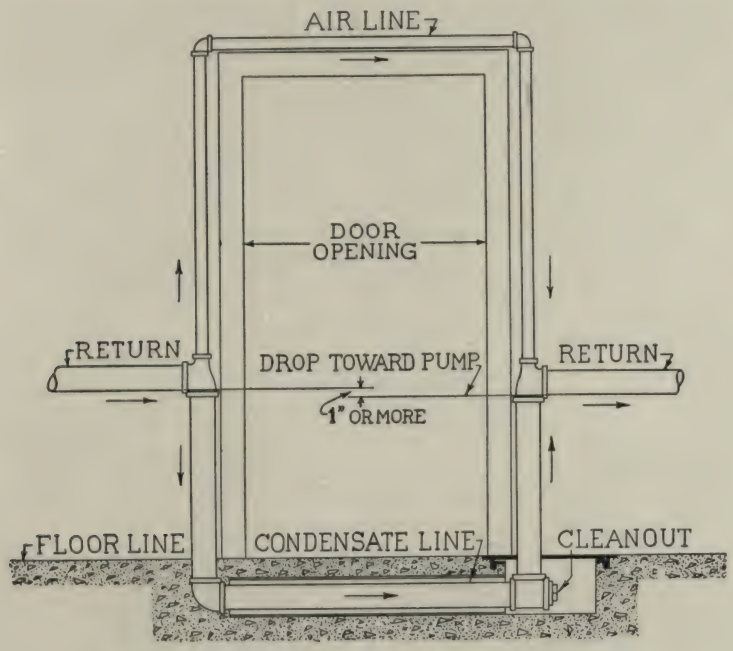
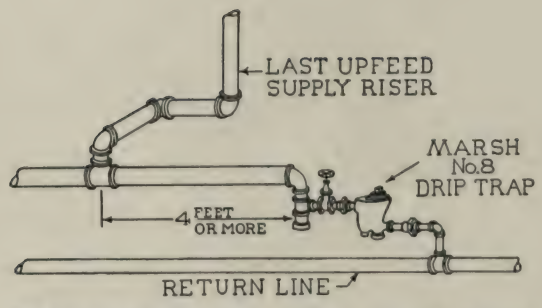
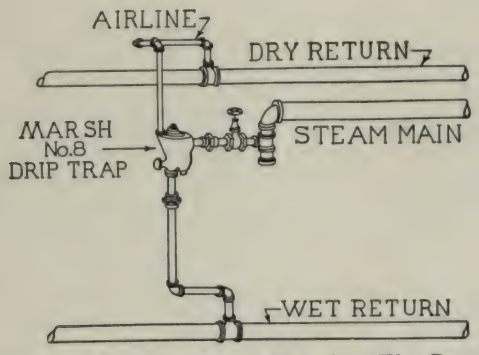
Installation Details
Marsh Vacuum System of Heating



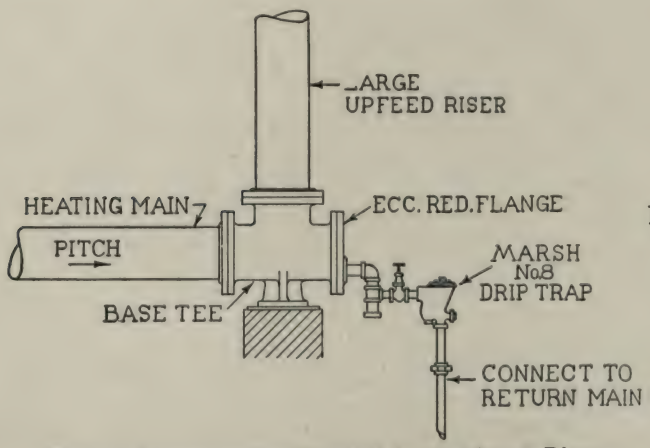
Standard Method of Looping Return Mains under Door Openings



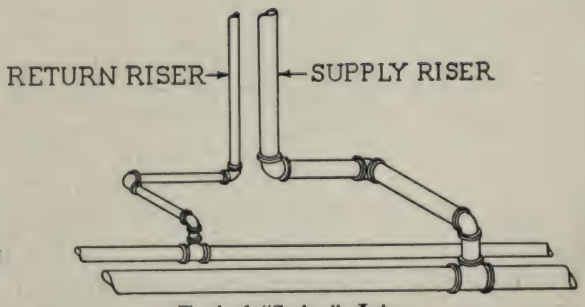
Method of Dripping Steam Mains into Dry Return



Method of Dripping Steam Main into Wet Return with Air Line to Dry Return



Typical Connections for Dripping Upfeed Steam Risers



Typical "Swing" Joint

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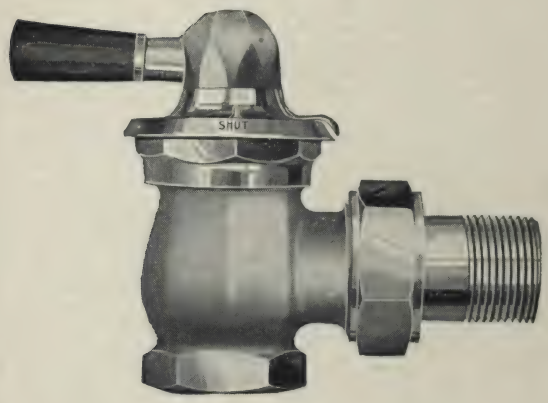
Marsh System Units

The following pages are devoted to a description of the Marsh System Units entering into the Marsh Standard Vacuum System of Heating. Realizing that a heating system is no better than the units which enter into the building of it, JAS. P. MARSH & COMPANY has utilized its many years of experience to develop the highest possible degree of accuracy and perfection in these units.

The Marsh System Units described in the following pages are most modern in design and in principle of operation. Beauty is featured in these units where beauty should be found, yet efficiency in operation and sturdiness of design has been the prime object in their production.



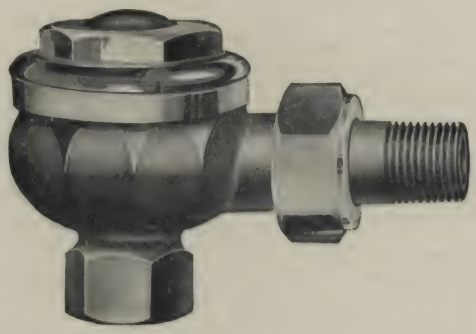
Marsh System Unit Radiator Valve

This unit, the Marsh Radiator Supply Valve, functions to control the operation and heat output of the individual radiator. As supplied in the illustrated graduated pattern the valve can be operated to restrict the flow of steam and as a result the heat output of the individual radiator as required. Also to shut off valve or to open full.

The octagonal body lines of the Marsh System Unit Radiator Valve blend perfectly with the body lines found in the modern tubular radiator, and as installed on the radiator in combination with the Marsh System Unit Radiator Trap, has a decided effect upon the appearance of the radiator as a whole. In direct contrast with surrounding interior decorations, the Marsh System Unit Radiator Valve stands out in pleasing relief in a two-tone chrome or nickel finish; the body in satin chrome and the bonnet and tailpiece in polished finish. A handle of futuristic design crowns the Marsh Radiator Valve, lending itself to easy opening or closing of the valve.

The interior construction of this valve is unique, utilizing two monel metal discs and two stainless steel discs as the packless feature, which makes possible the elimination of the conventional spring, composition packing glands, bellows or multiple diaphragms found in most radiator valves today.

Data on valve extensions and other accessories are given in Bulletin No. 150.



Marsh System Unit Radiator Trap

These traps, through their thermostatic action, retain the steam in the radiator until it has given up its heat and finally condenses into water. They also eliminate air and water from a radiator without passing steam—a very important factor in a vacuum system.

The action of the trap is entirely automatic. It is operated by heat and continues to function as long as steam flows to the radiator.

The operating element is a phosphor bronze diaphragm containing a combination of volatile fluids which expand and contract with heat, opening and closing the valve needle.

The body is of cast steam brass with two-tone satin and polished nickel or chrome finish.

Marsh System Unit Radiator Traps are built along octagonal body lines to blend with the Marsh System Unit Radiator Valve in perfect harmony with modern tubular radiation. This unit fits into a perfect blend with surrounding interior decorating schemes.

Marsh Thermostatic Traps are made in two sizes and types indicated by Series No. 1 and No. 2. They are used according to the size of the radiator, and operate automatically from below atmosphere to 25 pounds steam pressure.

Additional data on construction and types is given in Bulletin No. 175.

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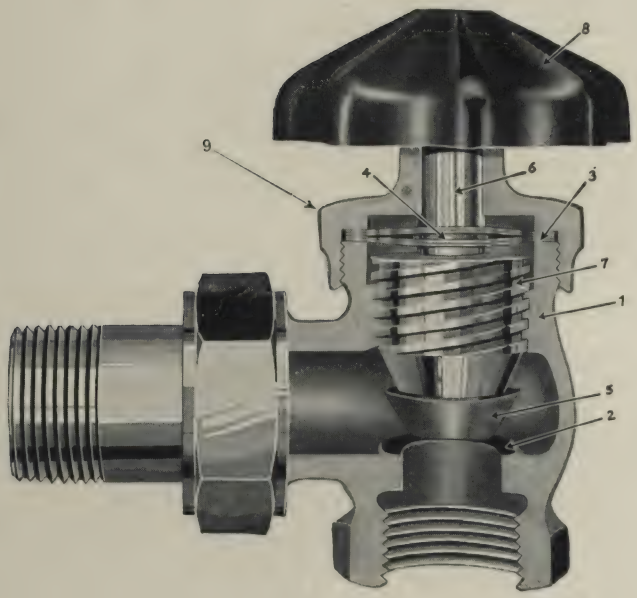
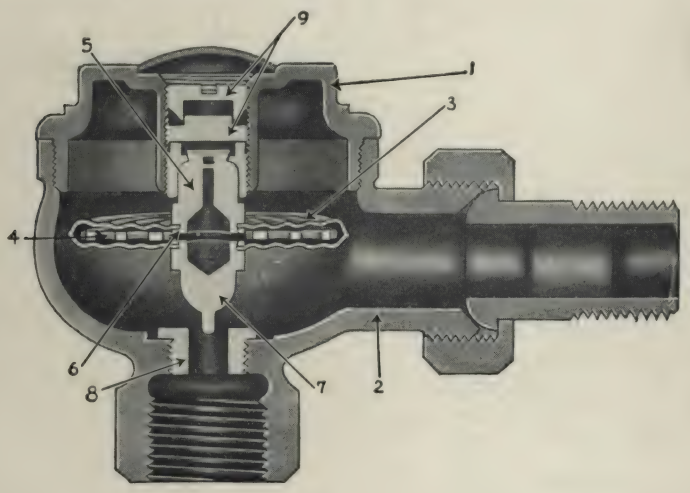
View Showing Interior and Construction of the Marsh System Unit Packless Radiator Valve



1—Valve Body
2—Valve Seat
3—Metalflex Sealing Discs
4—Stem Collar
5—Flexcone Valve Disc
6—Valve Stem
7—Thrust Screw
8—Bakelite Handle
9—Valve Bonnet

View Showing Interior and Construction of the Marsh System Unit Radiator Trap

1—Trap Bonnet
2—Trap Body
3—Thermostatic Diaphragm
4—Diaphragm Reinforcement
5—Swivel and Adjustment
6—Diaphragm Locking Seal
7—Valve Needle
8—Removable Seat
9—Adjustment Seal



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Marsh System Unit Drip Traps

Marsh No. 8 Drip Trap

This trap is continuous in discharge and is designed to quickly remove condensation and air from drip points on steam mains, steam risers, steam coils, or blast heaters, or for any like service within the capacity of the trap.

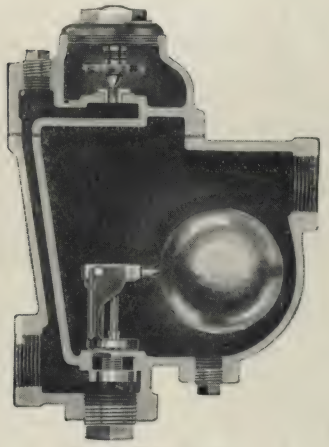
The design permits a deep water seal on the discharge valve. This water discharge valve is float controlled and located at a low point in the bottom of the trap and air is removed through a thermostatically controlled port in the cap of the trap. The thermostatic member used is our standard assembly as in the No. 1 Marsh Radiator Trap. Normally air is discharged through a port directly to the outlet connections of the trap. In cases where the trap may be required to discharge to a wet return the air discharge may be connected to a dry return from a special opening tapped in the cap of the trap.

Body of trap is provided with one 1¼-inch tapped inlet and two 1¼-inch tapped outlet openings. These openings are located so as to permit direct connection both to inlet and from outlet.

The trap may be suspended directly in the piping and no other supports are necessary. The thermostatic element screws directly in the cap of the trap and is interchangeable with the element from the No. 1 Radiator Trap.

All interior parts are of forged bronze castings with the exception of the float which is a seamless copper float tested for a working pressure of 25 pounds per square inch.

Copper asbestos gaskets are used throughout which avoid the necessity of supplying new gaskets whenever trap may be opened for inspection or repair.



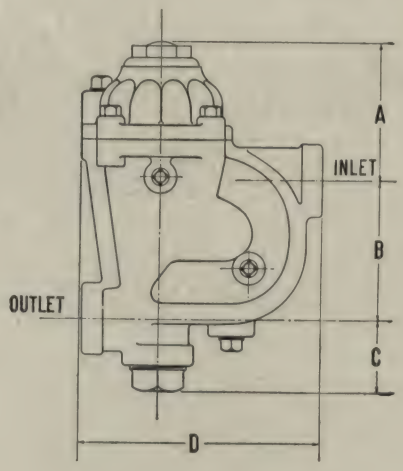
No. 8 Drip Trap

CONNECTION SIZES
1¼-in. Inlet
1¼-in. Outlet

DIMENSIONS
A—4⅜ in.
B—4⅛ in.
C—2¼ in.
D—7 1/16 in.

CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	500
1	900
2	1400
3	1600
4	1800
5	2000
10	3200
15	4000



Marsh No. 12 Drip Trap

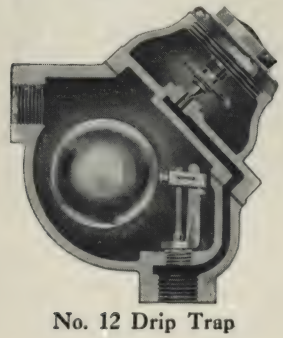
Designed for removal of air and condensation from short steam mains, branches or riser. Unit heaters, steam coils, etc., are within the limits of the capacity of the trap.

The size and weight of the trap permits its installation in the piping without any other means of support.

Condensation is removed through a float operated valve located at the lowest point inside the trap body. Air removal is located in the cap of the trap. Air passes through a passageway and out through the trap outlet.

Body of trap is of cast iron and all interior parts are of forged steam bronze, copper and monel metal.

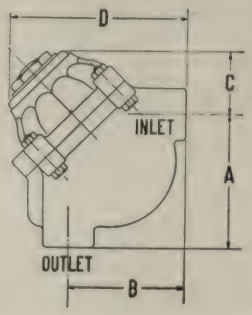
The thermostatic member of the air by-pass is interchangeable with the member of the standard No. 1 Radiator Trap.



No. 12 Drip Trap

CONNECTION SIZES
¾-in. Inlet
¾-in. Outlet

DIMENSIONS
A—4½ in.
B—3⅞ in.
C—1⅞ in.
D—6 in.



CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	350
1	600
2	800
3	1200
4	1400
5	1600
10	2000
15	2800

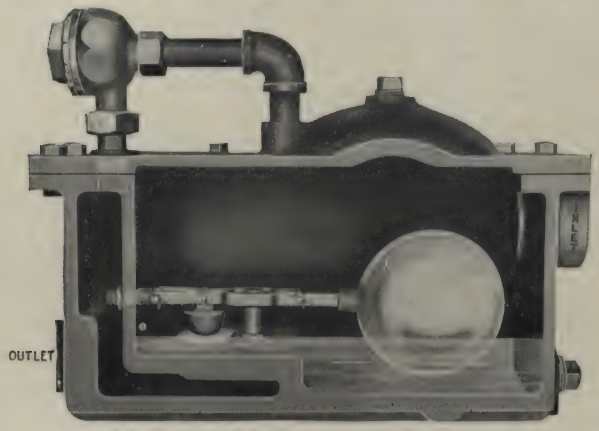
Continued on next page

Marsh System Unit
No. 9 Heavy Duty Trap

The Marsh No. 9 Heavy Duty Trap has a wide field in which it may be applied to equipment using steam as a heating element. This trap was designed especially for services where very large volumes of water and air must be taken care of as rapidly as possible, adding greatly to the efficient operation of the equipment upon which it is applied during the initial starting-up period.

It has a marked place in the service in conjunction with storage hot water heaters and Vento heaters where the rapid elimination of water and air is important.

On Vento service the problem of condensation is somewhat different. On Vento two factors must be taken into consideration. First, the temperature of the outside air to be heated, and secondly, the



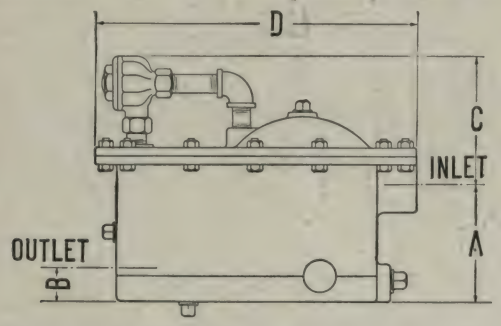
condensation to be emitted during the initial start-up period. For all practical purposes the chart below will indicate equivalent pounds of condensation to be calculated in computing heavy duty sizes for various outside temperatures.

Although modern methods dictate that separate air lines are incorporated on Vento to handle air only the Marsh No. 9 Heavy Duty Traps are equipped with a thermostatic by-pass to take care of any remaining air. However, for estimating purposes the air to be handled in Vento may be computed as 0.30 cubic foot of air per 100 square feet of equivalent radiation.

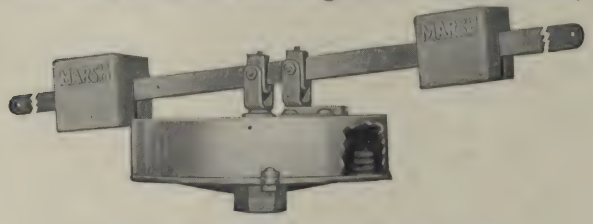
In construction the Marsh No. 9 Heavy Duty Trap is built to not only handle large volumes of water and air but is also designed to withstand heavy duty service. The body proper is of heavy cast iron, equipped with a removable cover. Extra proportions of metal are placed at the inlet and outlet stress points and it is also equipped with a plugged connection for draining. The entire float mechanism is of non-corrosive metals and so arranged to permit through passage of water. The ball float is of large proportions of heavy copper, designed to withstand pressures up to 25 pounds. The valve and valve seats are so arranged that at all times they are water sealed and likewise prevent accumulation of dirt interfering with a tight seat. As an integral part of the cover the Marsh No. 1 Series Thermostatic Trap is incorporated as a means of eliminating accumulated air. This unit is rigidly attached to the cover, permitting the entire cover and thermostatic trap to be taken off should it be necessary to remove the cover for cleaning.

CAPACITIES

Size	Orifice	½ lb.	1 lb.	2 lb.	3 lb.	4 lb.	5 lb.
9-C	¾″	1800 lb.	3150 lb.	4442 lb.	5284 lb.	6249 lb.	6955 lb.
9-D	⅞″	2620 lb.	4345 lb.	6125 lb.	7435 lb.	8613 lb.	9576 lb.
9-E	1 ″	3327 lb.	5676 lb.	8024 lb.	9778 lb.	11286 lb.	12517 lb.
9-F	1⅛″	4239 lb.	7197 lb.	12303 lb.	14256 lb.	15823 lb.	22228 lb.

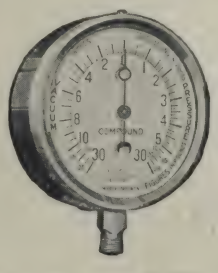


Size	Connections	A	B	C	D
9-C 9-D	1 ″ 1¼″	5½″	1½″	5 1⅛″	14½″
9-E 9-F	1½″ 2 ″	5⅞″	1¾″	6½″	16¼″



Type D-10 Damp Regulator

This device functions to control the dampers on hand fired coal boilers. A lever arm is automatically actuated to control the dampers.



No. 83 Compound Retard Gauge

Marsh Gauges of this or some similar type come as standard equipment on many makes of the most widely used boilers. A sensitive gauge is essential to satisfactory operation of any boiler. The Marsh Compound Retard Gauge is graduated in ounces of pressure and fractions of an inch vacuum permitting perfect reading.

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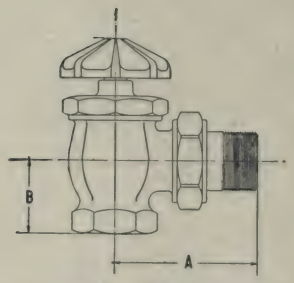
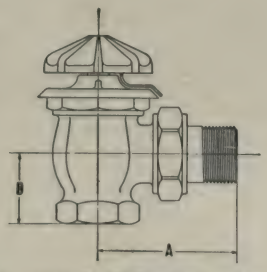
Patterns and Roughing-in Dimensions of Marsh System Unit Packless Radiator Valves



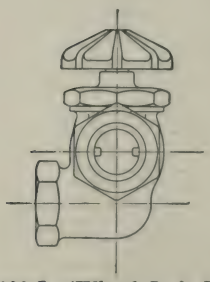
No. 100-A (Wheel Angle)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	1 3/16"
¾"	2⅞"	1 3/16"
1 "	3⅛"	1 3/16"
1¼"	3⅝"	1¾"
1½"	3⅞"	1½"
2 "	4⅜"	2⅜"



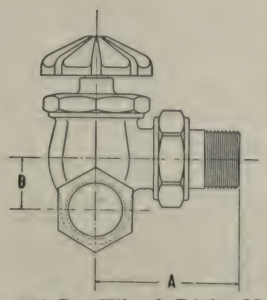
No. 101-A (Wheel Angle—Graduated)



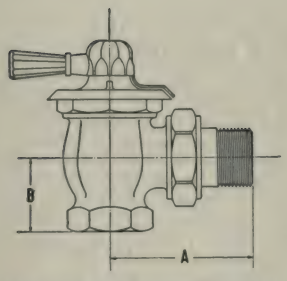
No. 100-L (Wheel Left Hand Corner)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	¾"
¾"	2⅞"	13/16"
1 "	3⅛"	⅞"
1¼"	3⅝"	1⅛"
1½"	3⅞"	1¼"
2 "	4⅜"	1½"



No. 100-R (Wheel Right Hand Corner)



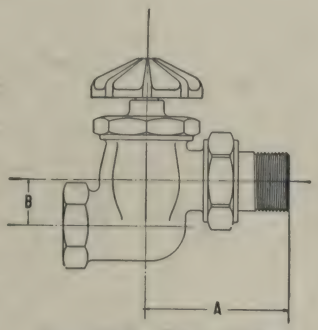
No. 102-A (Lever Handle)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	1 3/16"
¾"	2⅞"	1 3/16"
1 "	3⅛"	1 3/16"
1¼"	3⅝"	1¾"
1½"	3⅞"	1½"
2 "	4⅜"	2⅜"

DIMENSIONS IN INCHES

Sizes	A	B
½"	1⅜"	2⅜"
¾"	1⅜"	2⅞"
1 "	1 11/16"	3⅛"
1¼"	2 "	3⅝"
1½"	2⅜"	3⅞"
2 "	3 1/16"	4⅜"



No. 100-B (Back Offset)

Explanation of Dimensional Tables

Type No. 101 (wheel handle) and Type No. 102 (lever handle) graduated valves as made in left hand corner pattern, right hand corner pattern and back offset pattern have the same roughing-in dimensions shown above for the Type 100 valves in these patterns.

Roughing-in dimensions for Type Nos. 103 Lock and Shield Packless Valve and 104 Lock and Shield Graduated Valves in all patterns are the same as Type No. 100.

TYPES AND PATTERNS OF MARSH SYSTEM UNIT RADIATOR VALVES

Type	Pattern	Symbol
Wheel Handle	Angle	100-A
Wheel Handle	Left Hand Corner	100-L
Wheel Handle	Right Hand Corner	100-R
Wheel Handle	Back Offset	100-B
Wheel Handle Graduated	Angle	101-A
Wheel Handle Graduated	Left Hand Corner	101-L
Wheel Handle Graduated	Right Hand Corner	101-R
Wheel Handle Graduated	Back Offset	101-B

Type	Pattern	Symbol
Lever Handle Graduated	Angle	102-A
Lever Handle Graduated	Left Hand Corner	102-L
Lever Handle Graduated	Right Hand Corner	102-R
Lever Handle Graduated	Back Offset	102-B
Lock and Shield	Angle	103-A
Lock and Shield	Left Hand Corner	103-L
Lock and Shield	Right Hand Corner	103-R
Lock and Shield	Back Offset	103-B

Note: Lock and shield construction can also be supplied in the graduated type valve—specified as No. 104—in any pattern listed above.

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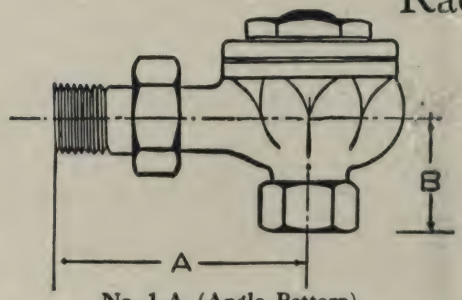
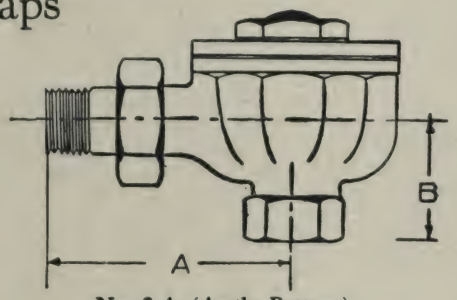
Roughing-in Dimensions of Marsh System Unit Radiator Traps



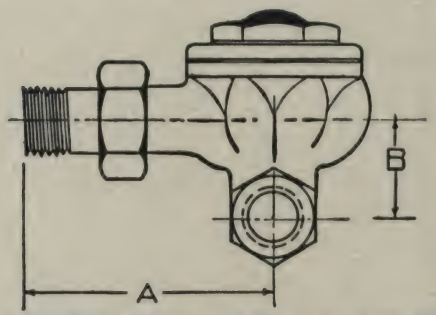
No. 1-A (Angle Pattern)

Size	Capacity	Water	A	B
½"	150 sq. ft.	40 lbs. per hour	3¼"	1½"



No. 2-A (Angle Pattern)

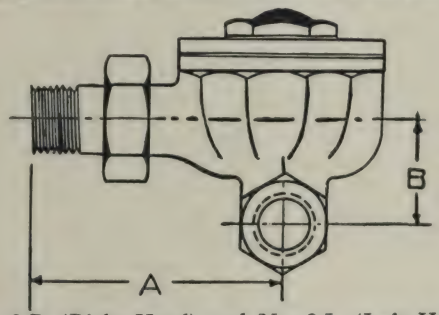
Size	Capacity	Water	A	B
½"	200 sq. ft.	50 lbs. per hour	3½"	1 7/16"
¾"	500 sq. ft.	125 lbs. per hour	3 13/16"	2"
1"	1000 sq. ft.	250 lbs. per hour	4 5/16"	2 1/16"



No. 1-R (Right Hand) and No. 1-L (Left Hand Corner Pattern)

Size	Capacity	Water	A	B
½"	150 sq. ft.	40 lbs. per hour	3¼"	1¼"

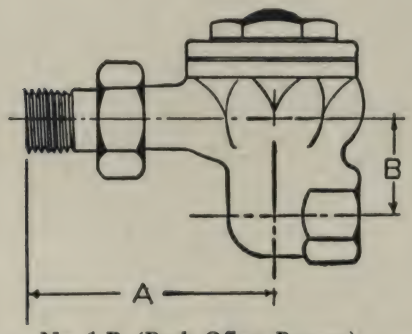
Dimensions on right and left hand pattern are identical.



No. 2-R (Right Hand) and No. 2-L (Left Hand Corner Pattern)

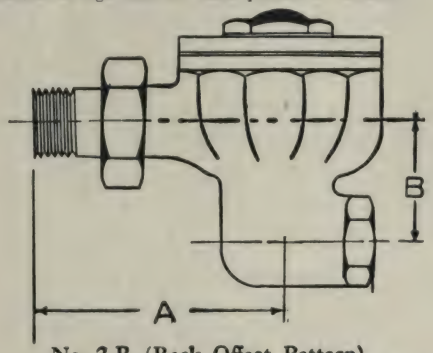
Size	Capacity	Water	A	B
½"	200 sq. ft.	50 lbs. per hour	3¾"	1¼"
¾"	500 sq. ft.	125 lbs. per hour	3 13/16"	1 5/8"
1"	1000 sq. ft.	250 lbs. per hour	4 5/16"	1 7/8"

Dimensions on right and left hand pattern are identical.



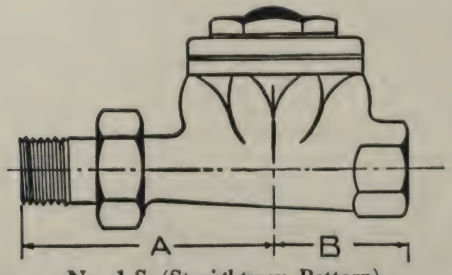
No. 1-B (Back Offset Pattern)

Size	Capacity	Water	A	B	C
½"	150 sq. ft.	40 lb . per hour	3¼"	1¼"	1⅛"



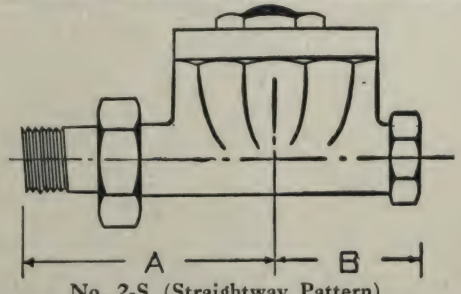
No. 2-B (Back Offset Pattern)

Size	Capacity	Water	A	B	C
½"	200 sq. ft.	50 lbs. per hour	3 7/8"	1¼"	1 3/8"
¾"	500 sq. ft.	125 lbs. per hour	3 13/16"	1 5/8"	1 3/8"
1"	1000 sq. ft.	250 lbs. per hour	4 5/16"	1 7/8"	1 5/8"



No. 1-S (Straightway Pattern)

Size	Capacity	Water	A	B
½"	150 sq. ft.	40 lbs. per hour	3¼"	1¾"



No. 2-S (Straightway Pattern)

Size	Capacity	Water	A	B
½"	200 sq. ft.	50 lbs. per hour	3¾"	2"

Continued on next page

Typical Specifications for Marsh Standard Vacuum System of Heating

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with standard practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete installation of a Marsh Vacuum System of Heating as hereinafter specified and as shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Boiler shall be a..... with guaranteed rating for ..... sq. ft. of radiation and shall contain ..... sq. ft. of heating surface. Boiler shall be installed upon suitable foundation and equipped with all necessary connections and trimmings, including Marsh Compound Gauge, Kunkle Pop Safety Valve and Type D Damper Regulator. For automatic stoker, oil or gas-fired boilers provision shall be made for connection of this apparatus to boiler in accordance with manufacturer's instructions.

4. Smoke Pipe—Connect boiler to chimney with suitable smoke pipe of ..... gauge black steel, of size as recommended by boiler manufacturer.

5. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure a complete and successful operation of the system. Joints to be made up with a paste consisting of Portland cement and boiled linseed oil applied to male threads only. Proper provision to be made for expansion in all mains, risers and branches. Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam opening, same to be dripped to return header through a bleeder. All spring pieces to steam and return mains shall be taken out of top of mains at 45 deg. on upfeed systems and out of bottom of steam mains at 90 deg. on downfeed systems.

Supply mains shall be graded to ½ in. in 10 ft. away from boiler and dripped through Marsh No. 8 Drip Traps. Runouts or branches to radiators or risers to be graded not less than 1 in. in 10 ft. towards supply mains.

Return mains shall be graded 1 in. in 10 ft. in direction of flow and shall be free from sags or pockets. No loop connections shall be used in return mains.

6. Floor Plates—Where pipes project through finished floors, ceilings or walls provide approved nickel plated floor or ceiling plates.

7. Vacuum Pump—Furnish and install vacuum pump as shown on plan. Pump to have capacity of ..... sq. ft. of radiation to be full automatic for ..... volts, ... phase, ... cycle. Pump to be unit consisting of pumps with their respective motors, one receiving tank, necessary float and automatic control, with check valves, gate valves, switches, etc. for complete installation ready to run.

8. Radiator Traps—Each radiator shall be provided with a Marsh System Unit Radiator Trap of proper size as manufactured by JAS. P. MARSH & CO.

9. Radiator Valves—Each radiator shall be equipped with a JAS. P. MARSH & CO. System Unit Flexcone Radiator Valve of proper size.

10. Radiation—Furnish and install radiation shown on plan. All radiation to be of approved make with air valve tapping plugged. Radiation shall be washed and cleaned at the factory and shipped equipped with wooden plugs in supply and return ends.

TAPPING SCHEDULE

Sq. ft.	Valve	Trap
0– 30	½"	½" No. 1
31– 80	¾"	½" No. 1
81–125	1 "	½" No. 1
126–175	1¼"	½" No. 2
176–250	1½"	½" No. 2
250 up	2 "	¾" No. 2

11. Hot Water Heaters—Returns from this equipment shall be either handled separately by a condensation pump direct to the boilers or shall be dripped into the vacuum return to Marsh No. 9 Heavy Duty Traps in accordance with manufacturer's instructions. In this latter case condensation shall be passed through an economizer located as shown.

12. Ventilating Apparatus—Steam coils in connection with this type of apparatus shall be handled generally as is the hot water heating equipment.

13. Covering—Cover all steam mains and spring pieces with 1 in. thick asbestos sectional covering. Cover all fittings with asbestos cement. All piping run on outside walls or within 18 in. of same shall be covered with ½ in. thick asbestos covering. Cover boiler as specified by boiler manufacturer. Smoke pipe is to be covered with asbestos blocks wired on and finished smooth with coat of asbestos cement.

14. Painting—Where painting is included on this contract all exposed piping in finished rooms shall be given a priming coat of flat paint and thereafter painted or enameled as directed. Radiators shall be painted as directed. Exposed parts on boiler to be given two coats of graphite paint.

15. Check Valves—Check valves shall be horizontal type with brass disc, best grade obtainable. They shall be installed where called for by plans and shall be tested for tightness before final connections are made.

16. Test for Tightness—The system when finished shall be tested for tightness. A drop of 10 in. of vacuum in one hour will be allowed, measured from a maximum of 15 in. of vacuum secured when system is filled with steam. At this point the steam supply valve shall be closed, the pump stopped and at the end of an hour 5 in. of vacuum shall remain in the steam side of the system.

17. Guarantee—The heating contractor shall guarantee the apparatus installed to circulate steam thoroughly through every radiator without noise. If the apparatus shall fail to accomplish this guarantee by reason of any defect developing within the period of one full heating season and that defect is due to faulty material or poor workmanship, the heating contractor shall remedy such defect at his own cost within reasonable time after notice thereof.

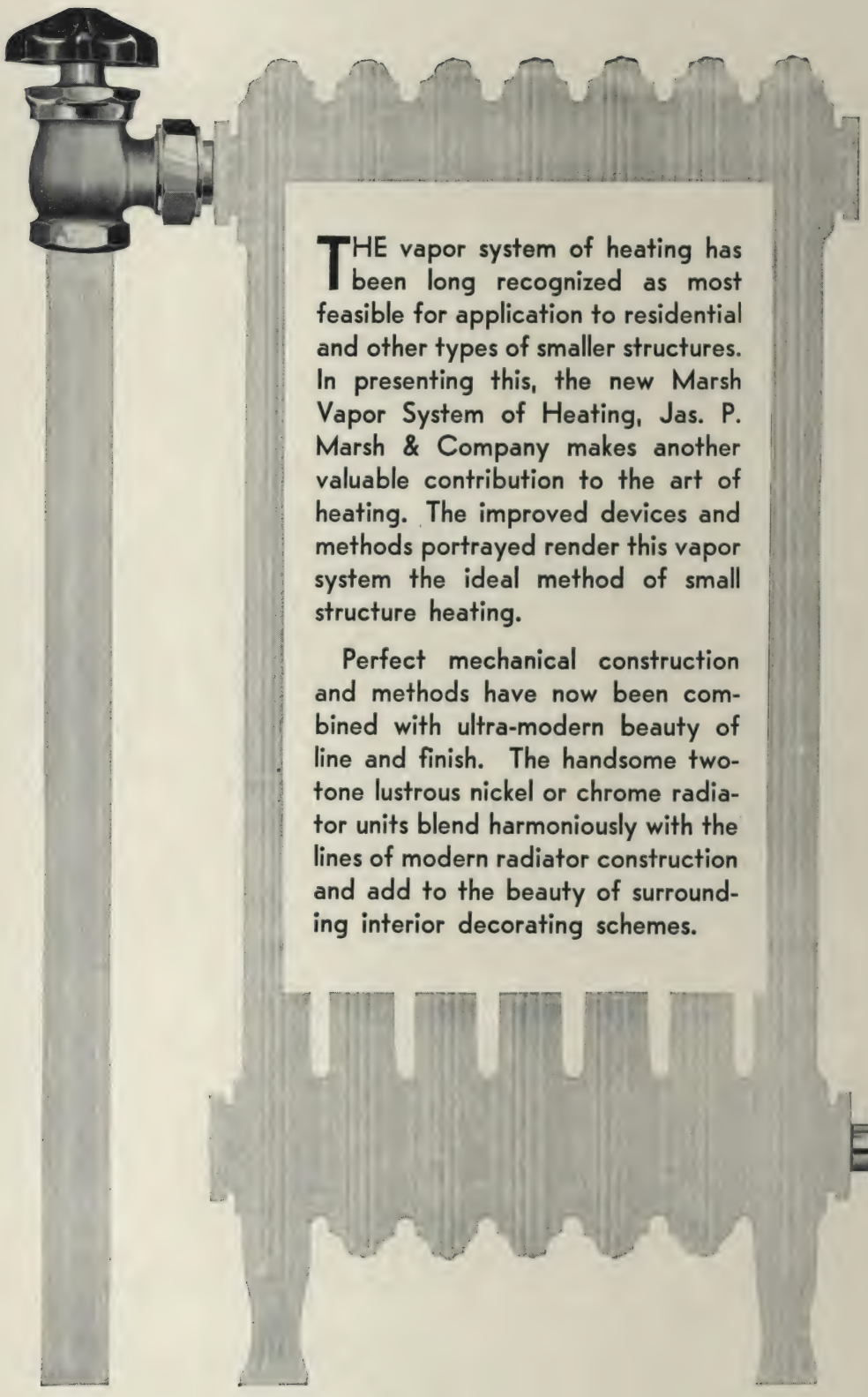
18. Finally—The true intent and meaning of these specifications is to bring about the satisfactory installation of a Marsh Vacuum System of Heating and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work.

THE MARSH VAPOR SYSTEM OF HEATING

Bulletin No. 100

for Residential Small Apartment and Public Buildings

JAS. P. MARSH & COMPANY
CHICAGO



THE vapor system of heating has been long recognized as most feasible for application to residential and other types of smaller structures. In presenting this, the new Marsh Vapor System of Heating, Jas. P. Marsh & Company makes another valuable contribution to the art of heating. The improved devices and methods portrayed render this vapor system the ideal method of small structure heating.

Perfect mechanical construction and methods have now been combined with ultra-modern beauty of line and finish. The handsome two-tone lustrous nickel or chrome radiator units blend harmoniously with the lines of modern radiator construction and add to the beauty of surrounding interior decorating schemes.

THE MARSH VAPOR SYSTEM OF HEATING

DIFFICULTIES heretofore encountered in gravity heating systems have caused a rapid development in recent years of the vapor systems of heating. This type of system, because of its simplicity of design and ease of operation, makes it especially adaptable in residences, stores and apartment buildings covering a moderate area. Its efficiency as a heating element has been definitely established in modern heating.

The ability to generate heat as it is needed to meet outside weather conditions with a minimum amount of fuel and attention, with maximum efficiency and utmost simplicity, constitutes the appeal of the Marsh Vapor System. This system is a two pipe system, which circulates vapors at very low pressures —silent and unfailing in operation.

On single pipe systems it is necessary for the water of condensation (condensed steam) to pass out through the same inlet valve through which it entered the radiator as steam. This method reduces the efficiency of heat output and makes it necessary to generate sufficient steam to create a pressure in order to circulate heat throughout the system.

As the steam and water attempt to pass each other they create a pounding noise, a detriment in any heating system. The air contained within the radiator must be expelled through an air valve located on the radiator directly into the living quarters.

The result is a needless waste of fuel, loss in efficiency, unnecessary noises and undesirable atmosphere produced by the escape of air from the air valve.

Advantages of the Marsh Vapor System

In the Marsh Vapor System these defects are entirely overcome. Due to its simplicity of piping arrangement, vapor may be generated at as low as four ounces pressure and still circulate sufficient vapor throughout the supply system to produce a radiator heat output that corresponds directly to heat demand in mild weather. By so generating vapor under low pressures, an economy in fuel consumption is effected. Due to its flexible efficiency the Marsh Vapor System can be operated to meet sudden demands for more or less heat as outside weather conditions change. The amount of vapor delivered to the radiators can be controlled by opening the Marsh radiator valves installed on these radiators to one-quarter, one-half, three-quarters or full open position, based upon the amount of heat required.

By manipulating the radiator valve this action is automatically transmitted to a sensitive damper regulator on the generating unit, closing or opening the drafts as weather conditions warrant. For instance, should there be a sudden lowering of outside temperature, demanding more heat in the rooms, the occupant will naturally open the radiator valve to its full opening, admitting more vapor to the radiator and increasing the heat output. Admitting more vapor to the radiator will tend to decrease the pressure in the generating unit, which will automatically manipulate the damper regulator to opening the draft door. In this manner a brisk fire is created and the pressure in the generating unit increased by several ounces, until it reaches a predetermined point. When this point is reached the damper regulator automatically closes the draft damper and opens the check damper, preventing further excessive generation of vapor. Likewise, the reverse: when the radiator valves are partially closed the damper regulator operates the dampers in such a manner that no more vapor is generated than may be required by prevailing weather conditions.

The Marsh Vapor System Units form the basis of simplified and automatic control. They positively eliminate air binding which is the cause of much inefficient heat distribution, and they likewise eliminate the necessity of an air valve on the radiator. They spread circulation of vapor to the radiators and require a lower initial pressure to achieve circulation. They make the system noiseless, assure the quality of safety, permit minimum sizes of piping, avoid complexity of design and widen the scope of application of this system to the most serious heating problem. This system has a direct appeal to the operator due to its flexibility, economy, simplicity, and ease of operation.

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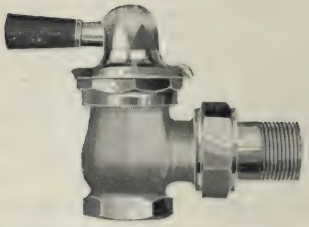
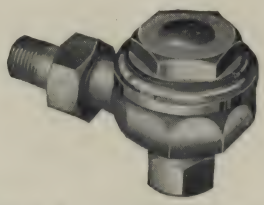
Typical Installation
Marsh Vapor System of Heating

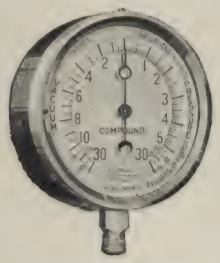
Showing Customary Arrangement of Marsh System Units



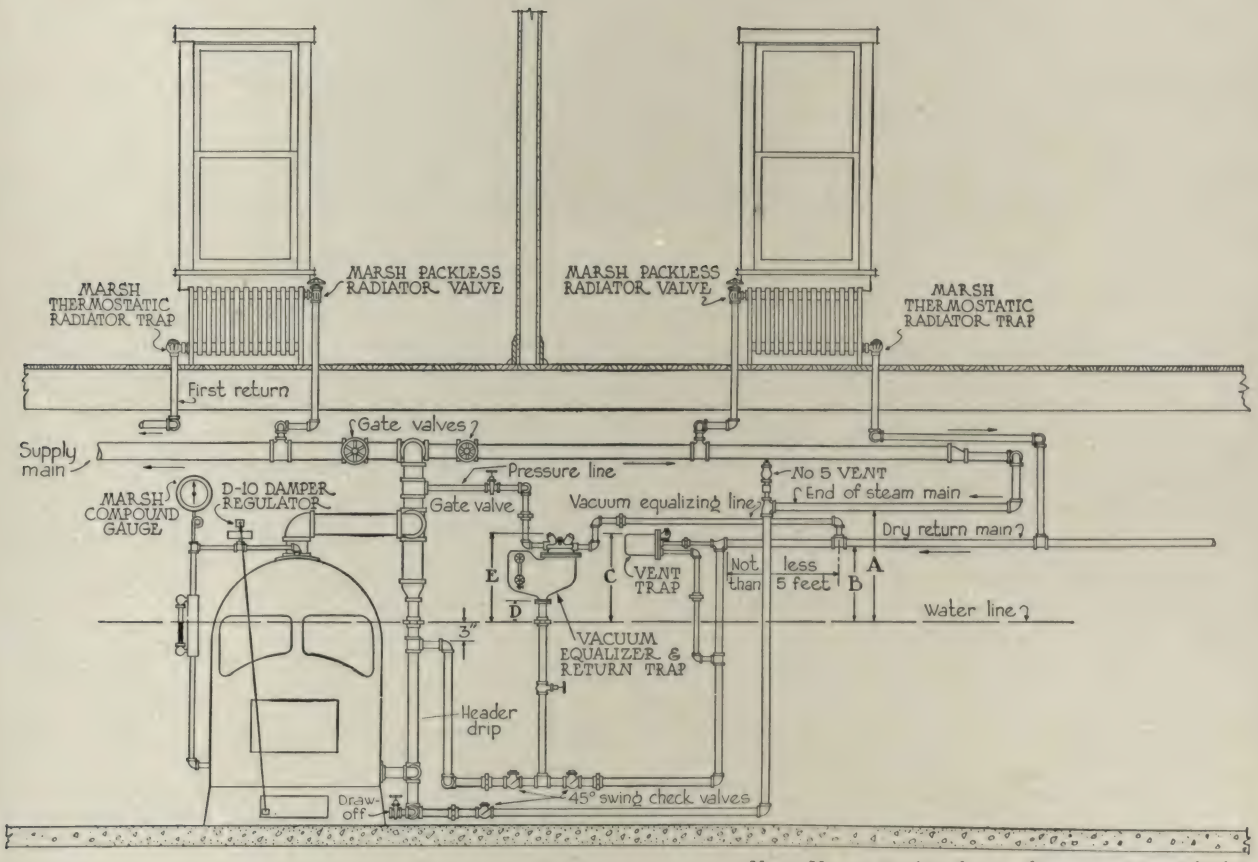
Marsh System Unit Radiator Valve



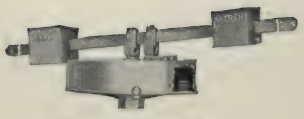
Marsh System Unit Radiator Trap



Compound Gauge

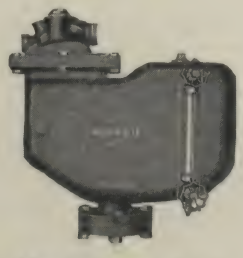


Note: Vacuum equalizer feature of return trap copyrighted.

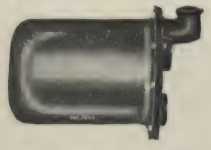


Damper Regulator

No. 5 Vent



Marsh System Unit Equalizer and Return Trap



Marsh System Unit Vent Trap

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Operation

The Marsh Vapor System of Heating properly installed offers the opportunity to heat as heat is required. In general, this type of system embraces a generating unit or boiler with a simple arrangement of supply and return piping as the means of distributing vapors to the radiator and returning condensate to the boiler.

The cycle of operation begins with the generation of vapors in the boiler at pressures ranging from a few ounces to one-pound gauge, varied according to weather requirements. As vapor is generated it circulates through the supply piping due to its expansion, forcing the air present in the supply piping before it. By means of branches taken from the supply mains connecting to the radiator, vapor enters the radiator to serve as the heat medium. Marsh System Unit Radiator Valves, generally of the graduated type are placed at the top of the radiators and connected to the branches and serve as a means of controlling the amount of vapor which must enter the radiator to give a required amount of heat. The air contained within the radiator is forced out through the Marsh System Unit Radiator Trap and on into the return piping. As the air is eliminated into the return system the space taken up by it is instantly filled with vapor, and until such time as the vapor comes in contact with the thermostatic element in the radiator trap this element will remain in a neutral position. The radiator trap, having an expansible diaphragm, will close off immediately when it comes in contact with vapor, thereby eliminating the waste of steam into the return system.

Previous to its closing, the trap allows immediate passage of all water of condensation and air into the return system which is pitched in such a manner that the water and air will gravitate back to a point near the boiler. At this point instead of allowing the air to accumulate, it is eliminated into atmosphere through the Marsh System Unit Air Vent Trap, which is provided with an integral ball check so that the air once eliminated cannot return into the system. Likewise on the supply system, the air is eliminated by means of the Marsh No. 5 Vent, permitting a rapid circulation of vapor throughout the supply system.

At the terminus of the return main it drops down below the water line of the boiler and is connected to the boiler through a loop connection. As there is a slight pressure in the boiler the water in the return main may not have sufficient dynamic weight to flow back into the boiler by gravity, therefore some means must be provided to return this water into the boiler. To meet this condition, the Marsh System Unit No. 10 Equalizer and Boiler Return Trap is installed between the boiler and the point where the return main drops below the water line of the boiler, having a check valve on each side of the connection to the equalizer and return trap in the wet return main. Water in the return system, seeking its own level, will find its way into the body of the equalizer and return trap, and as it continues to accumulate in the latter it causes the float in this trap to rise until a predetermined point has been reached.

At this point, the float will have risen to such an extent so as to cause the mechanism within the trap to open an inlet port connected directly to the boiler by means of piping to the boiler header. This action of the return trap permits the steam pressure from within the boiler to pass on through the piping into the trap, thus equalizing the difference in pressure between the trap and boiler, and as the pressures are now the same, the water has sufficient force due to its height above the level of the water line to gravitate into the boiler—the source from which it started in the form of steam.

This cycle of operation positively returns water of condensation back into the boiler automatically, regardless of the pressure in the boiler.

In connection with this type of system, it occurs that when the fire in the boiler is banked a vacuum will be created in the supply system due to the fact that the space formerly occupied by vapor under pressure is void. This condition oftentimes causes water in the return mains to be held up in the system, thus preventing it from returning to the boiler.

This condition cannot occur in the Marsh Vapor System due to the special patented construction of the Marsh System Unit No. 10 Equalizer and Return Trap. Incorporated in the construction of this system unit is an integral ball check between the steam supply connection and the exhaust connection to the dry return main. With this arrangement the vacuum in the boiler or supply system, if it is deeper than the vacuum in the return, will lift the ball in the check valve allowing an equalization of the vacuum between supply and return systems. This frees the water in the return system allowing it to gravitate into the No. 10 equalizer and boiler return trap in the regular manner.

The boiler is equipped with a sensitive type D10 damper regulator, the purpose of which is to control the amount of vapor generated in accordance with adjustment based on the demands of outside weather conditions.

It operates automatically through a sensitive laminated metal bellows which actuates a lever arm balanced by weights. This arm through the medium of a chain opens and closes the check and draft dampers on the boiler as there is need to accelerate or retard the fire.

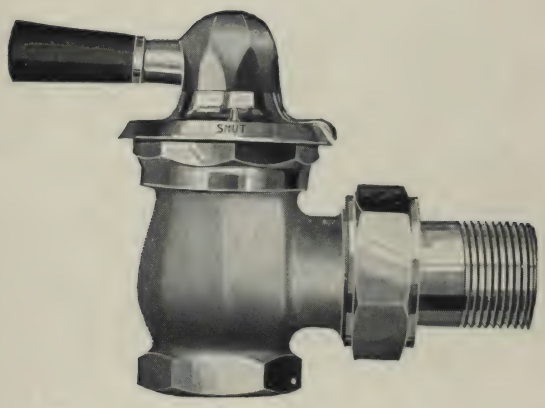
Continued on next page

Marsh System Units

The following pages carry portrayal of the Marsh System Units which combine to form the Marsh Vapor System of Heating. Into the development and construction of these units has been incorporated the benefit of our 65 years of experience in the manufacture of heating specialties and instruments.

Many of the units here portrayed permit of vastly improved methods of heating system construction and operation, contributing to the value of this system of heating for small structures.

Beauty is featured in these units of modern design and principle.



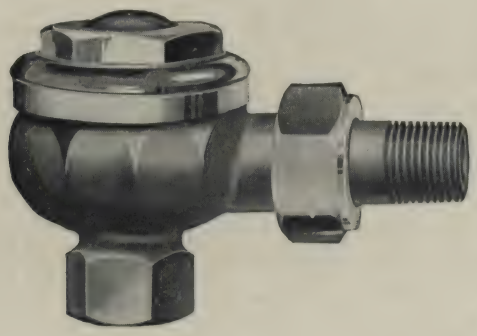
Marsh System Unit Radiator Valve

This unit, the Marsh Radiator Supply Valve, functions to control the operation and heat output of the individual radiator. As supplied in the illustrated graduated pattern the valve can be operated to restrict the flow of steam and as a result the heat output of the individual radiator as required. Also to shut off valve or to open full.

The octagonal body lines of the Marsh System Unit Radiator Valve blend perfectly with the body lines found in the modern tubular radiator, and as installed on the radiator in combination with the Marsh System Unit Radiator Trap, has a decided effect upon the appearance of the radiator as a whole. In direct contrast with surrounding interior decorations, the Marsh System Unit Radiator Valve stands out in pleasing relief in a two-tone chrome or nickel finish; the body in satin chrome and the bonnet and tailpiece in polished finish. A handle of futuristic design crowns the Marsh Radiator Valve, lending itself to easy opening or closing of the valve.

The interior construction of this valve is unique, utilizing two monel metal discs and two stainless steel discs as the packless feature, which makes possible the elimination of the conventional spring, composition packing glands, bellows or multiple diaphragms found in most radiator valves today.

Data on valve extensions and other accessories are given in Bulletin No. 150.



Marsh System Unit Radiator Trap

These traps, through their thermostatic action, retain the steam in the radiator until it has given up its heat and finally condenses into water. They also eliminate air and water from a radiator without passing steam—a very important factor in a vacuum system.

The action of the trap is entirely automatic. It is operated by heat and continues to function as long as steam flows to the radiator.

The operating element is a phosphor bronze diaphragm containing a combination of volatile fluids which expand and contract with heat, opening and closing the valve needle.

The body is of cast steam brass with two-tone satin and polished nickel or chrome finish.

Marsh System Unit Radiator Traps are built along octagonal body lines to blend with the Marsh System Unit Radiator Valve in perfect harmony with modern tubular radiation. This unit fits into a perfect blend with surrounding interior decorating schemes.

Marsh Thermostatic Traps are made in two sizes and types indicated by Series No. 1 and No. 2. They are used according to the size of the radiator, and operate automatically from below atmosphere to 25 pounds steam pressure.

Additional data on construction and types is given in Bulletin No. 175.

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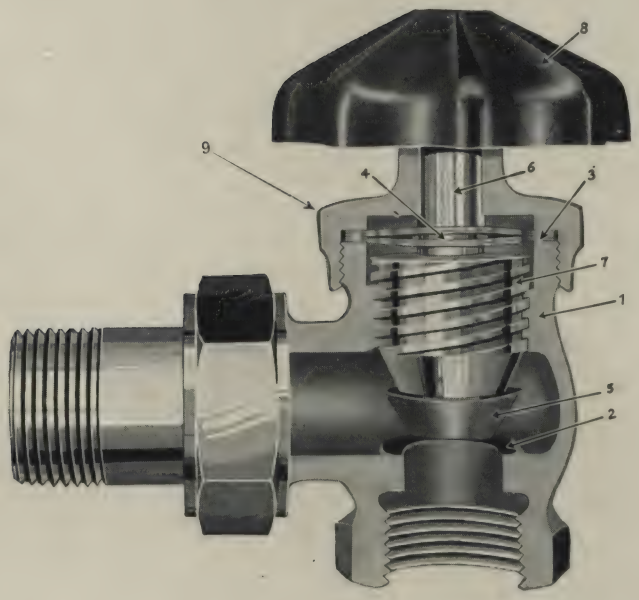
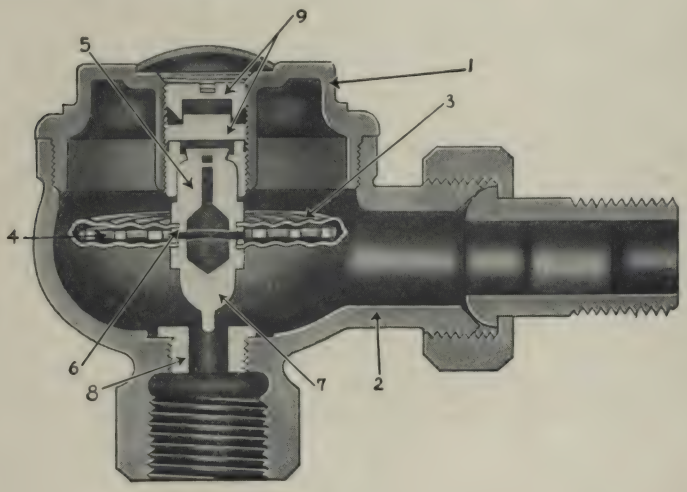
View Showing Interior and Construction of the Marsh System Unit Packless Radiator Valve



1—Valve Body
2—Valve Seat
3—Metalflex Sealing Discs
4—Stem Collar
5—Flexcone Valve Disc
6—Valve Stem
7—Thrust Screw
8—Bakelite Handle
9—Valve Bonnet

View Showing Interior and Construction of the Marsh System Unit Radiator Trap

1—Trap Bonnet
2—Trap Body
3—Thermostatic Diaphragm
4—Diaphragm Reinforcement
5—Swivel and Adjustment
6—Diaphragm Locking Seal
7—Valve Needle
8—Removable Seat
9—Adjustment Seal



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Marsh System Unit Equalizer and Boiler Return Trap

The Marsh System Unit No. 10 Equalizer and Boiler Return Trap is the most important automatic element entering into the construction of a Marsh Vapor System of Heating. The entire successful operation of the system depends upon the functions of this Marsh System Unit of assuring perfect circulation throughout the entire heating system and return of water to the boiler.

The patented features of construction embodied in this Marsh System Unit combined with perfection and accuracy of construction are entire assurance of the successful functioning of same.

Equalizer Operation

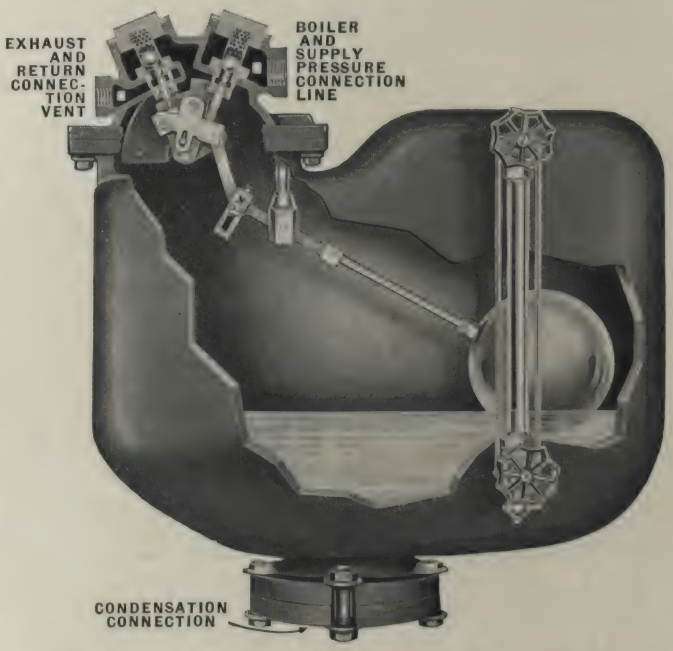
Incorporated in the head construction of the unit is an integral ball check between the steam supply and return connections as shown on the drawing. With this arrangement, should the depth of vacuum in the supply system become greater than within the return system, the integral ball check will open permitting equalization of the vacuum in the supply and return systems.

This unique and patented construction eliminates the additional piping necessitated in other types of systems where an equalizer has been installed. It likewise relieves the Marsh System of one of the most troublesome features of other vapor systems using the equalizer line—that of the small check valve placed in the line, which often either leak, destroying circulation, or stick entirely.

Return of Water to Boiler

Water in the return system seeking its own level will find its way into the body of the trap, and as it continues to accumulate in the return lines, it causes the float to rise until a predetermined point has been reached.

At this point, the float will have risen to such an extent so as to cause the mechanism within the trap to open an inlet port connected directly to the boiler by means of piping to the boiler header. This action of the return trap permits the steam pressure from within the boiler to pass on through the piping into the trap, thus equalizing the difference in pressure between the trap and boiler, and as the pressures are now the same, the water has sufficient force due to its height above the level of the water line to gravitate into the boiler—the source from which it started in the form of steam.



The Marsh System Unit Equalizer and Boiler Return Trap may be aptly termed "heart of the Marsh Vapor System" for in this device is appropriately vested the important function of assuring perfect circulation within the system at all times and under all conditions

Such a cycle of operation protects the boiler against damage by positively returning water of condensation back into the boiler automatically, regardless of the pressure in the boiler.

The mechanism within the return trap operates as follows: The float and float rod are pivoted to a supporting stem attached to the head of the trap, allowing a free motion. As water accumulates in the trap, the float rises accordingly. When a predetermined height of water has been reached, the connecting rod, which is pivoted to both float rod and main balance weight, pulls the main balance weight in an off-center position, causing it to fall downwardly.

Simultaneously, the falling of the main balance weight acts upon an idler weight also throwing this weight off center in a downward motion, which actuates a cam placed in an eccentric position on the idler weight in such a manner as to force the boiler pressure inlet valve stem upwardly.

This unseats the ball and allows steam from the boiler to enter into the trap and in the same motion, pulls the exhaust vent valve stem downward, closing it tightly against the escape of steam. After reaching the tripping point it requires but a second to complete the cycle of opening the boiler pressure inlet valve and closing the exhaust vent valve.

As the pressures in the boiler now correspond to that of the trap, the water will flow into the boiler

Continued on next page

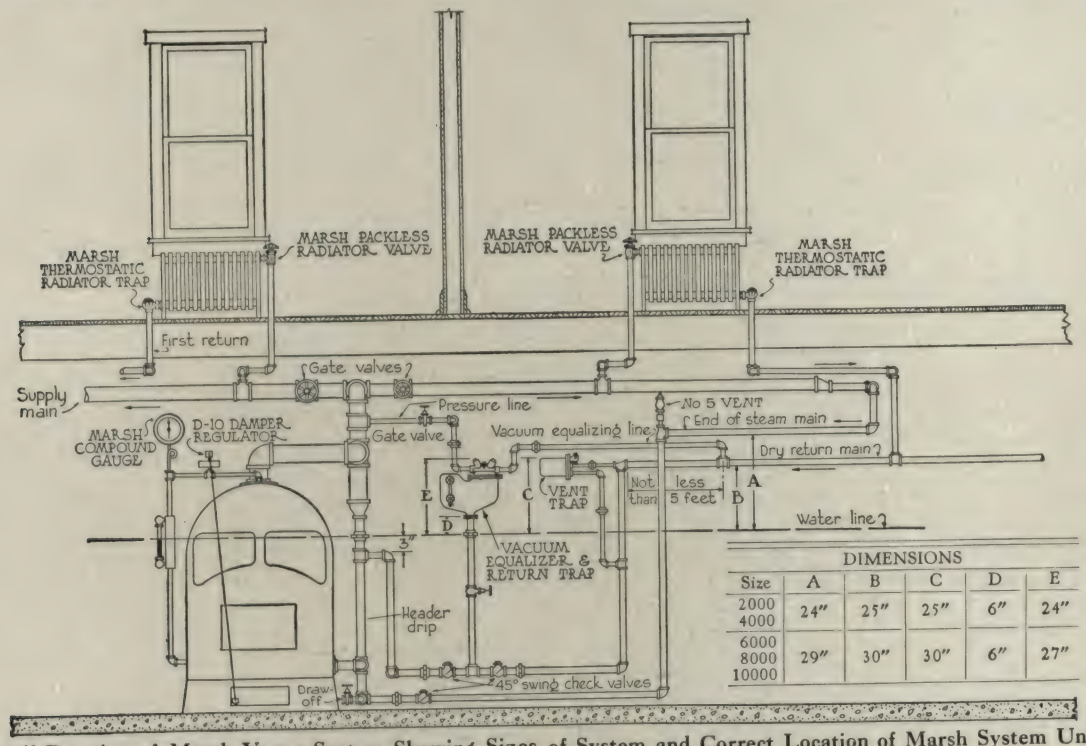
to maintain a normal water line. As the water recedes, the float follows the downward motion and reverses the action of the weights. This closes the boiler pressure inlet valve and opens the exhaust vent valve, which allows the small amount of steam accumulated in the trap to be vented. This action within the trap continues as long as the system is in operation. It is noiseless, entirely automatic and unfailing in its performance.

Construction

The body is of heavy cast iron fitted with a companion flange which bolts on the inlet opening. The head is so designed that when it is removed from the body, the entire mechanism can be taken out in one operation. The float is of heavy copper. The cast brass float and connecting rods are pivoted with stainless steel pins to resist rusting or wearing action.

The main balance and idler weights are made of cast iron, mounted on the body of the trap by stainless steel pins with bronze bushings, and the valve stems, eccentric and idler blocks are made of brass.

The entire assembly is well protected against wear from operation or by rust from the water.



DIMENSIONS					
Size	A	B	C	D	E
2000 4000	24″	25″	25″	6″	24″
6000 8000 10000	29″	30″	30″	6″	27″

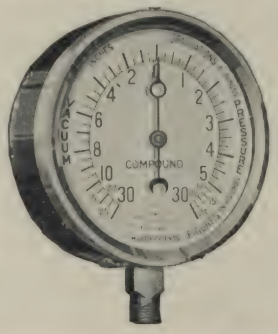
Detail Drawing of Marsh Vapor System Showing Sizes of System and Correct Location of Marsh System Units

Type D-10 Damper Regulator

The boiler on this system is equipped with this sensitive regulator—the purpose of which is to control the amount of vapor generated in accordance with adjustment based on outside weather conditions. It operates automatically through a sensitive laminated metal bellows which actuates a lever arm balanced by weights. This arm through the medium of a chain opens and closes check and draft dampers on the boiler. This regulator comes equipped with 48-inch lever weight, two bell cranks, 12 feet of chain and 1-inch female pipe connection.

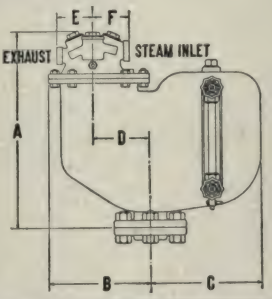
No. 83 Compound Retard Gauge

The Marsh No. 83 Compound Retard Gauge was designed expressly for vapor systems. Dial is graduated in ounces up to 5 pounds, and in 5-pound graduations from 5 to 30 pounds. For sub-atmospheric pressures, the depth of vacuum is indicated in wide half-inch graduations up to 10 inches, and in 5-inch graduations from 10 to 30 inches. Sizes 3½-inch to 10-inch dial.



Sizes and Dimensions of Marsh Equalizer and Boiler Return Trap

For installations having more than 10,000 square feet of direct radiation, two or more Marsh System Unit Equalizer and Boiler Return Traps can be connected in series, details for which will be furnished upon request.



No.	Size	A	B	C	D	E	F
10-A 10-B	2000 4000	16¾″	8¼″	9⅜″	4⅝″	3″	3″

Steam inlet ¾″. Trap inlet 2″. Exhaust ½″.

		A	B	C	D	E	F
10-C 10-D 10-E	6000 8000 10000	21½″	9¾″	11¼″	5⅜″	3⅜″	3⅜″

Steam inlet ¾″. Trap inlet 2½″. Exhaust ½″.

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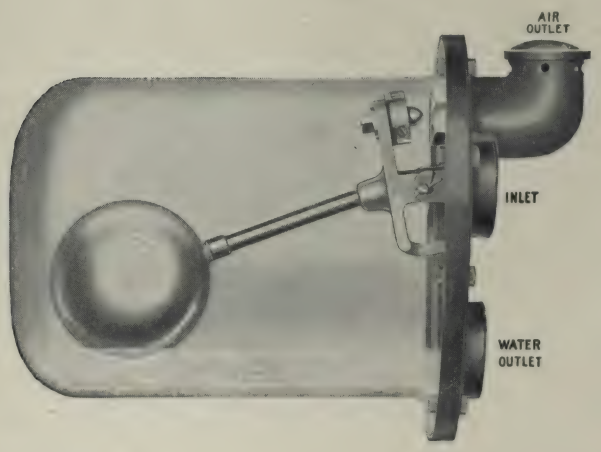


The Marsh System Unit No. 11 Air Vent Trap

Function

This trap is designed to provide a positive means of expelling air at the terminus of the return system in the boiler room and at the same time prevent leakage.

Operation

A float mechanism within the trap allows the air to pass from the top of the return line into this trap, and then to escape through the air outlet at the top of the trap by means of piping, which extends well above the normal water level of the return system.

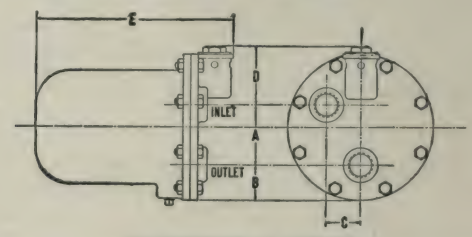
The ball check valve prevents the air from re-entering the system at this point. As water builds up in this trap, the float rises, closing the air outlet and retaining the water in the return system.

Capacity

This trap has sufficient air expelling capacity to take care of all size jobs up to 10,000 square feet direct radiation. On larger installations where more than one Marsh System Unit No. 10 Equalizer and Boiler Return Trap are used, one No. 11 Air Trap is installed for each.

Construction

The body is of pressed steel with a cast iron cover. The float mechanism is made of non-corrosive metals and the air outlet fitted with a special Jenkins composition disc to insure a tight seating. The Trap is made in one size only.



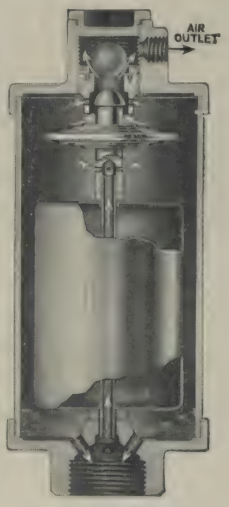
DIMENSIONS IN INCHES

Air outlet	Inlet	Water outlet	A	B	C	D	E
½ inch	1 inch	1 inch	3 7/16"	1¾"	1⅞"	3⅛"	10½"

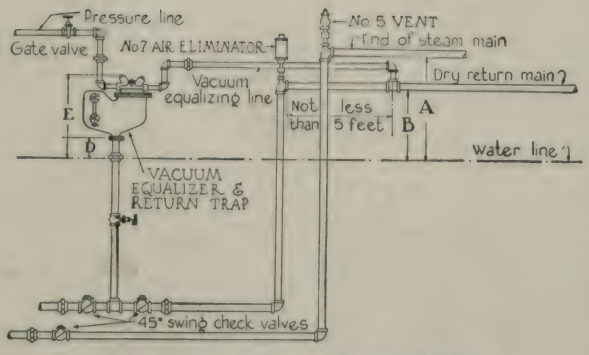
Marsh No. 7 Air Eliminator

This air eliminator is another form of air expelling unit used for the same purpose as the No. 11 Air Vent Trap. It may be substituted where so desired. It is equipped with cylindrical float arrangement to prevent water from surging.

The air port allows free expulsion of air, and has a vacuum top feature to prevent air from re-entering the system. This eliminates the need for a check valve on the air outlet. Made in ¾ and 1 inch connections.

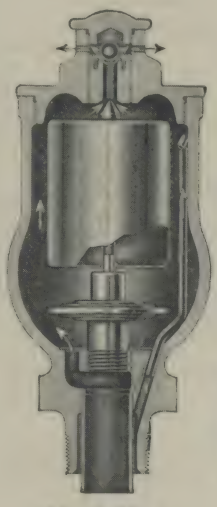


No. 7 Air Eliminator



Application of No. 7 Air Eliminator

Marsh No. 5 Vent



No. 5 Vent

On vapor systems this vent is the air expelling unit at the ends of steam mains. It expels air until steam has reached the thermostatic element. When steam reaches this element, it expands upwardly, closing the outlet port and preventing vapor from escaping.

This vent is fitted with a float to eliminate the possibilities of water surging and also a vacuum top feature to prevent air from re-entering the system.

Continued on next page

Marsh System Unit Drip Traps

Marsh No. 8 Drip Trap

This trap is continuous in discharge and is designed to quickly remove condensation and air from drip points on steam mains, steam risers, steam coils, or blast heaters, or for any like service within the capacity of the trap.

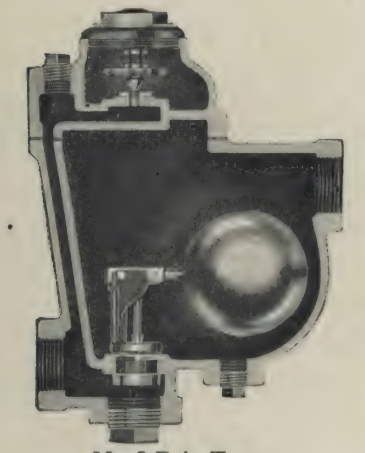
The design permits a deep water seal on the discharge valve. This water discharge valve is float controlled and located at a low point in the bottom of the trap and air is removed through a thermostatically controlled port in the cap of the trap. The thermostatic member used is our standard assembly as in the No. 1 Marsh Radiator Trap. Normally air is discharged through a port directly to the outlet connections of the trap. In cases where the trap may be required to discharge to a wet return the air discharge may be connected to a dry return from a special opening tapped in the cap of the trap.

Body of trap is provided with one 1¼-inch tapped inlet and two 1¼-inch tapped outlet openings. These openings are located so as to permit direct connection both to inlet and from outlet.

The trap may be suspended directly in the piping and no other supports are necessary. The thermostatic element screws directly in the cap of the trap and is interchangeable with the element from the No. 1 Radiator Trap.

All interior parts are of forged bronze castings with the exception of the float which is a seamless copper float tested for a working pressure of 25 pounds per square inch.

Copper asbestos gaskets are used throughout which avoid the necessity of supplying new gaskets whenever trap may be opened for inspection or repair.



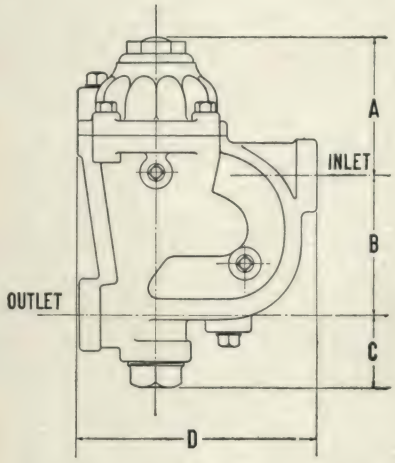
No. 8 Drip Trap

CONNECTION SIZES
1¼-in. Inlet
1¼-in. Outlet

DIMENSIONS
A—4⅜ in.
B—4⅛ in.
C—2¼ in.
D—7 1/16 in.

CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	500
1	900
2	1400
3	1600
4	1800
5	2000
10	3200
15	4000



Marsh No. 12 Drip Trap

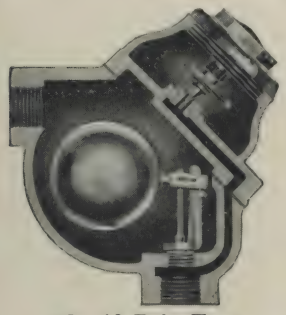
Designed for removal of air and condensation from short steam mains, branches or riser. Unit heaters, steam coils, etc., are within the limits of the capacity of the trap.

The size and weight of the trap permits its installation in the piping without any other means of support.

Condensation is removed through a float operated valve located at the lowest point inside the trap body. Air removal is located in the cap of the trap. Air passes through a passageway and out through the trap outlet.

Body of trap is of cast iron and all interior parts are of forged steam bronze, copper and monel metal.

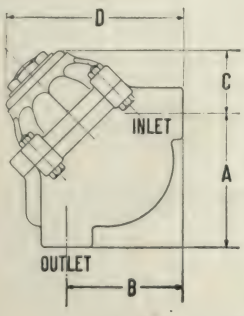
The thermostatic member of the air by-pass is interchangeable with the member of the standard No. 1 Radiator Trap.



No. 12 Drip Trap

CONNECTION SIZES
¾-in. Inlet
¾-in. Outlet

DIMENSIONS
A—4½ in.
B—3⅞ in.
C—1⅞ in.
D—6 in.



CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	350
1	600
2	800
3	1200
4	1400
5	1600
10	2000
15	2800

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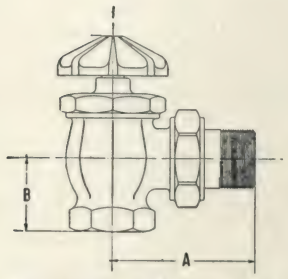
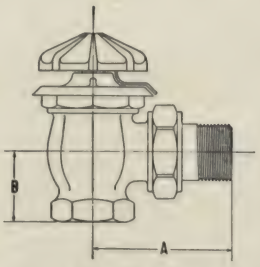
Patterns and Roughing-in Dimensions of Marsh System Unit Packless Radiator Valves



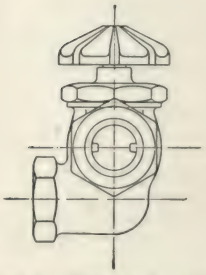
No. 100-A (Wheel Angle)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	1 3/16"
¾"	2⅞"	1 3/16"
1 "	3⅛"	1 5/16"
1¼"	3⅝"	1¾"
1½"	3⅞"	1½"
2 "	4⅜"	2⅜"



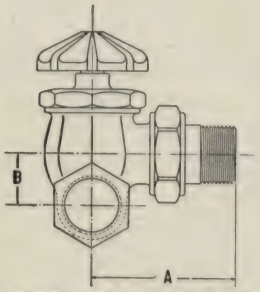
No. 101-A (Wheel Angle—Graduated)



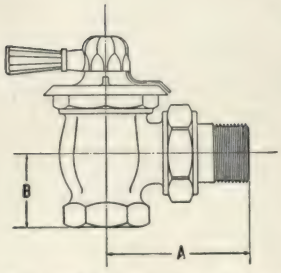
No. 100-L (Wheel Left Hand Corner)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	¾"
¾"	2⅞"	31/32"
1 "	3⅛"	⅞"
1¼"	3⅝"	1⅛"
1½"	3⅞"	1¼"
2 "	4⅜"	1½"



No. 100-R (Wheel Right Hand Corner)



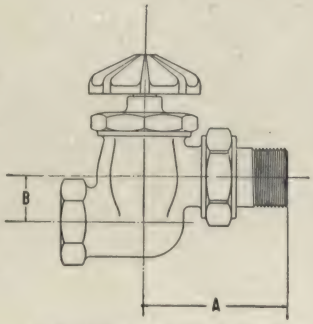
No. 102-A (Lever Handle)

DIMENSIONS IN INCHES

Sizes	A	B
½"	2⅜"	1 3/16"
¾"	2⅞"	1 3/16"
1 "	3⅛"	1 5/16"
1¼"	3⅝"	1¾"
1½"	3⅞"	1½"
2 "	4⅜"	2⅜"

DIMENSIONS IN INCHES

Sizes	A	B
½"	1⅜"	2⅜"
¾"	1⅜"	2⅞"
1 "	1 11/16"	3⅛"
1¼"	2 "	3⅝"
1½"	2⅜"	3⅞"
2 "	3 1/16"	4⅜"



No. 100-B (Back Offset)

Explanation of Dimensional Tables

Type No. 101 (wheel handle) and Type No. 102 (lever handle) graduated valves as made in left hand corner pattern, right hand corner pattern and back offset pattern have the same roughing-in dimensions shown above for the Type 100 valves in these patterns.

Roughing-in dimensions for Type Nos. 103 Lock and Shield Packless Valve and 104 Lock and Shield Graduated Valves in all patterns are the same as Type No. 100.

TYPES AND PATTERNS OF MARSH SYSTEM UNIT RADIATOR VALVES

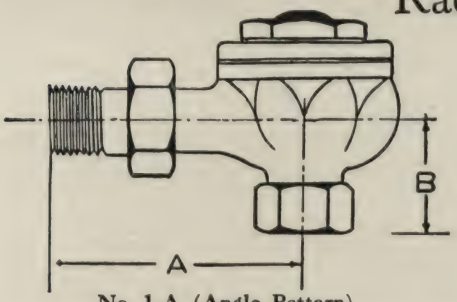
Type	Pattern	Symbol
Wheel Handle	Angle	100-A
Wheel Handle	Left Hand Corner	100-L
Wheel Handle	Right Hand Corner	100-R
Wheel Handle	Back Offset	100-B
Wheel Handle Graduated	Angle	101-A
Wheel Handle Graduated	Left Hand Corner	101-L
Wheel Handle Graduated	Right Hand Corner	101-R
Wheel Handle Graduated	Back Offset	101-B

Type	Pattern	Symbol
Lever Handle Graduated	Angle	102-A
Lever Handle Graduated	Left Hand Corner	102-L
Lever Handle Graduated	Right Hand Corner	102-R
Lever Handle Graduated	Back Offset	102-B
Lock and Shield	Angle	103-A
Lock and Shield	Left Hand Corner	103-L
Lock and Shield	Right Hand Corner	103-R
Lock and Shield	Back Offset	103-B

Note: Lock and shield construction can also be supplied in the graduated type valve—specified as No. 104—in any pattern listed above.

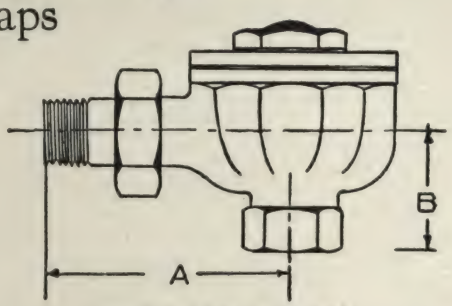
Continued on next page

Roughing-in Dimensions of Marsh System Unit Radiator Traps



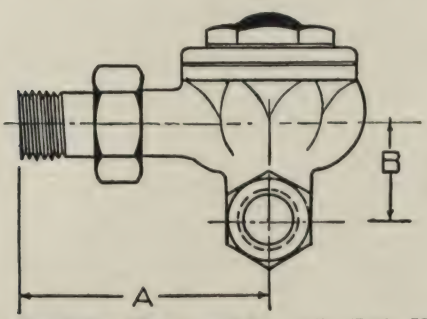
No. 1-A (Angle Pattern)

Size	Capacity	Water	A	B
½"	150 sq. ft.	40 lbs. per hour	3¼"	1½"



No. 2-A (Angle Pattern)

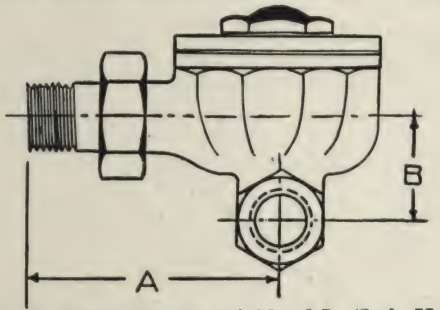
Size	Capacity	Water	A	B
½"	200 sq. ft.	50 lbs. per hour	3½"	1 7/16"
¾"	500 sq. ft.	125 lbs. per hour	3 13/16"	2 "
1 "	1000 sq. ft.	250 lbs. per hour	4 3/16"	2 7/16"



No. 1-R (Right Hand) and No. 1-L (Left Hand Corner Pattern)

Size	Capacity	Water	A	B
½"	150 sq. ft.	40 lbs. per hour	3¼"	1¼"

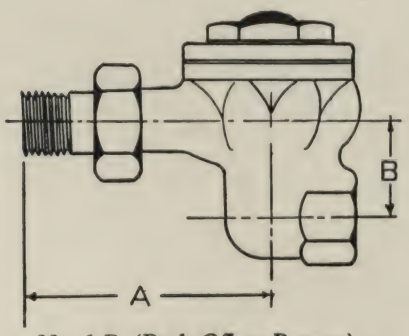
Dimensions on right and left hand pattern are identical.



No. 2-R (Right Hand) and No. 2-L (Left Hand Corner Pattern)

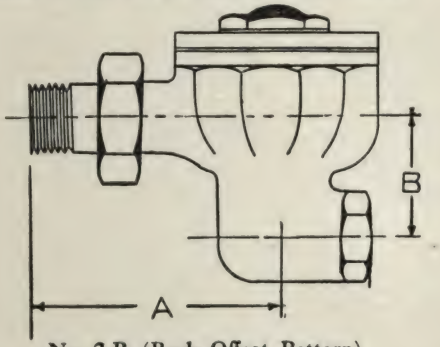
Size	Capacity	Water	A	B
½"	200 sq. ft.	50 lbs. per hour	3¾"	1¼"
¾"	500 sq. ft.	125 lbs. per hour	3 13/16"	1 5/8"
1 "	1000 sq. ft.	250 lbs. per hour	4 7/16"	1 7/8"

Dimensions on right and left hand pattern are identical.



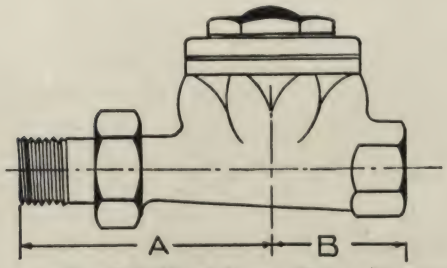
No. 1-B (Back Offset Pattern)

Size	Capacity	Water	A	B	C
½"	150 sq. ft.	40 lbs. per hour	3¼"	1¼"	1⅛"



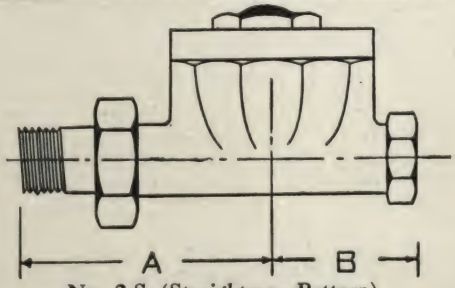
No. 2-B (Back Offset Pattern)

Size	Capacity	Water	A	B	C
½"	200 sq. ft.	50 lbs. per hour	3⅞"	1¼"	1⅜"
¾"	500 sq. ft.	125 lbs. per hour	3 13/16"	1⅝"	1 7/16"
1 "	1000 sq. ft.	250 lbs. per hour	4 7/16"	1⅞"	1⅝"



No. 1-S (Straightway Pattern)

Size	Capacity	Water	A	B
½"	150 sq. ft.	40 lbs. per hour	3¼"	1¾"



No. 2-S (Straightway Pattern)

Size	Capacity	Water	A	B
½"	200 sq. ft.	50 lbs. per hour	3¾"	2"

Continued on next page

Typical Specifications for Marsh Vapor Systems

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with the standard practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete erection of a Marsh Vapor Heating System as hereinafter specified and as shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all heating apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Furnish and install a ..... type boiler as manufactured by ....., having a guaranteed rating of .... sq. ft. of radiation. Boiler shall be equipped with all necessary trimmings and accessories, including Marsh Compound Vacuum and Pressure Gauge, Kunkle Pop Safety Valve and Type D-10 Damper Regulator. The above boiler shall be connected to chimney with a .... in. breeching of .... gauge black steel, all as shown on plans.

4. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure a complete and successful operation of the system. Fittings to be of standard best grade cast iron, and pipe to be of mild black steel properly threaded and reamed. Joints to be made up with a paste consisting of Portland cement and boiled linseed oil applied to male threads only. Proper provision to be made for expansion in all mains, risers and branches.

Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam opening, same to be dripped to return header through a bleeder. All spring pieces to steam and return mains shall be taken out of top of mains at 45 deg. on upfeed, and out of bottom of steam mains at 45 deg. on downfeed systems. All runouts or branches to radiators or risers to be graded 1 in. in 10 ft. and supply and return mains 1 in. in 20 ft.

Short run steam mains shall be returned back to boiler at a height not less than 24 in. above water line, dropping to return header with check valve and vented through a Marsh No. 5 Vent. Mains that terminate a great distance from boiler shall be dripped through a Marsh No. ..... trap and vented by a Marsh No. 5 Vent. Return mains shall run in same direction as steam mains and shall terminate at the boiler at a height not less than .... in. above water line.

5. Covering—All steam mains, risers and runouts that are exposed shall be covered with an approved air cell covering 1 in. thick, same to be convased and banded in a neat and workmanlike manner. Fittings to be covered with plastic asbestos cement troweled smooth and canvased. System shall be tested with water for leaks before covering of piping is commenced.

6. Floor Plates—Where pipes project through finished floor, ceiling or wall, provide an approved type nickel plated floor or ceiling plate.

7. Radiator—Furnish and install where shown on plans a total of .... sq. ft. of direct radiation, as manufactured by ..... or equal, to have top supply and bottom return tappings at opposite ends. Contractor must instruct manufacturer to thoroughly wash sections free of all core sand and plug all openings. Eccentric bushings shall be used at return tapping.

8. Painting—All radiation and exposed piping shall be given one priming coat of flat paint and one coat of paint to match surrounding decorations, except where piping is to be covered, all as directed by the architect. Boiler and smoke breeching to be given two coats of graphite paint.

9. Radiator Traps—Each radiator shall be provided with a Marsh System Unit Radiator Trap of proper size as manufactured by JAS. P. MARSH & COMPANY.

TAPPING SCHEDULE

Sq. ft.	Valve	Trap
0– 30	½"	½" No. 1
31– 80	¾"	½" No. 1
81–125	1 "	½" No. 1
126–175	1¼"	½" No. 2
176–250	1½"	½" No. 2
250 up	2 "	¾" No. 2

10. Radiator Valves—Each radiator shall be equipped with a Jas. P. Marsh & Company System Unit Flexcone Radiator Valve of proper size:

11. Vapor Specialties—At each point where steam mains drop to a lower level or where a steam main is dripped, it shall be vented by a Marsh No. 5 Vent. Where the return main drops below water line at boiler, it shall be vented by a Marsh No. 11 Air Trap as indicated on drawings. Return main shall be connected to a Marsh Equalizer and Boiler Return Trap, having a capacity of .... sq. ft. of direct radiation. Install swing check valves on each side of return trap connection in return main and connect same to boiler header bleeder through Hartford loop connection 3 in. below water line of boiler. All check valves to be tested for tightness before installing.

12. Cleaning System—System shall be operated for a period of several days with condensation wasted to sewer. Boiler shall then be blowed down through the bottom blowoff connection under 5-lb. pressure. Remove safety valve and connect piping from this opening to sewer properly valved. Fill boiler to proper water level, build hot fire to create at least 5 lb. pressure and open valve in top blowoff connection, feeding enough water to boiler to maintain a constant water level. After four hours firing in this manner, fill boiler with water and allow hot water to flow out of top blowoff connection for one hour. Draw the fire, shut off feed water and blow down through bottom blowoff connection. Allow boiler to cool, replace safety valve and fill boiler with fresh water to proper level.

13. Guarantee—The contractor shall guarantee in the entire system a complete continuous and noiseless circulation of steam to each radiator or coil, free of all air and condensation, at a pressure not to exceed .... lb. gauge. He shall also hold himself responsible for any defects which may develop in any part of the system, including piping, valves or other apparatus included in this specification, due to faulty workmanship, design or material at any time within one full heating season from date of final payment and shall remedy such defects at his own cost.

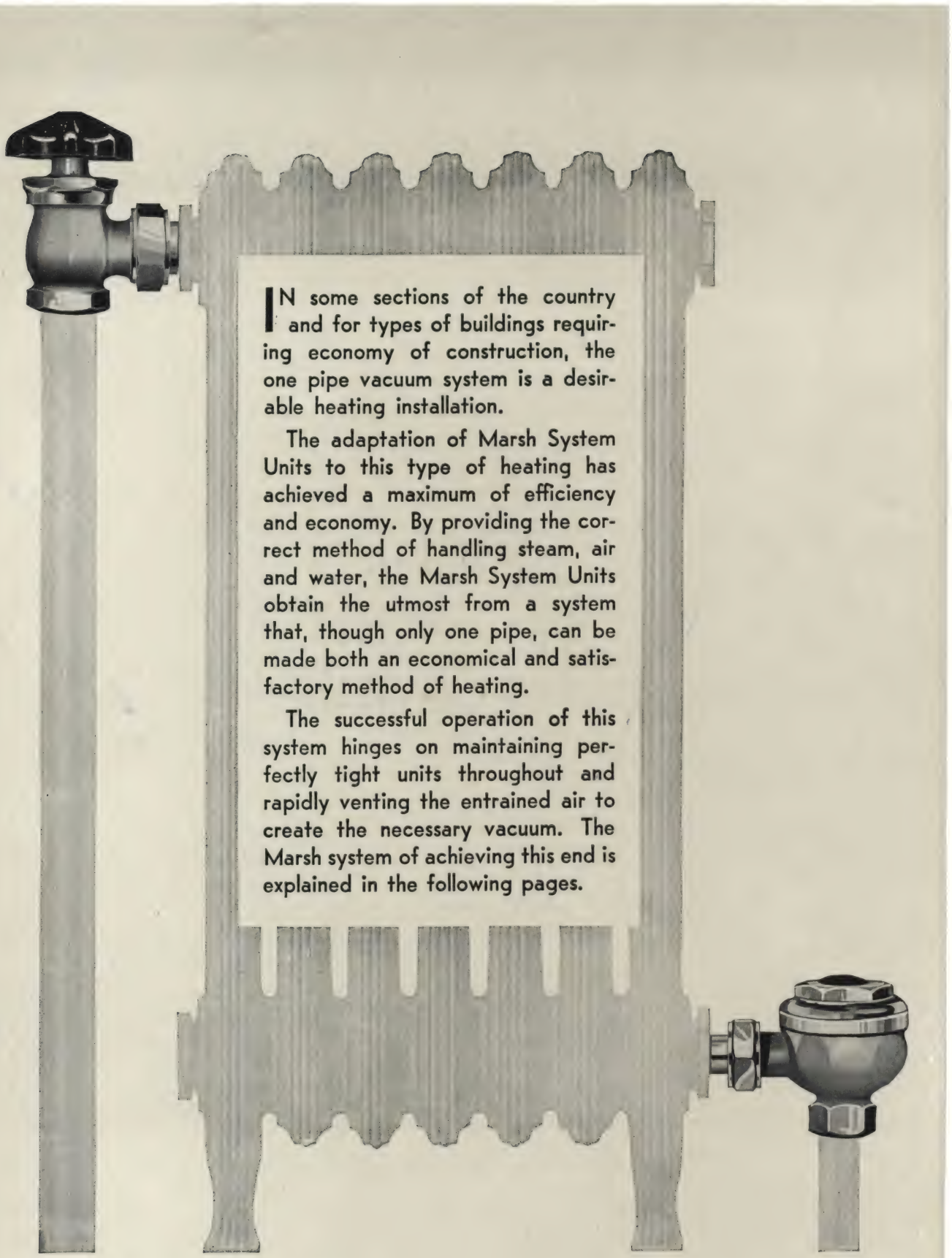
14. Finally—The true intent of these specifications is to bring about the satisfactory completion of the system as outlined above, and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work.

THE MARSH ONE PIPE VACUUM SYSTEM OF HEATING

Bulletin No. 125

for Residential Small Apartment and Public Buildings

JAS. P. MARSH & COMPANY
CHICAGO



IN some sections of the country and for types of buildings requiring economy of construction, the one pipe vacuum system is a desirable heating installation.

The adaptation of Marsh System Units to this type of heating has achieved a maximum of efficiency and economy. By providing the correct method of handling steam, air and water, the Marsh System Units obtain the utmost from a system that, though only one pipe, can be made both an economical and satisfactory method of heating.

The successful operation of this system hinges on maintaining perfectly tight units throughout and rapidly venting the entrained air to create the necessary vacuum. The Marsh system of achieving this end is explained in the following pages.

THE MARSH ONE PIPE VACUUM SYSTEM OF HEATING

THE one pipe heating system is usually applied to that type of structure, in the building of which first cost is an important consideration, but in which it is desired not to sacrifice the benefits accruing from radiator steam heating.

Air and Vacuum Valve

The installation of the Marsh System Unit Air and Vacuum Valve and correlated devices on one pipe steam heating system overcomes certain weaknesses inherent in this system. This valve functions to rapidly eliminate air from the system and seal it against further intrusion of air when the steam pressure drops. It likewise keeps the system under a vacuum between heating-up periods. This permits steam to be generated and circulated under lower pressures or vacuum and the radiators retain heat for a much longer period, resulting in a considerable saving in fuel.

It also serves to eliminate noises and pounding that are usually found in one pipe systems in which proper circulation under vacuum conditions is not obtained.

The Radiator Valve

Of prime importance in this system is the use of a perfect packless supply valve which is installed at the bottom of the radiator. In the one pipe system steam and condensate travel in opposite directions in the same piping and through the same valve. This conflict of opposing elements is responsible for the noisome hammering and pounding to which one pipe heating systems are often subject. This condition is alleviated by the use of valves with large openings. Likewise, for this reason, valves on such systems must be either fully opened or fully closed. But even in the case of valves with large openings, the operation of the valve, unless performed quickly will give rise to hammering.

One of the chief causes of loss of vacuum in this type of system is the infiltration of air due to leakage around the valve stem.

The Marsh System Unit Radiator Valve is the ideal valve for the one pipe vacuum system. It is perfectly packless and immune to air infiltration or steam escape. The large port opening provides practically the same opening as the pipe itself, offering no resistance to the flow of steam or condensate. It is quick opening in operation. It opens fully, closes tightly and is operated completely by less than a full turn.

Boiler Room Equipment

As in the case of any type of heating system, the proper functioning of the one pipe vacuum system is largely dependent upon the wise selection of the boiler and boiler equipment. A sensitive damper regulator and a gauge that responds to the slightest changes in pressure or vacuum are essential to the successful operation of the system.

In design the system is comprised of a source of steam supply. The supply main from the source of steam supply pitches downward following a course depending upon the radiators to be supplied. The pitch should not be less than ¾ inch or 1 inch in 10 feet. Depending upon the contour of the building, the mains may be carried to some distant point from the boiler before terminating or they may be arranged so that their terminus occurs at or near the boiler. In either case, the main is dropped below the water line of the boiler with a check valve at the base of the drop to prevent water from the boiler surging into the system.

Application

The Marsh System Units comprising this one pipe vacuum system of heating may not only be utilized in the installing of systems in new buildings but are readily adaptable to old one pipe systems, transforming them to vacuum operation.

Tightness of System

It is equally important that all pipe joints be perfectly tight, so that no air can penetrate the system through the joints. A system, to be sufficiently tight, should be subjected upon installation to a two-fold test to determine the tightness of the joints, sealing those that show signs of leakage. A brisk fire should be built in the boiler and continued until 5 pounds is shown on the gauge and all radiators filled with steam. Then draw fire. All joints should be carefully examined for leaks. If the system is tight, after the pressure has dropped, continued condensation of the steam will create a vacuum of at least 10 inches. After reaching a maximum, the vacuum indication on the gauge will recede and if the system is tight this recession will be at a rate of less than 1 inch of vacuum per hour.

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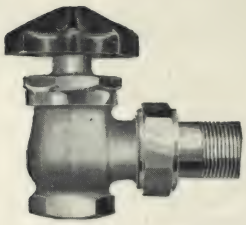
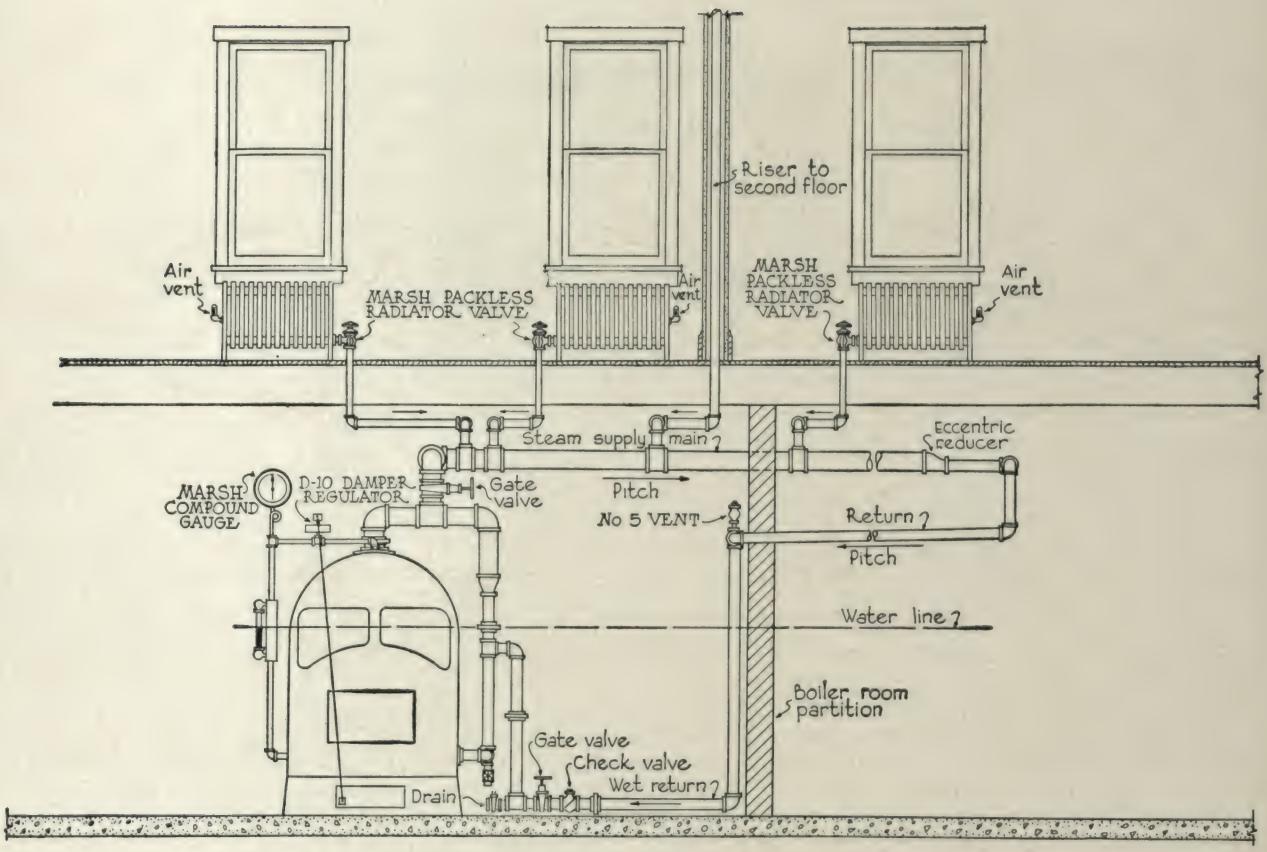
Typical Installation
Marsh One Pipe System of Heating

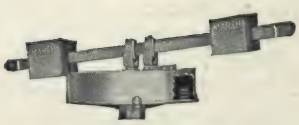
Showing Customary Arrangement of Marsh System Units



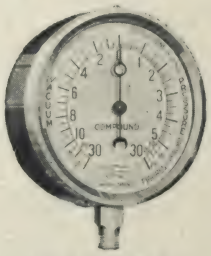
Marsh System Unit
Radiator Valve

Marsh System Unit Air
and Vacuum Valve





Damper Regulator



Compound Gauge

No. 5 Vent

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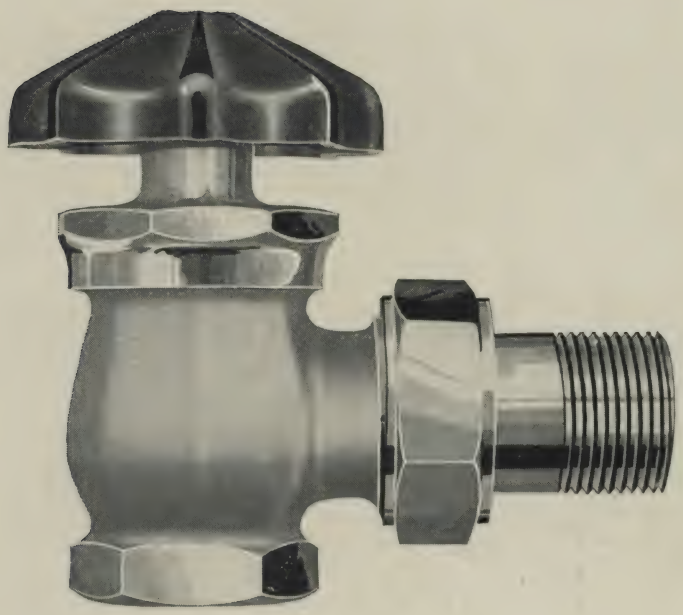
Marsh System Units

Following the trend towards beautifying interior decorations in the modern mode, Marsh has combined efficiency with beauty of line in radiator valves and air vents. The designs of these units match each other and at the same time blend with the fine lines of up-to-date tubular radiators.



Marsh System Unit Radiator Valve

The Marsh Radiator Valve is exceptionally well suited to use on the one pipe vacuum system. It has a large opening, operates rapidly, and is perfectly packless. To efficiency of operation is added beauty. The body design of this valve is in keeping with modern decoration and matches the equally modern design of the air and vacuum valve.

The valve is finished in two-tone chrome finish; the body in satin chrome and the bonnet and tail-piece in polished chrome. A Bakelite wheel handle of modern design crowns the valve and is so moulded that it fits perfectly into the hand for easy operation. The body is of the highest grade cast steam bronze. The valve seat is so designed that grit, dirt or scale will not clog it.

Bodies are regularly furnished in angle, straight-way, offset and right and left-hand corner types in sizes ranging from ½ inch to 2 inches inclusive. Data on valve extensions and other accessories are given in bulletin No. 150. Construction details are given on next page.

Marsh Air and Vacuum Valve

This radiator air vent carries out the same modern motif in design as the new Marsh Radiator Valve. The combination of this vent with its companion part, the radiator valve, makes a most pleasing appearance on the latest type of radiator.

The function of this device is to vent the air from the radiator and close the system when steam comes in contact with a special element within, thus preventing steam waste and likewise preventing the introduction of air into the system.

Water of condensation is drained as fast as formed. If the vent fills with water from any condition in the radiator, the syphon first clears the base of the vent of water. Air then rushes to the top of the vent above the water line and the balance of water falls to base and is instantly syphoned back into the radiator.

Dirt, grit or scale cannot interfere with the operation of the vent.

Finished in lustrous polished chrome.

Continued on next page

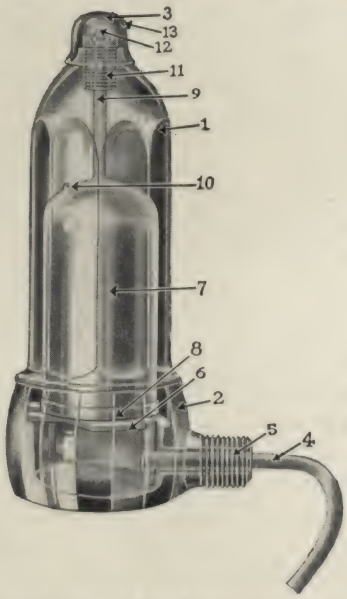
Operation of the Marsh Air and Vacuum Valve

The operation of the Marsh Air and Vacuum Valve is based upon a new principle of construction, which combines the three important functions of thermostatic, flotation and vacuum operation in one operative part. It has very rapid air eliminating capacity and an absolutely positive vacuum feature. With the exception of the primary vacuum at the initial firing up, the vacuum operation of the Marsh Air and Vacuum Valve is controlled by the sealing of atmospheric pressure within the float member.

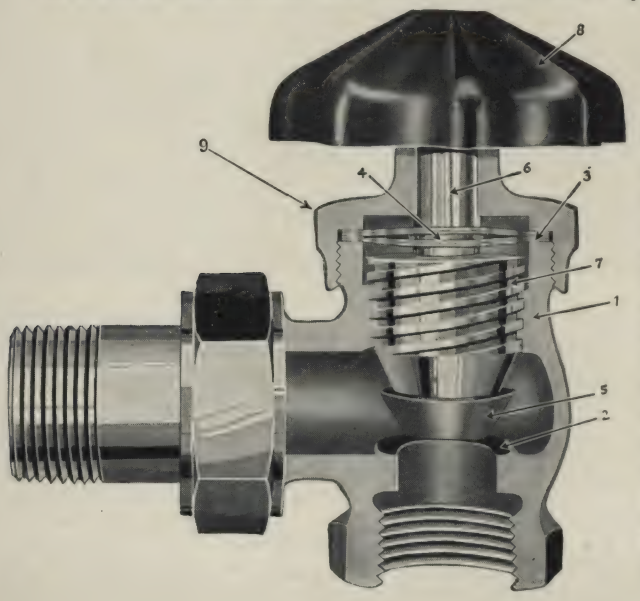
The entire mechanism of the Marsh Air and Vacuum Valve is contained within the assembly of the shell (1) and the base (2), except the primary ball check (12) which is contained in the cap (3).

Operation is as follows: When steam enters the radiator it drives air ahead into the valve, through the vent screw (11), (pushing the light ball upward) and out through the air port (13). It takes only a fraction of an ounce of pressure to remove it from its seat. When all air has been eliminated steam enters the valve and a combination of volatile fluids contained within the float member (7) creates internal pressure expanding diaphragm (8) which rests upon baffle plate (6), raising the float member (7) and valve pin (9), sealing vent screw (11).

The valve remains closed until additional air forms, when its lower temperature contracts the diaphragm (8) removing valve stem from vent screw and permitting air to escape. As the air is replaced by steam the diaphragm expands, sealing the valve once more. As the steam condenses, a vacuum is formed within the radiator and valve. This draws the primary ball (12) against its seat until such time as approximately 1 inch of vacuum is created in the radiator and the valve. With atmospheric pressure sealed into the float (7) through air seal (10) and a vacuum in the valve surrounding the float, the difference in pressure causes the diaphragm (8) to remain expanded raising the float and valve pin against the vent screw, sealing the valve. As the depth of vacuum increases the pressure on the inside of the float against the diaphragm increases, assuring a perfect seal against the entrance of air and maintaining the system under a vacuum until additional steam is supplied. Should a rush of water enter the valve from the radiator, the baffle plate (6) serves to break up the force of the water impact, protecting the float against damage. As this water enters the valve the float (7) rises, carrying the valve pin (9) against the seat, sealing the valve. Due to the inner construction of the base (2) water passes out of the valve by gravity and is aided in this course by the syphon (4), through which water can flow while steam or air enter the valve through channel (5).



Construction of the Marsh System Unit Radiator Valve



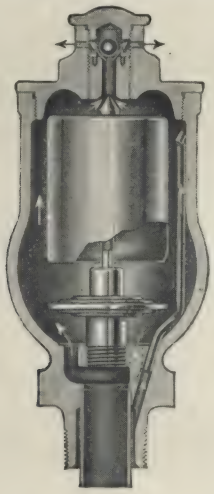
The body of the valve (1) is a steam bronze casting accurately machined and tested to 125 pounds pressure. The valve seat (2) is built integrally into the valve body and in combination with the Flexcone valve disc (5) permits a large, full capacity flow through the valve. The lift thread in which the thrust screw (7) operates is cut integrally into the main body casting allowing a large deep thread and adding strength to the body casting. The patented Flexcone valve seat (5) is a drawn monel metal spring cup permanently riveted to the thrust screw. Integrally incorporated in the valve stem is a perfectly machined stem collar (4) which in conjunction with the Metalflex sealing discs (3) serve to make the valve perfectly packless. These sealing discs consist of two sets of thin metal diaphragms. The valve bonnet (9) is screwed onto the valve body around the valve steam (6), lining up the latter and at the same time compressing the upper set of Metalflex discs against the lower set, forming a perfect seal. The valve wheel (8) is made of bakelite.

Continued on next page

Boiler Room System Units For One Pipe Vacuum Systems

No. 83 Compound Retard Gauge

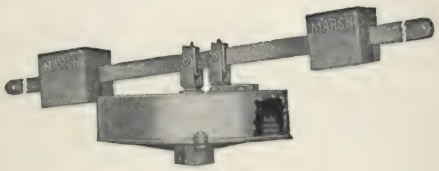
A sensitive gauge that will indicate to the operator the slightest change in pressure is essential. The Marsh No. 83 Compound Retard Gauge was designed expressly for this service, having a sensitive spring that will register the slightest change in pressure. Dial is graduated in ounces up to 5 pounds, and in 5-pound graduations from 5 to 30 pounds. For subatmospheric pressures, the depth of vacuum is indicated in wide half-inch graduations up to 10 inches, and in 5-inch graduations from 10 to 30 inches. Sizes, 3½-inch to 10-inch dial.



No. 5 Vent

This vent is the air expelling unit at the ends of steam mains. It expels air until steam has reached the thermostatic element. When steam reaches this element, it expands upwardly, closing the outlet port and preventing vapor from escaping.

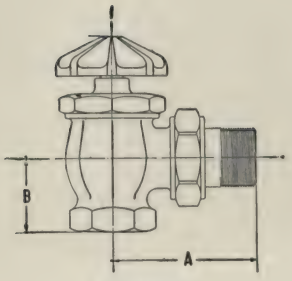
This vent is fitted with a float to eliminate the possibilities of water surging and also a vacuum top feature to prevent air from re-entering the system.



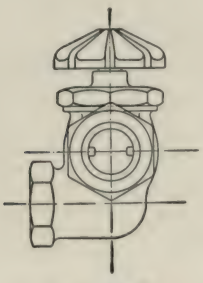
Type D-10 Damper Regulator

The boiler on this system is equipped with this sensitive regulator—the purpose of which is to insure the operator against waste of fuel by controlling the amount of vapor generated in accordance with adjustment based on outside weather conditions. It operates automatically through a sensitive laminated metal bellows which actuates a lever arm balanced by weights. This arm through the medium of a chain opens and closes check and draft dampers on the boiler. This regulator comes equipped with 48-inch lever weight, two bell cranks, 12 feet of chain and 1 inch female pipe connection.

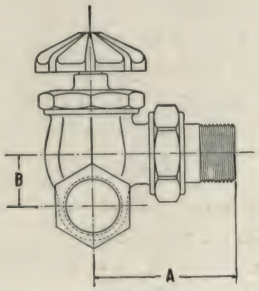
Dimensions Marsh System Unit Packless Radiator Valves



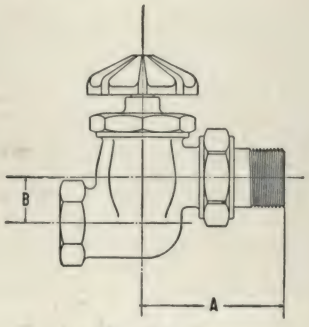
No. 100-A (Angle)



No. 100-L (Left Hand Corner)



No. 100-R (Right Hand Corner)



No. 100-B (Back Offset)

DIMENSIONS IN INCHES

Size	A	B
½″	2 3/8″	1 3/16″
¾″	2 7/8″	1 3/16″
1 ″	3 1/8″	1 3/16″
1¼″	3 5/8″	1¾″
1½″	3 7/8″	1½″
2 ″	4 3/8″	2 3/8″

DIMENSIONS IN INCHES

Size	A	B
½″	2 3/8″	¾″
¾″	2 7/8″	¾″
1 ″	3 1/8″	7/8″
1¼″	3 5/8″	1 1/8″
1½″	3 7/8″	1¼″
2 ″	4 3/8″	1½″

DIMENSIONS IN INCHES

Size	A	B
½″	1 3/8″	2 3/8″
¾″	1 3/8″	2 7/8″
1 ″	1 11/16″	3 1/8″
1¼″	2 ″	3 5/8″
1½″	2 3/8″	3 7/8″
2 ″	3 1/16″	4 3/8″

Continued on next page

Typical Specifications for Marsh One Pipe Vacuum System

1. General Conditions—The general conditions governing this portion of the work shall be in accordance with those of the American Institute of Architects and installation shall be in accordance with Standard Practices of the local association of contractors.

2. Scope of Work—The work to be done includes the furnishing of all labor and materials for the complete erection of a Marsh One Pipe Vacuum System as hereinafter specified and as shown on drawings. Work to be done shall be executed in a neat and workmanlike manner, and all heating apparatus pertaining to this portion of the work to be of the best grade materials and shall strictly conform to these specifications.

3. Boiler—Furnish and install a ..... type boiler as manufactured by ..... having a guaranteed rating of .... sq. ft. of radiation. Boiler shall be equipped with all necessary trimmings and accessories, including Marsh Compound Vacuum and Pressure Gauge, Kunkle Pop Safety Valve and Type D-10 Damper Regulator.

The above boiler shall be connected to chimney with a .... in. breeching of .... gauge black steel, all as shown on plans.

4. Pipe and Fittings—Contractor shall furnish and install where indicated on plans all pipe and fittings properly supported and graded to insure a complete and successful operation of the system. Fittings to be of standard best grade cast iron, and pipe to be of mild black steel properly threaded and reamed. Joints to be made up with a paste consisting of Portland cement and boiled linseed oil applied to male threads only. Proper provision to be made for expansion in all mains, risers and branches.

Boiler header shall be made up of standard flanged fittings connected to boiler full size of steam opening, same to be dripped to return header through a bleeder. All spring pieces to steam mains shall be taken out of top of mains on upfeed systems, and out of bottom of steam mains on downfeed systems. All runouts or branches to radiators or risers to be graded 1 in. in 5 ft. and supply mains 1 in. in 10 ft. Steam mains shall be carried to their terminus and there dropped below the water line of boiler and vented with a Marsh No. 5 Vent with a swing check valve at the base of the line. Wet return main shall be carried back to boiler and connected to the header bleeder through a loop connection.

5. Covering—All steam mains, risers and runouts that are exposed shall be covered with an approved air cell covering 1 in. thick, same to be canvased and banded in a neat and workmanlike manner. Fittings to be covered with plastic asbestos cement troweled smooth and canvased. System shall be tested with water for leaks before covering of piping is commenced.

6. Floor Plates—Where pipes project through finished floor, ceiling or wall, provide an approved type nickelplated floor or ceiling plate.

7. Radiator—Furnish and install where shown on plans a total of .... sq. ft. of direct steam radiation, as manufactured by ..... or equal, to have bottom supply and a provision for air valve below center of radiator. Contractors must instruct manufacturers to wash sections free of all core sand and plug all openings.

8. Painting—All radiation and exposed piping shall be given one priming coat of flat paint and one coat of paint to match surrounding decorations, except where piping is to be covered, all as directed by the architect. Boiler and smoke breeching to be given two coats of graphite paint.

9. Air Valves—On each radiator a Marsh System Unit Air and Vacuum Valve is to be placed on radiator in the opening provided for by radiator manufacturers.

10. Radiator Valves—At the bottom of each radiator install a Marsh System Unit Quick Opening Packless Radiator Valve of a size to be determined by schedule below.

TAPPING SCHEDULE

Sq. ft.	Valve
0– 30	1 "
31– 60	1¼"
61–100	1½"
100 up	2 "

Test for Tightness—Before pipe covering is installed, the heating contractor shall conduct the following test for tightness of joints: Build a brisk fire in the boiler, filling all radiators with steam. When gauge indicates 5 lbs., draw fire. After pressure has dropped, the gauge shall show a vacuum of at least ten inches. After reaching maximum, indication on the gauge shall recede at a rate of not more than 1 in. of vacuum per hour. The contractor must see that all piping withstands this test.

11. Cleaning System—System shall be operated for a period of several days with condensation wasted to sewer. Boiler shall then be blowed down through the bottom blow-off connection under 5-lb. pressure. Remove safety valve and connect piping from this opening to sewer properly valved. Fill boiler to proper water level, build hot fire to create at least 5-lb. pressure and open valve in top blow-off connection, feeding enough water to boiler to maintain a constant water level. After four hours firing in this manner, fill boiler with water and allow hot water to flow out of top blow-off connection for one hour. Draw the fire, shut off feed water and blow down through bottom blow-off connection. Allow boiler to cool, replace safety valve and fill boiler with fresh water to proper level.

12. Guarantee—The contractor shall guarantee in the entire system a complete continuous and noiseless circulation of steam to each radiator or coil, free of all air and condensation, at a pressure not to exceed .... lb. gauge. He shall also hold himself responsible for any defects which may develop in any part of the system, including piping, valves or other apparatus included in this specification, due to faulty workmanship, design or material at any time within .... years from date of final payment and shall remedy such defects at his own cost.

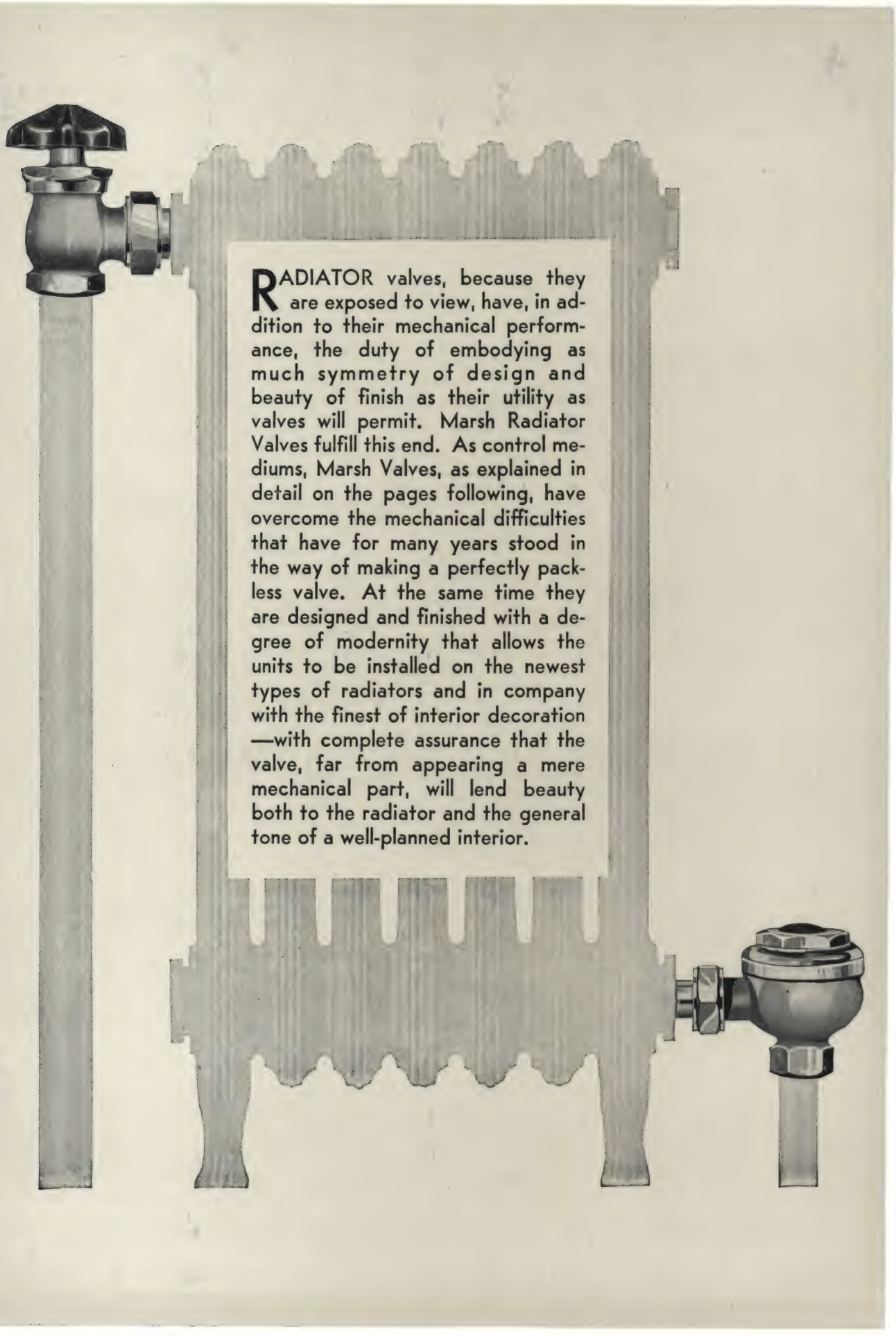
13. Finally—The true intent of these specifications is to bring about the satisfactory completion of the system as outlined above, and nothing contained herein can be construed to relieve the contractor from making good and perfect the work in all usual details of construction, and he will be held responsible and bear all expenses incidental to the satisfactory completion of the work.

MARSH SYSTEM UNIT RADIATOR VALVES

Bulletin No. 150

Packless and Graduated Radiator Valves

JAS. P. MARSH & COMPANY
CHICAGO



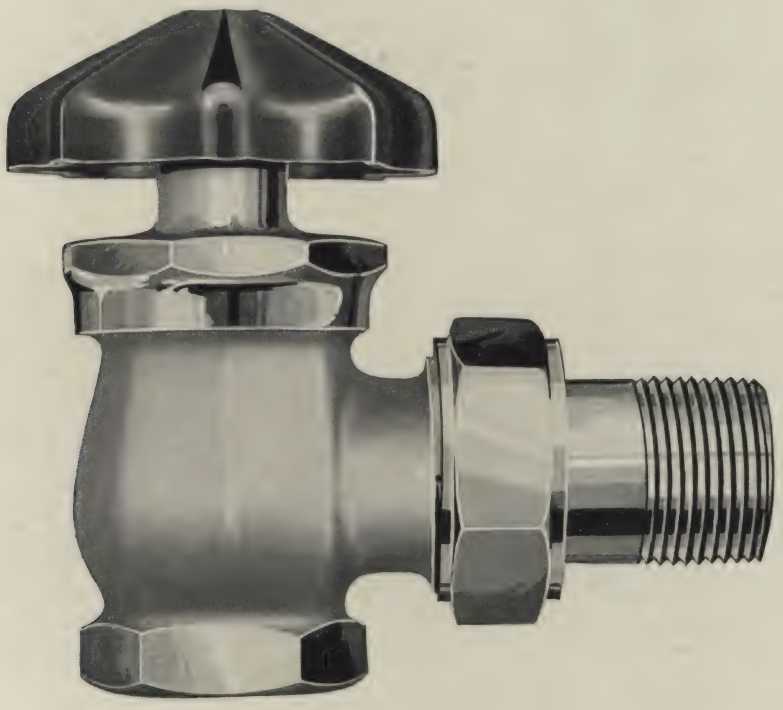
RADIATOR valves, because they are exposed to view, have, in addition to their mechanical performance, the duty of embodying as much symmetry of design and beauty of finish as their utility as valves will permit. Marsh Radiator Valves fulfill this end. As control mediums, Marsh Valves, as explained in detail on the pages following, have overcome the mechanical difficulties that have for many years stood in the way of making a perfectly packless valve. At the same time they are designed and finished with a degree of modernity that allows the units to be installed on the newest types of radiators and in company with the finest of interior decoration —with complete assurance that the valve, far from appearing a mere mechanical part, will lend beauty both to the radiator and the general tone of a well-planned interior.

MARSH SYSTEM UNIT RADIATOR VALVES

IN keeping with the modern trend of architecture JAS. P. MARSH & COMPANY has designed the new Marsh System Unit Radiator Valve which combines beauty with mechanical perfection. Now, radiator fittings as well as radiators themselves may be worked into interior design and be in keeping with the finest of furnishings.

This New Marsh Radiator Valve is modern in design. The simplicity of its lines, the two-tone polished and satin chrome or nickel body finish, crowned by a control wheel or lever of bakelite of distinctive proportions, places this heating necessity abreast of modern trend.

Yet, with all the advanced beauty of design this valve has that dependability typical of all Marsh products.



The Truly Packless Valve

Despite numerous changes in the design of heating systems since the early days when radiator valves were themselves the sole means of regulating, the radiator valve is still a fundamental part of heating systems.

For many years, it was an accepted practice to repack radiator valves at frequent intervals. The introduction of the first so-called packless valve was an endeavor to overcome this condition. This first "packless" valve relied upon a composition disc and spring construction to achieve its purpose. The rapid deterioration of the materials used, however, resulted in the necessity for a more efficient design. Then came the metal-to-metal valve. In this construction, an auxiliary packing around the stem was required to offset the wear of the metal parts due to friction. Still later came the bellows and multiple diaphragm types. These formed a perfect seal but were subject to the dangers of cracking due to strain in service.

The Marsh System Unit Radiator Valve is truly packless. At the same time, its packless feature is not subject to deterioration, wear or cracking. We have confidence in the principles upon which it has been designed. These principles have proven as sound as they are new.

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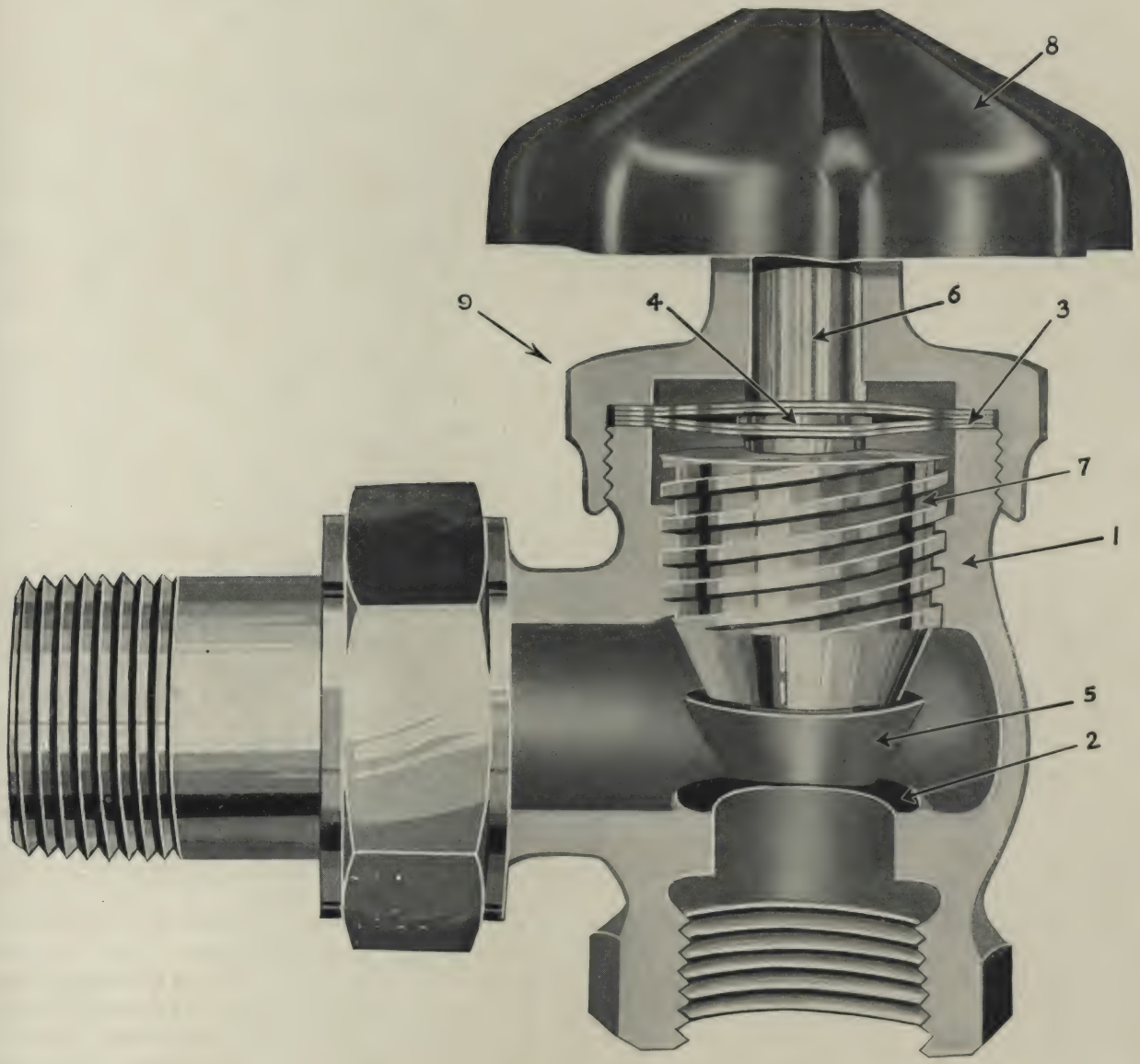
View Showing Interior and Construction of the Marsh System Unit Packless Radiator Valve



1—Valve Body
2—Valve Seat
3—Metalflex Sealing Discs
4—Stem Collar
5—Flexcone Valve Disc
6—Valve Stem
7—Thrust Screw
8—Bakelite Handle
9—Valve Bonnet

Continued on next page

Construction of Marsh System Unit Radiator Valves

The construction of Marsh System Unit Radiator Valves consists of two major assemblies, the valve mechanism and the bonnet assembly.

The body (1) of the valve is a steam bronze casting accurately machined and tested to 125 pounds pressure. Modern methods of machining on all parts of the body including the thrust screw thread and the bonnet (9) are employed, gaged by micrometer scale, making all parts uniform and interchangeable.

The valve seat (2), built integrally into the valve body, in combination with the Flexcone valve disc (5) permits of large, full capacity flow through the valve. In the case of the graduated type valve this construction makes for very fine modulation of the flow.

The lift thread, in which the thrust screw (7) operates, is cut integrally into the main body casting, allowing a large, deep thread, and adding to the wall thickness and strength of the body casting.

The thrust screw consists of a bronze forging with a large, heavy, quadruple lift thread of sizable proportions which operates directly into a similar thread machined into the valve body. This construction makes the valve quick opening, even in the larger sizes. It also permits of "slow" thread construction lending power to the operation of the valve and contributing to the easy operation of the entire valve, eliminating all possibility of sticking or clogging of the threads. In actual test it has been impossible to clog or stick the thread under the most severe operating conditions. The large diameter thread also assures perfect, continuous seating of the valve. Either entirely closed or partially open, the valve seat, at a given position, remains in that position until manually reset. Chattering or pressure vibration does not disturb the setting.

The patented Flexcone valve seat (5) is a drawn monel metal spring cup permanently riveted to the thrust screw. This assembly is swivelled, permitting the disc (5) to make a perfect seating at all times.

The cone shape of the valve disc in combination with the large area of the opening in the valve seat gives this valve large, full, pipe size flow capacity when fully opened. The cone shape acts as a deflector in cutting the flow of water and diverting it to the proper angle of flow into the radiator and does not restrict flow as in the case of the Jenkins type flat disc used in other types of valves.

In the graduated type valve, the Flexcone valve disc raising and lowering in the orifice of the valve seat modulates the area of the opening and in that way controls the flow in direct proportion to the setting of the indicator and dial (parts 3 and 4 in illustration on following page).

The valve assembly (parts 7 and 5) are operated by a valve stem (6) which fits loosely into a tongue and groove arrangement within the thrust screw. As the valve stem is rotated by wheel (8) or by the turning of lever handle, it in turn rotates the thrust screw raising or lowering it in the body thread.

Integrally incorporated in the valve stem is a perfectly machined stem collar (4) which in conjunction with the Metalflex sealing discs (3) make the unique, positive and perfect sealing packless arrangement built into this valve. The Metalflex sealing discs consist of two sets of thin metal divided with a hole, through which the valve stem passes. The upper set of discs consists of a monel metal diaphragm in contact at the center with the flat diaphragm in contact at the center with the flat upper surface of the stem collar and a stainless spring steel diaphragm resting on top of the monel diaphragm. The lower set of discs has a similar monel metal diaphragm in contact with the lower flat surface of the stem collar and a stainless spring steel diaphragm resting against the monel metal diaphragm. This assembly separates the upper and lower sets of discs from each other by the thickness of the stem collar.

The entire assembly of valve stem and Metalflex sealing discs is installed into the valve body assembly. The valve bonnet (9) as screwed onto the valve body fits around valve stem, lining up the latter and at the same time compressing the upper set of Metalflex discs tightly against the lower set of discs forming a perfect seal at the outer periphery. At the same time this compresses the two sets of Metalflex discs against the stem collar, creating a self-spring seal as the stem collar rests or rotates between the two monel metal diaphragms.

The valve wheel is made of Bakelite. It is of unique design and its form lends itself to perfect fit of the hand. This form also allows air currents to circulate under and around the wheel assuring coolness to the touch. The lever handle construction consists of a forging formed to match the balance of the Marsh System Unit Valve design and is fitted with a bakelite lever.

Union nut and tail piece are made of hard brass forgings. The tail piece construction includes two lugs for easy installation into the radiator fitting.

Tests

Laboratory tests of Marsh System Unit Valves calculated to definitely prove the efficiency and perfection of the unique construction, have subjected these units to service many times that of normal operation. To test the wearing qualities of the Flexcone valve disc and bronze valve seat, completely assembled valves have been tested upwards of 30,000 operations, on pressures from vacuum to several hundred pounds, without showing any appreciable signs of wear.

These same tests applied prove the packless and sealing qualities of the Metalflex sealing discs and the stem collar, which following upwards of 30,000 operations show no appreciable wear and resulted in no strain of component parts.

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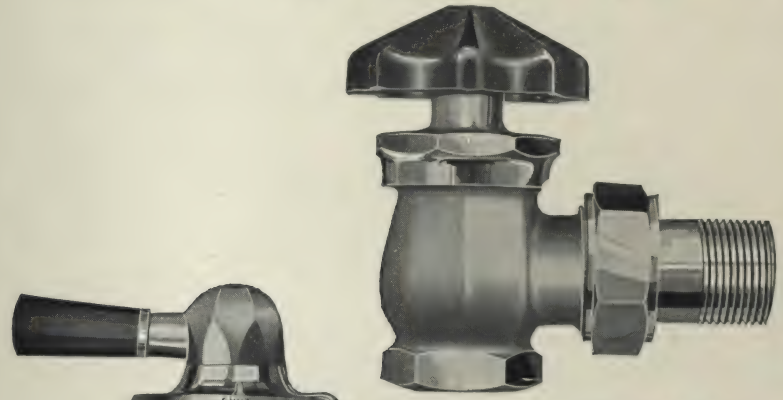
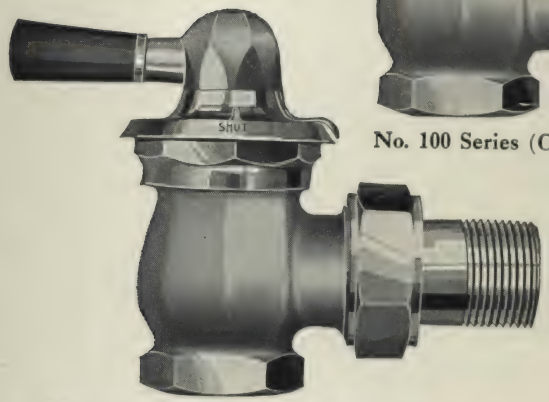
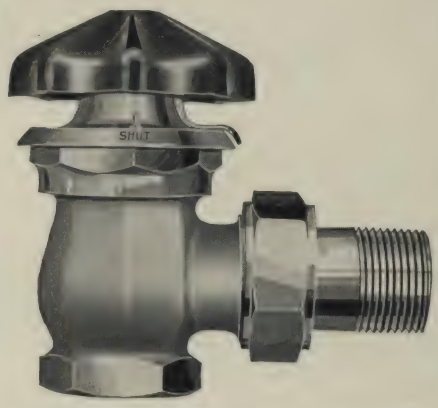
Different Types of Marsh System Unit Radiator Valves



No. 100 Series (Oval Wheel Packless)



No. 102 Series (Lever Handle—Graduated)



No. 101 Series (Oval Wheel—Graduated)

The Graduated Type of Marsh System Unit Radiator Valve

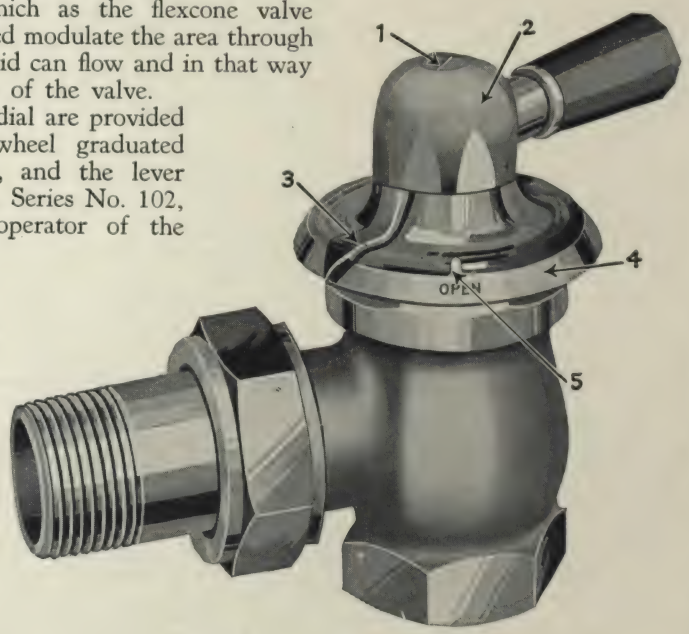
In the Marsh Graduated Type Packless Radiator Valve a means is provided whereby the total capacity of the valve is adjusted in proportion to the size of the radiator, operating the valve so as to limit the flow through the valve in quantities graded approximately according to weather requirements. The flexcone valve disc, together with the valve seat (parts 5 and 2 in illustration on page 2), form an orifice arrangement which as the flexcone valve disc is raised and lowered modulate the area through which the steam or liquid can flow and in that way graduating the capacity of the valve.

An indicator and dial are provided with both the oval wheel graduated valve, Series No. 101, and the lever handle graduated valve, Series No. 102, acting to guide the operator of the valve as to the proper setting for the desired flow.

This construction provides a simple means for the steamfitter, or any other authorized person to calibrate the total capacity found expedient according to the size of the radiator upon which it is installed.

This simple operation is as follows:

With the valve installed, set the percentage of full opening desired. Remove graduating assembly (parts 1, 2, 3 and 4 of the accompanying illustration), replace dial (4) in such position on the valve that indicating field is in full view of operator. Replace indicator (3) directly against "open" pin (5) on the graduating field side. Replace lever handle bonnet (2) and screw (1).



The valve is now calibrated for the desired maximum opening. Also, so arranged that the occupant can change the proportional flow through the valve as desired.

In the case of the Series No. 101 oval wheel graduated valve the operation is the same except that the oval wheel is removed instead of the lever handle bonnet to permit changing of dial and indicator and is replaced, following the changing operation.

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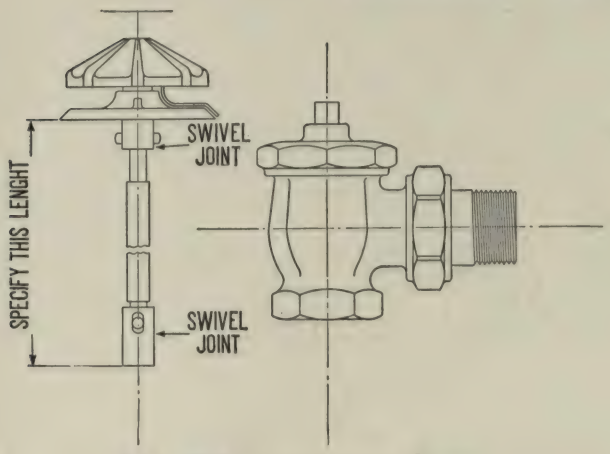
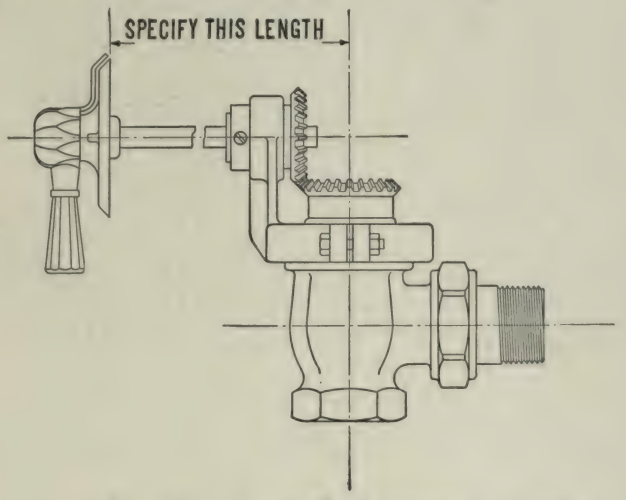
Radiator Valve Accessories



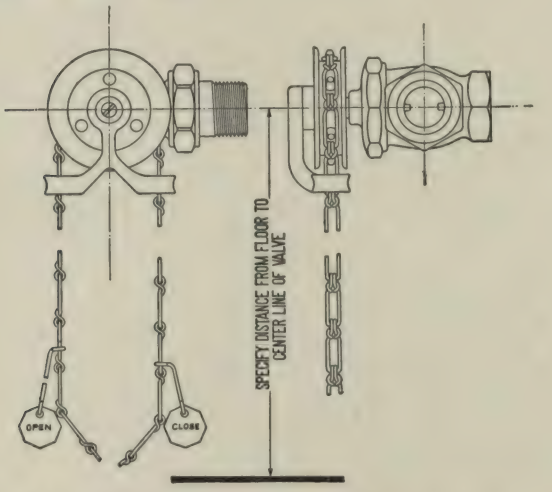
No. 200 Extension Stem

This type of extension stem is utilized in connection with radiator valves installed in radiator furniture, radiator cabinets, and behind grilles, where the wheel and dial indicator are placed at the top of the enclosure. Also where the valve is so installed that the stem is horizontal, permitting the wheel and dial to be placed on the face of the enclosure. The unique universal swivel joints permit the handle of the extension to be located in an off center position where desired. Furnished with wheel or lever handle, indicator and dial and with extension rod in standard lengths which can be cut to correct lengths on the job. The entire distance of extension, as shown in the illustration, should always be specified for each valve.



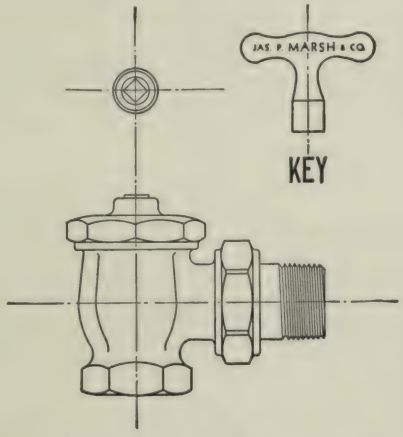
No. 201 Geared Extension Stem

Application of this extension stem assembly permits installation of valves behind grilles and in connection with concealed radiation where access to the wheel is not available above the radiator or where it is not possible to install the valve so that the stem is horizontal. This attachment permits installation of the wheel or lever, together with dial and indicator, on the face of the enclosure regardless of the type or position of the valve. Also permits opening and closing of the valve with a minimum of turn of the wheel or handle. Also permits fractional operation of graduated type valves. Furnished with wheel or lever handle, indicator and dial and with extension rod in standard lengths which can be cut to correct length on the job. The entire distance of extension, as shown in the illustration, should always be specified for each valve.



No. 202 Chain Type Extension

This attachment is available for all sizes and types of Marsh System Unit Packless Valves and is adaptable to use where radiators are located on the ceiling or on the wall near the ceiling out of reach of the operator. Consists of a grooved sprocket operated by chain belt, requiring a minimum turn to open or close valve. Chain is furnished in any length to meet conditions for which it is intended, complete with tags indicating "open" and "closed" position.

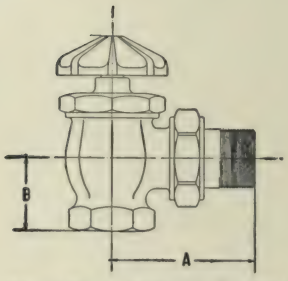


No. 103 Lock Radiator Valve

In order to meet the demand for a locking device on radiator valves located in public buildings, lobbies, offices, etc., the Marsh No. 103 Lock and Shield Radiator Valve can be furnished in all patterns and all sizes up to 2 inches, and No. 104 Graduated Lock and Shield Valves. Separable key permits only authorized persons to change the required setting of the valve.

Continued on next page

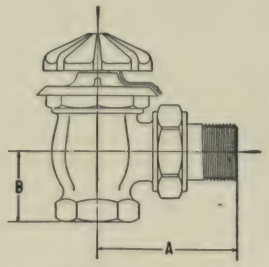
Patterns and Roughing-in Dimensions of Marsh System Unit Packless Radiator Valves



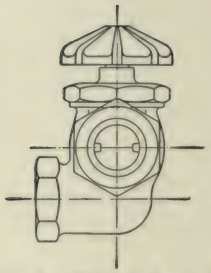
No. 100-A (Wheel Angle)

DIMENSIONS IN INCHES

Sizes	A	B
½″	2⅜″	1 3/16″
¾″	2⅞″	1 3/16″
1 ″	3⅛″	1 5/16″
1¼″	3⅝″	1¾″
1½″	3⅞″	1½″
2 ″	4⅜″	2⅜″



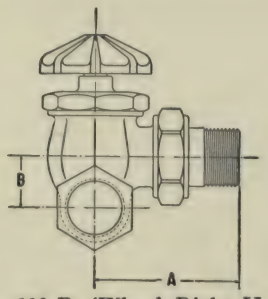
No. 101-A (Wheel Angle—Graduated)



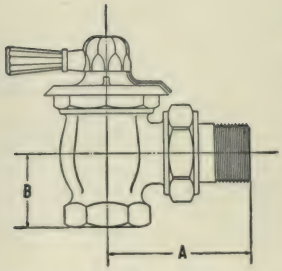
No. 100-L (Wheel Left Hand Corner)

DIMENSIONS IN INCHES

Sizes	A	B
½″	2⅜″	¾″
¾″	2⅞″	13/16″
1 ″	3⅛″	⅞″
1¼″	3⅝″	1⅛″
1½″	3⅞″	1¼″
2 ″	4⅜″	1½″



No. 100-R (Wheel Right Hand Corner)



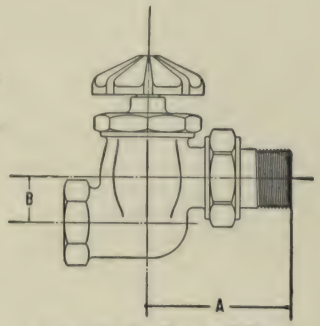
No. 102-A (Lever Handle)

DIMENSIONS IN INCHES

Sizes	A	B
½″	2⅜″	1 3/16″
¾″	2⅞″	1 3/16″
1 ″	3⅛″	1 5/16″
1¼″	3⅝″	1¾″
1½″	3⅞″	1½″
2 ″	4⅜″	2⅜″

DIMENSIONS IN INCHES

Sizes	A	B
½″	1⅜″	2⅜″
¾″	1⅜″	2⅞″
1 ″	1 11/16″	3⅛″
1¼″	2 ″	3⅝″
1½″	2⅜″	3⅞″
2 ″	3 1/16″	4⅜″



No. 100-B (Back Offset)

Explanation of Dimensional Tables

Type No. 101 (wheel handle) and Type No. 102 (lever handle) graduated valves as made in left hand corner pattern, right hand corner pattern and back offset pattern have the same roughing-in dimensions shown above for the Type 100 valves in these patterns.

Roughing-in dimensions for Type Nos. 103 Lock and Shield Packless Valve and 104 Lock and Shield Graduated Valves in all patterns are the same as Type No. 100.

TYPES AND PATTERNS OF MARSH SYSTEM UNIT RADIATOR VALVES

Type	Pattern	Symbol
Wheel Handle	Angle	100-A
Wheel Handle	Left Hand Corner	100-L
Wheel Handle	Right Hand Corner	100-R
Wheel Handle	Back Offset	100-B
Wheel Handle Graduated	Angle	101-A
Wheel Handle Graduated	Left Hand Corner	101-L
Wheel Handle Graduated	Right Hand Corner	101-R
Wheel Handle Graduated	Back Offset	101-B

Type	Pattern	Symbol
Lever Handle Graduated	Angle	102-A
Lever Handle Graduated	Left Hand Corner	102-L
Lever Handle Graduated	Right Hand Corner	102-R
Lever Handle Graduated	Back Offset	102-B
Lock and Shield	Angle	103-A
Lock and Shield	Left Hand Corner	103-L
Lock and Shield	Right Hand Corner	103-R
Lock and Shield	Back Offset	103-B

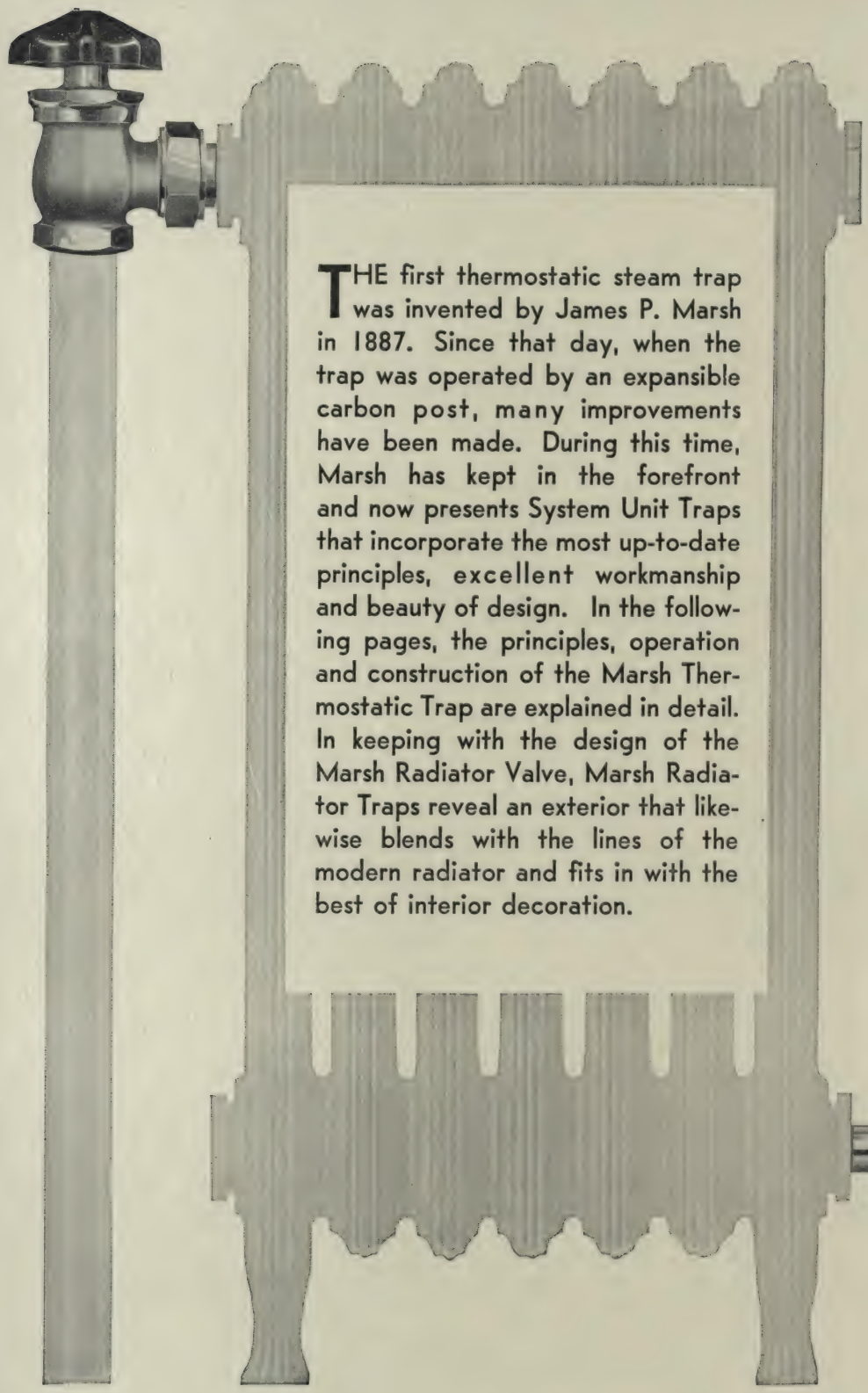
Note: Lock and shield construction can also be supplied in the graduated type valve—specified as No. 104—in any pattern listed above.

MARSH SYSTEM UNIT TRAPS

Bulletin No. 175

Radiator, Drip, Float and Heavy Duty Traps

JAS. P. MARSH & COMPANY
CHICAGO

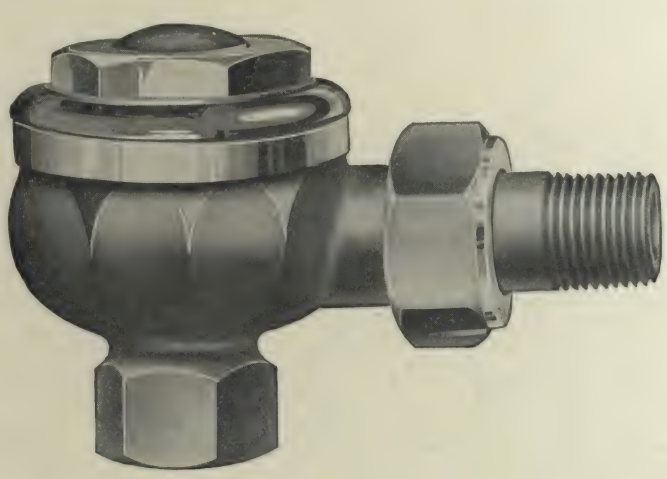


THE first thermostatic steam trap was invented by James P. Marsh in 1887. Since that day, when the trap was operated by an expansible carbon post, many improvements have been made. During this time, Marsh has kept in the forefront and now presents System Unit Traps that incorporate the most up-to-date principles, excellent workmanship and beauty of design. In the following pages, the principles, operation and construction of the Marsh Thermostatic Trap are explained in detail. In keeping with the design of the Marsh Radiator Valve, Marsh Radiator Traps reveal an exterior that likewise blends with the lines of the modern radiator and fits in with the best of interior decoration.

MARSH SYSTEM UNIT THERMOSTATIC RADIATOR TRAPS

IN keeping with the modern trend of architecture, Marsh System Unit Radiator Traps and Radiator Valves, as well as the radiators themselves, are now available in designs which can be worked into and match with the finest interior decorations and furnishings. The octagonal body lines of Marsh System Unit Radiator Traps blend perfectly with the body lines found in the modern tubular radiator and as installed on the radiator in combination with the Marsh System Unit Radiator Valve have a decided effect upon the improved appearance of the modern radiator as a whole. Marsh System Unit Radiator Traps in combination with Marsh System Unit Radiator Valves are manufactured in two tone lustrous polished and satin finish and obtainable in lustrous chrome or nickel finish.

Yet with all the advanced beauty of design, this Marsh System Unit has that dependability which is typical of all Marsh products.



Function of the Radiator Trap

It is essential to economical and satisfactory operation of any steam or vapor heating system to obtain as much heat as possible from the steam which has been delivered to the radiator. It is the function of the Marsh System Unit Radiator Trap, as installed at the outlet of the radiator, to accomplish this result by retaining the steam within the radiator until it has delivered to the radiator its heat units. While it is essential to retain steam within the radiator and thus conserve heat, it is equally essential that all water of condensate, air and other gases be passed out of the radiator into the return system promptly. The accomplishment of these results is entirely dependent upon the sensitive operation of the thermostatic diaphragm within the range where steam, water and air are at temperatures varying only slightly from each other. It is the sensitive and proper reaction to these varying elements and their respective temperatures which makes for the high efficiency of the Marsh System Unit Thermostatic Radiator Trap and economical and efficient operation of Marsh Vacuum and Vapor Heating Systems.

The thermostatic trap as installed upon the radiator has a second important function; that of automatically maintaining the necessary difference in pressure or vacuum between supply and return systems, assuring circulation throughout the entire heating system, resulting in full steam supply to the radiators and flow of condensate, air and gases away from the radiator. This function must be promptly and efficiently accomplished either with the aid of the induced vacuum provided by the vacuum pump in a standard vacuum system, or through natural gravity circulation in the vapor system of heating. This service likewise the Marsh System Unit Radiator Trap performs perfectly due to its ability to maintain a perfect seal between the radiator and return system, except when opened to pass water, air and non-condensable gases into the return system.

Principle of Operation

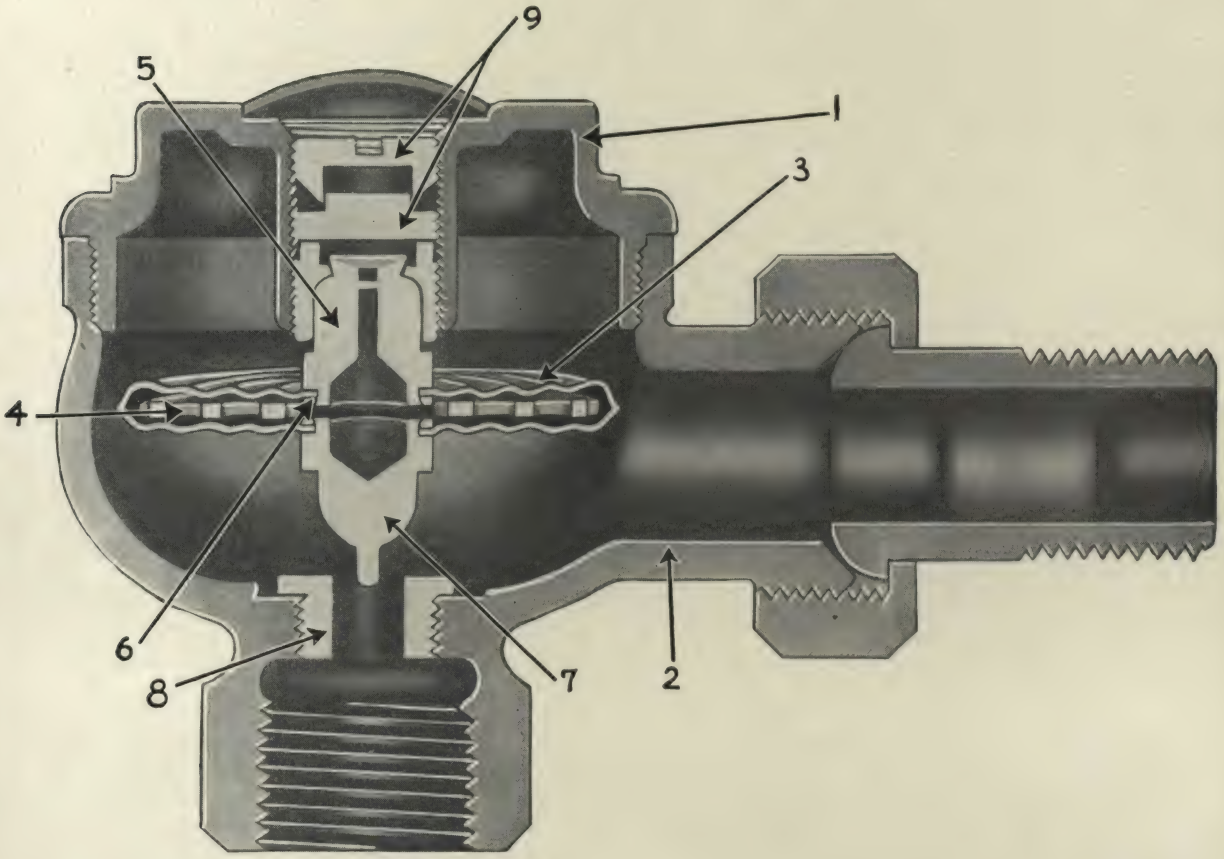
Steam supplied from the boiler or from a central source of supply is circulated through the supply piping, enters the radiator and circulates through the sections of the radiator, forcing air ahead of it until the air has passed through the radiator and on through the radiator trap, which is opened for that purpose, into the return piping. As the steam passes through the radiator and comes in contact with the lower temperature of the radiator walls it gives off heat to the radiator walls and condenses. This water of condensate and the air and non-condensable gases liberated from the steam pass through the trap into the return piping until the radiator is completely filled with steam. When steam reaches the trap, through expansion by the heating of a combination of volatile fluids, the diaphragm in which they are contained likewise expands and carries the valve needle against the trap seat closing the trap and retaining the steam in the radiator. The steam contained in the radiator condenses to give off its heat to the lower temperatured radiator walls, which in turn pass the heat on into the still lower temperatured room in which the radiator is contained, thus accomplishing the result of raising the temperature of the room to the desired degree. This process condenses the steam and the resulting water being heavier than the steam drops to the bottom of the radiator. It is permitted to accumulate until it has reached the level of the thermostatic diaphragm in the trap. The lower temperature of the water causes the diaphragm to contract, passing this water of condensate and such air as has accumulated, which likewise is of lower temperature than the steam, into the return system.

This cycle of operation is automatically repeated and continued as long as there is a supply of steam delivered to the radiator.

Continued on next page

View Showing Interior and Construction Marsh System Unit Thermostatic Trap

The illustration on this page shows in detail construction of the Marsh System Unit Thermostatic Trap. This construction is typical of all Marsh Thermostatic Traps as utilized on radiators, drips, etc., and as thermostatic by-pass on Marsh System Unit Heavy Duty Traps. The bonnet assembly, including the thermostatic diaphragm is typical of the thermostatic by-pass incorporated in the construction of the Marsh System Units No. 8 and No. 12 Float and Thermostatic Traps.



1. Trap Bonnet
2. Trap Body
3. Thermostatic Diaphragm
4. Diaphragm Reinforcement
5. Swivel and Adjustment
6. Diaphragm Locking Seal
7. Valve Needle
8. Renewable Seat
9. Adjustment Seal

Continued on next page

General Description
Marsh System Unit Thermostatic Traps

Marsh System Unit Thermostatic Traps as a unit consists of two major assemblies: (1) The body with the renewable seat and the union nut and tail piece. (2) The bonnet with the diaphragm assembly and locking arrangement complete.

Thermostatic Diaphragm

The several unique and patented features, which enter into the construction of the Marsh Thermostatic Diaphragm, are largely responsible for the high degree of efficiency and economy in the operation of Marsh Heating Systems.

Marsh Thermostatic Diaphragms operate on the principle of expansion and contraction of a combination of volatile fluids when subjected to varying temperatures. The volatile fluid contained within the sealed diaphragm expands as temperatures are applied, causing the diaphragm assembly to expand carrying the valve needle against the seat, closing the trap. As the lower temperatures of condensate and air come in contact with the diaphragm these lower temperatures cause the volatile fluid to contract, lowering the internal pressure in the diaphragm, contracting the diaphragm and allowing the passage of condensate, air and gases.

Construction

The expansible portion of the thermostatic diaphragm assembly consists of an upper and lower wafer of tinned phosphor bronze, drawn and spun to perfection of temper. The lower wafer is fastened to the valve needle (7) which consists of a tinned brass screw machine part spun and sweated to the diaphragm wafer. The upper diaphragm wafer is spun and sweated to the adjustment screw assembly consisting of two parts combined to form the adjustment screw (5) and swivel. When the two wafers are assembled, projection on both the upper post (5) and the valve needle (7) combine to form a matched fit when the diaphragm is completely compressed. An interior reinforcement arrangement (4) forms a perfect inner ring reinforcement between the upper and lower wafers so that when the diaphragm is completely compressed it is the equivalent of a solid disc so far as power to withstand overpressure or water hammer is concerned. The two wafers are assembled on the outer periphery by a spinning and sweating operation. The volatile fluid is then injected through the upper post (5) in carefully measured quantities, following which the opening in post (5) is plugged and sweated shut. The entire diaphragm assembly is then treated by one of the most important exclusive Marsh diaphragm construction features. The entire diaphragm assembly is given an overlay, by an electro-plating process, of a thick application of copper metal.

Bonnet Assembly

In the construction of Marsh System Unit Thermostatic Traps the diaphragm assembly is screwed into the bonnet assembly. The construction of the Marsh System Unit Bonnet is designed to permit the accurate adjustment of each trap under actual operating conditions and is not a "jig" adjustment. Following such adjustment the diaphragm assembly is securely locked into the bonnet, which is a brass forging, by means of lock washers (9) and name plate shown at the top of the illustration completes the bonnet assembly. The bonnet is accurately threaded and machined to make steam and vacuum tight assembly to the body without the use of any pipe cement.

Body Assembly

The body (2) of Marsh System Unit Thermostatic Traps is a steam bronze casting accurately machined and tested to 125 pounds working pressure. Modern methods of machining on all parts, including the body (2) and bonnet (1) are employed, gaged by micrometer scale with a tolerance of .007 inches which allows all parts to be interchangeable due to uniformity.

Marsh System Unit Thermostatic Traps are built with renewable seat (8) made of a hard brass screw machine part. In actual service this accurately machined seat and the accurately machined needle valve (7) require no renewal over a period of many years of average service on heating systems. However, should unusually severe service cause the seat to wear after many years of service, it is possible to renew the seat by merely removing the old one and screwing in a new one to the locked position. This is seldom necessary.

The union nut and tail piece of Marsh System Unit Thermostatic Radiator Traps are both made of hard brass forgings, which lend themselves to the accuracy of machining and fit so vital in these parts. The tail piece construction includes two lugs for easy installation into the radiator fitting.

Tests

Each Marsh System Unit Thermostatic Trap is individually adjusted and tested by experienced operators under actual operating conditions, assuring accurate calibration and perfect operation in actual service.

While Marsh System Unit Thermostatic Traps are intended for pressure up to 25 pounds, laboratory tests have been conducted to determine breakdown points. As a regular part of routine laboratory tests a percentage of each production of diaphragms is subjected to pressure of several hundred pounds before distortion sets in (many times the normal internal pressure). All Marsh System Unit Thermostatic Diaphragms are capable of withstanding 1000 pounds external pressure without distortion, but are not guaranteed to operate accurately beyond normal pressure of 25 pounds per square inch.

Finish

Marsh System Unit Thermostatic Radiator Traps are finished in two tone polished and satin nickel or chrome to match Marsh System Unit Packless Radiator Valves.

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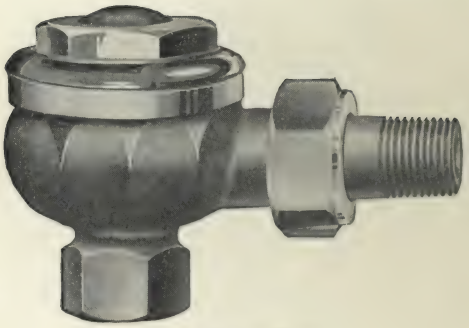
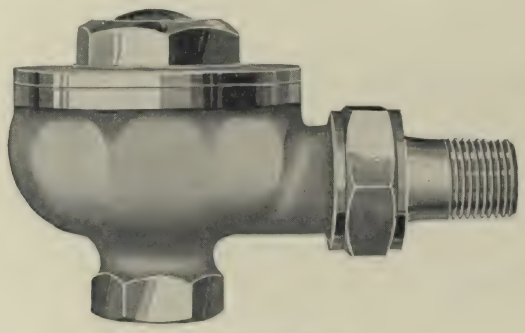
Patterns and Styles Marsh System Unit Thermostatic Traps



No. 1 Series Trap



No. 2 Series Trap

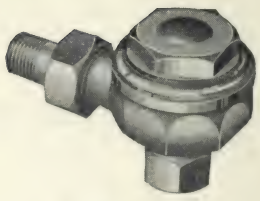
Marsh System Unit Thermostatic Traps are manufactured in two styles: The Marsh No. 1 Series which is made in ½ inch connection size only and the No. 2 Series which is made in three sizes, ½, ¾ and 1 inch. The No. 1 series is obtainable in the following patterns: Angle, Straightway, Right Hand, Left Hand and Back Offset. These same patterns are supplied in the ½ inch No. 2 series. In the ¾ and 1 inch sizes of No. 2 series the following patterns are obtainable: Angle, Right Hand, Left Hand and Back Offset. Both series in all patterns are made in either nickel or chrome finish.

SIZES AND CAPACITIES

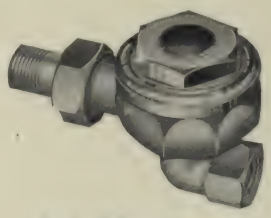
No. 1 Series Radiator Trap		No. 2 Series Radiator Trap	
Sizes	Sq. Ft. C. I. Radiation	Sizes	Sq. Ft. C. I. Radiation
½"x½" connection	150	½" x ½" connection	200
		¾" x ¾" connection	500
		1 " x 1 " connection	1000

SPECIFICATION SYMBOLS

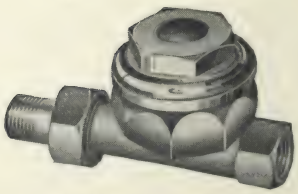
	Trap Pattern	Symbol
No. 1 Series	Angle Pattern	No. 1-A
	Left Hand Corner Pattern	No. 1-L
	Right Hand Corner Pattern	No. 1-R
	Straightway Pattern	No. 1-S
	Back Offset Pattern	No. 1-B
No. 2 Series	Angle Pattern	No. 2-A
	Left Hand Corner Pattern	No. 2-L
	Right Hand Corner Pattern	No. 2-R
	Straightway Pattern	No. 2-S
	Back Offset Pattern	No. 2-B



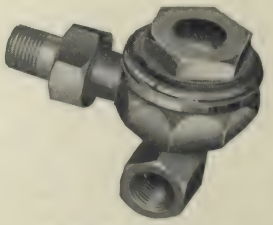
Angle Pattern



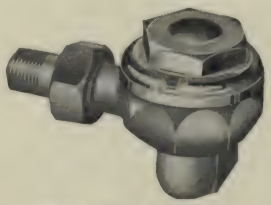
Back Offset Pattern



Straightway Pattern



Left Hand Corner



Right Hand Corner

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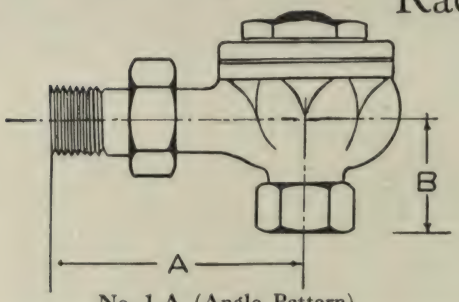
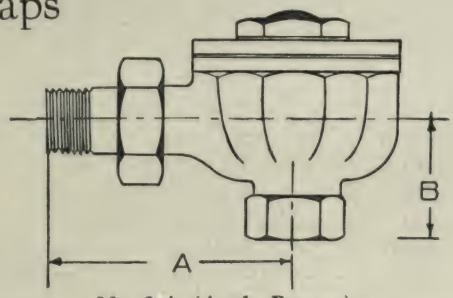
Roughing-in Dimensions of Marsh System Unit Radiator Traps



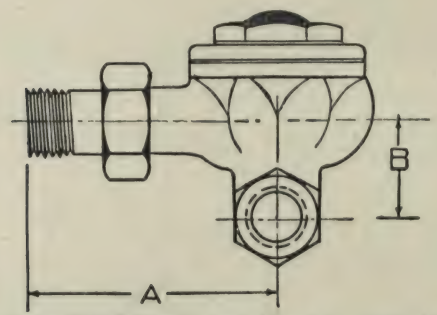
No. 1-A (Angle Pattern)

Size	Capacity	Water	A	B
½″	150 sq. ft.	40 lbs. per hour	3¼″	1½″



No. 2-A (Angle Pattern)

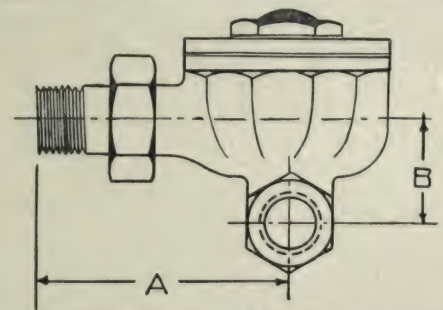
Size	Capacity	Water	A	B
½″	200 sq. ft.	50 lbs. per hour	3½″	1 7/16″
¾″	500 sq. ft.	125 lbs. per hour	3 13/16″	2″
1″	1000 sq. ft.	250 lbs. per hour	4 3/8″	2 1/16″



No. 1-R (Right Hand) and No. 1-L (Left Hand Corner Pattern)

Size	Capacity	Water	A	B
½″	150 sq. ft.	40 lbs. per hour	3¼″	1¼″

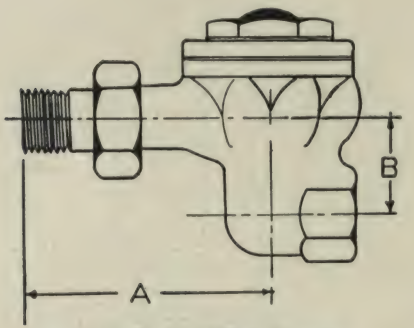
Dimensions on right and left hand pattern are identical.



No. 2-R (Right Hand) and No. 2-L (Left Hand Corner Pattern)

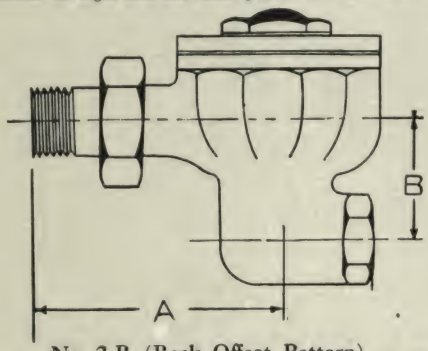
Size	Capacity	Water	A	B
½″	200 sq. ft.	50 lbs. per hour	3¾″	1¼″
¾″	500 sq. ft.	125 lbs. per hour	3 13/16″	1 5/8″
1″	1000 sq. ft.	250 lbs. per hour	4 1/16″	1 7/8″

Dimensions on right and left hand pattern are identical.



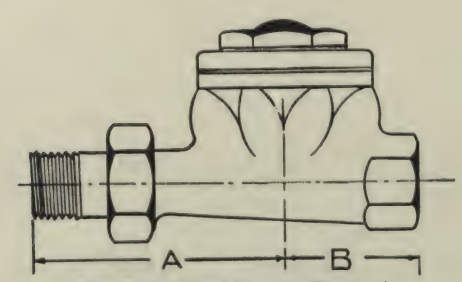
No. 1-B (Back Offset Pattern)

Size	Capacity	Water	A	B	C
½″	150 sq. ft.	40 lbs. per hour	3¼″	1¼″	1⅛″



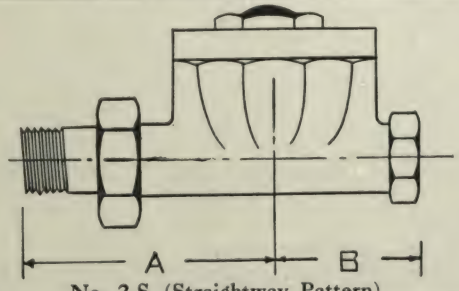
No. 2-B (Back Offset Pattern)

Size	Capacity	Water	A	B	C
½″	200 sq. ft.	50 lbs. per hour	3⅞″	1¼″	1⅜″
¾″	500 sq. ft.	125 lbs. per hour	3 13/16″	1 5/8″	1 3/8″
1″	1000 sq. ft.	250 lbs. per hour	4 1/16″	1⅞″	1⅞″



No. 1-S (Straightway Pattern)

Size	Capacity	Water	A	B
½″	150 sq. ft.	40 lbs. per hour	3¼″	1¾″



No. 2-S (Straightway Pattern)

Size	Capacity	Water	A	B
½″	200 sq. ft.	50 lbs. per hour	3¾″	2″

Continued on next page

Marsh System Unit
Drip Traps

Marsh No. 8 Drip Trap

This trap is continuous in discharge and is designed to quickly remove condensation and air from drip points on steam mains, steam risers, steam coils, or blast heaters, or for any like service within the capacity of the trap.

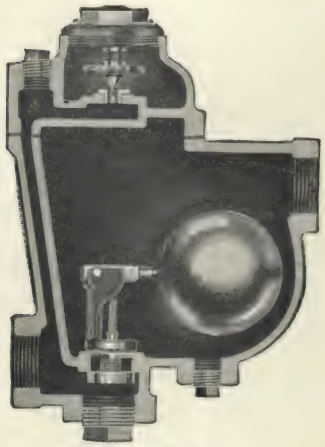
The design permits a deep water seal on the discharge valve. This water discharge valve is float controlled and located at a low point in the bottom of the trap and air is removed through a thermostatically controlled port in the cap of the trap. The thermostatic member used is our standard assembly as in the No. 1 Marsh Radiator Trap. Normally air is discharged through a port directly to the outlet connections of the trap. In cases where the trap may be required to discharge to a wet return the air discharge may be connected to a dry return from a special opening tapped in the cap of the trap.

Body of trap is provided with one 1¼-inch tapped inlet and two 1¼-inch tapped outlet openings. These openings are located so as to permit direct connection both to inlet and from outlet.

The trap may be suspended directly in the piping and no other supports are necessary. The thermostatic element screws directly in the cap of the trap and is interchangeable with the element from the No. 1 Radiator Trap.

All interior parts are of forged bronze castings with the exception of the float which is a seamless copper float tested for a working pressure of 25 pounds per square inch.

Copper asbestos gaskets are used throughout which avoid the necessity of supplying new gaskets whenever trap may be opened for inspection or repair.



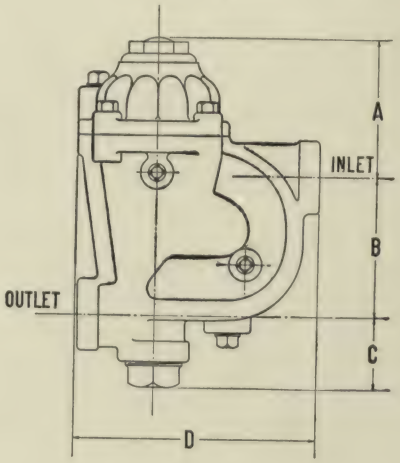
No. 8 Drip Trap

CONNECTION SIZES
1¼-in. Inlet
1¼-in. Outlet

DIMENSIONS
A—4⅜ in.
B—4⅛ in.
C—2¼ in.
D—7 11/16 in.

CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	500
1	900
2	1400
3	1600
4	1800
5	2000
10	3200
15	4000



Marsh No. 12 Drip Trap

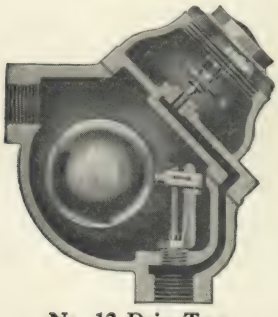
Designed for removal of air and condensation from short steam mains, branches or riser. Unit heaters, steam coils, etc., are within the limits of the capacity of the trap.

The size and weight of the trap permits its installation in the piping without any other means of support.

Condensation is removed through a float operated valve located at the lowest point inside the trap body. Air removal is located in the cap of the trap. Air passes through a passageway and out through the trap outlet.

Body of trap is of cast iron and all interior parts are of forged steam bronze, copper and monel metal.

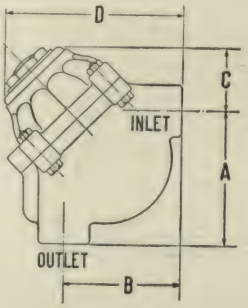
The thermostatic member of the air by-pass is interchangeable with the member of the standard No. 1 Radiator Trap.



No. 12 Drip Trap

CONNECTION SIZES
¾-in. Inlet
¾-in. Outlet

DIMENSIONS
A—4½ in.
B—3⅞ in.
C—1⅞ in.
D—6 in.



CAPACITIES

Steam pressure in lb.	Capacities in lb. water per hr.
½	350
1	600
2	800
3	1200
4	1400
5	1600
10	2000
15	2800

Continued on next page

Marsh System Unit
No. 9 Heavy Duty Trap

The Marsh No. 9 Heavy Duty Trap has a wide field in which it may be applied to equipment using steam as a heating element. This trap was designed especially for services where very large volumes of water and air must be taken care of as rapidly as possible, adding greatly to the efficient operation of the equipment upon which it is applied during the initial starting-up period.

It has a marked place in the service in conjunction with storage hot water heaters and Vento heaters where the rapid elimination of water and air is important. It is often found that an underrated or inefficient trap is placed on either of these services with the result that the equipment does not operate as efficiently as intended.

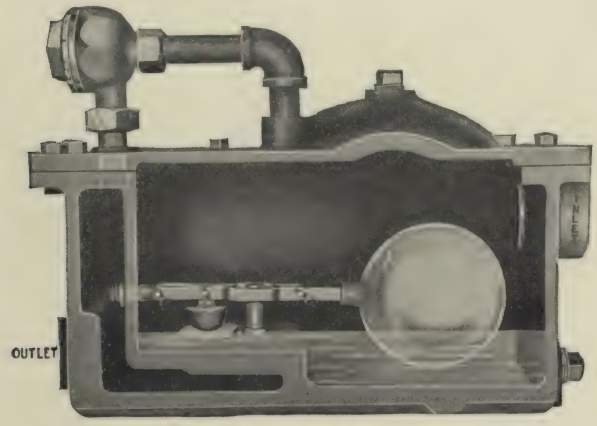
Too often the heavy duty trap is placed in service without taking into consideration that during the initial start-up periods the condensation would be much more than when the system is under normal operating conditions. For this reason we recommend that traps selected for Vento or hot water heating service be selected according to the tables on this page.

For all practical purposes the condensation on hot water heaters may be computed by considering each gallon of water to be heated as equivalent to 4.33 square feet of equivalent direct radiation and by assuming that each square foot of direct radiation will produce .25 pound of condensation per hour. A total condensation for a given size hot water storage heater may be thus estimated.

On Vento service the problem of condensation is somewhat different. On Vento two factors must be taken into consideration. First, the temperature of the outside air to be heated, and secondly, the condensation to be emitted during the initial start-up period. For all practical purposes the chart will indicate equivalent pounds of condensation to be calculated in computing heavy duty trap sizes for various outside temperatures.

Although modern methods dictate that separate air lines be incorporated on Vento to handle air only the Marsh No. 9 Heavy Duty Traps are equipped with a thermostatic by-pass to take care of any remaining air. However, for estimating purposes the air to be handled in Vento may be computed as 0.30 cubic foot of air per 100 square feet of equivalent radiation.

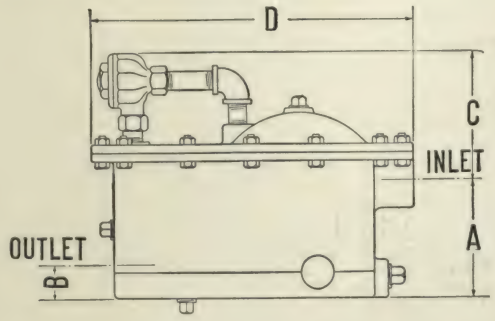
In construction the Marsh No. 9 Heavy Duty Trap is built to not only handle large volumes of water and air but is also designed to withstand heavy duty service. The body proper is of heavy cast iron, equipped with a removable cover. Extra proportions of metal are placed at the inlet and outlet stress points and it is also equipped with a plugged connection for draining. The entire float mechanism is of non-corrosive metals and so arranged to permit through passage of water. The ball float is of large proportions of heavy copper, designed to withstand pressures up to 25 pounds. The valve and valve seats are so arranged that at all times they are water sealed and likewise prevent accumulation of dirt interfering with a tight seat. As an integral part of the cover the Marsh No. 1 Series Thermostatic Trap is incorporated as a means of eliminating accumulated air. This unit is rigidly attached to the cover permitting the entire cover and thermostatic trap to be taken off should it be necessary to remove the cover for cleaning.



Marsh System Unit No. 9 Heavy Duty Trap

CAPACITIES

Size	Orifice	½ lb.	1 lb.	2 lb.	3 lb.	4 lb.	5 lb.
9-C	¾"	1800 lb.	3150 lb.	4442 lb.	5284 lb.	6249 lb.	6955 lb.
9-D	⅞"	2620 lb.	4345 lb.	6125 lb.	7435 lb.	8613 lb.	9576 lb.
9-E	1 "	3327 lb.	5676 lb.	8024 lb.	9778 lb.	11286 lb.	12517 lb.
9-F	1⅛"	4239 lb.	7197 lb.	12303 lb.	14256 lb.	15823 lb.	22228 lb.



Spec. Symbol	Size	A	B	C	D
9-C 9-D	1 " 1¼"	5½"	1½"	5 1/16"	14½"
9-E 9-F	1½" 2 "	5⅝"	1¾"	6½"	16¼"

Continued on next page

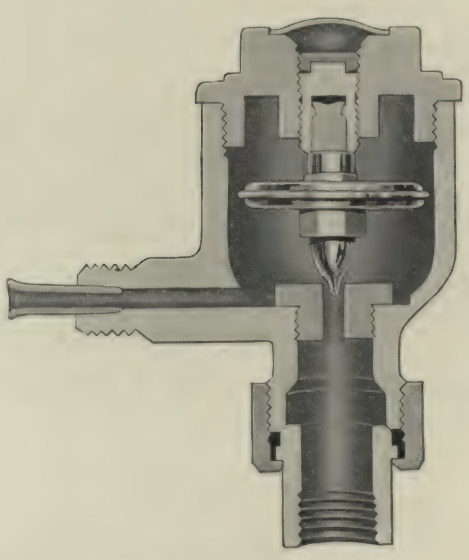
Marsh System Unit
Air Line Valve

The object of this valve is to permit all air to be rapidly vented out of the radiator and supply system of air line or Paul heating systems. By so doing permitting steam to generate at low temperatures and to circulate quickly without resistance, into the entire heating system.

The valve automatically passes all air, hot or cold, but prevents the escape of steam into the air line.

Operates automatically with or without mechanical suction on the return line.

There is just one movable part in the construction of the Marsh System Unit Air Line Valve. The valve opens for air and closes for steam by means of the contraction and expansion of a phosphor bronze diaphragm containing a combination of volatile fluid. This diaphragm is similar in construction to the diaphragm of the Marsh System Unit Radiator Trap.

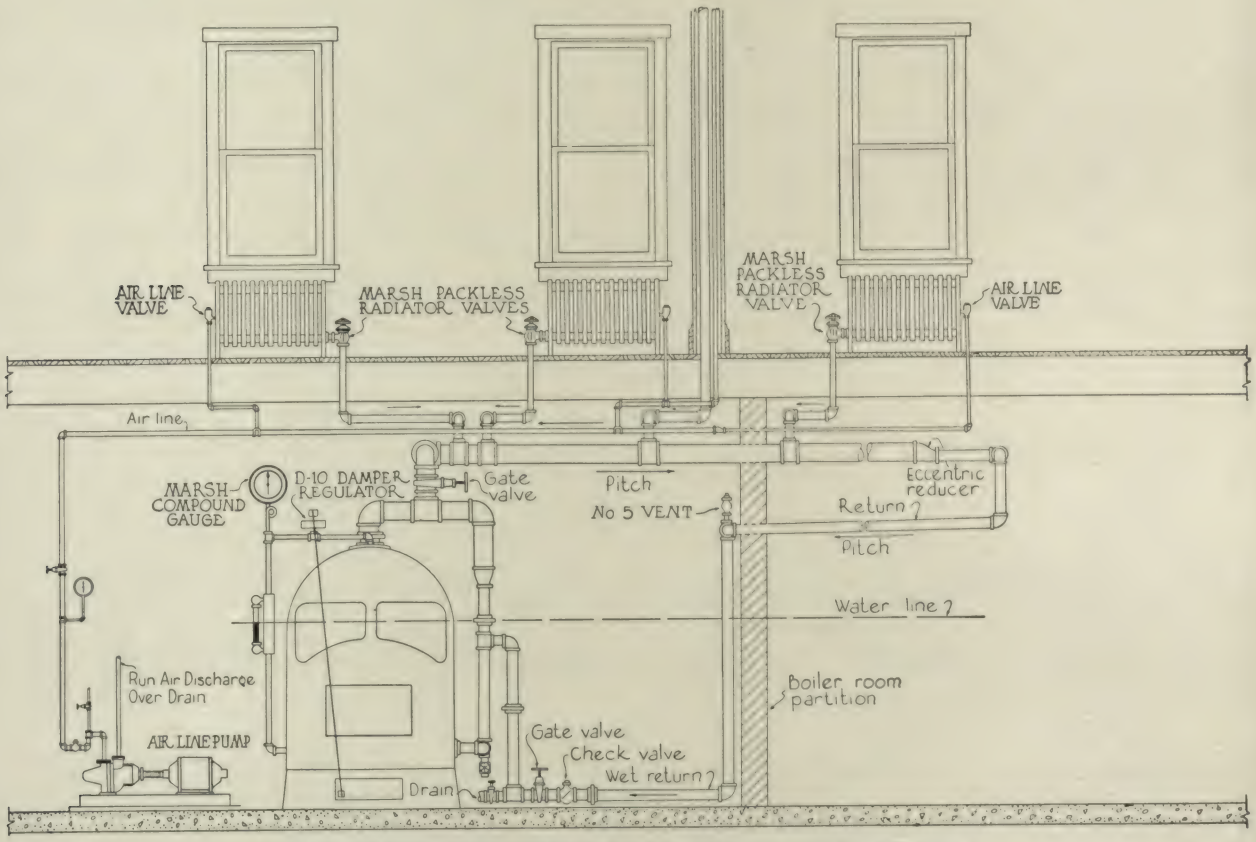


When cold, the valve is open. The instant steam reaches the valve the volatile fluid in the diaphragm vaporizes and expands the diaphragm closing the valve stem against the valve seat. When air is given off by condensation of steam, the diaphragm contracts and air is passed out of the valve into the air return line.

There is no water pocket in this valve. The inlet is also the outlet to the radiator and back into the system for all water of condensation. This prevents a drain on the water in the boiler and insures a dry return air line.

Valve is finished in two-tone polished and satin nickel plate.

For installation on radiators made with 1/8 inch connection to the radiator and 1/4 inch connection to the return air line. For blast coils made in two sizes, 1/4 inch male x 3/8 inch union, or 3/8 inch male x 3/8 inch union.



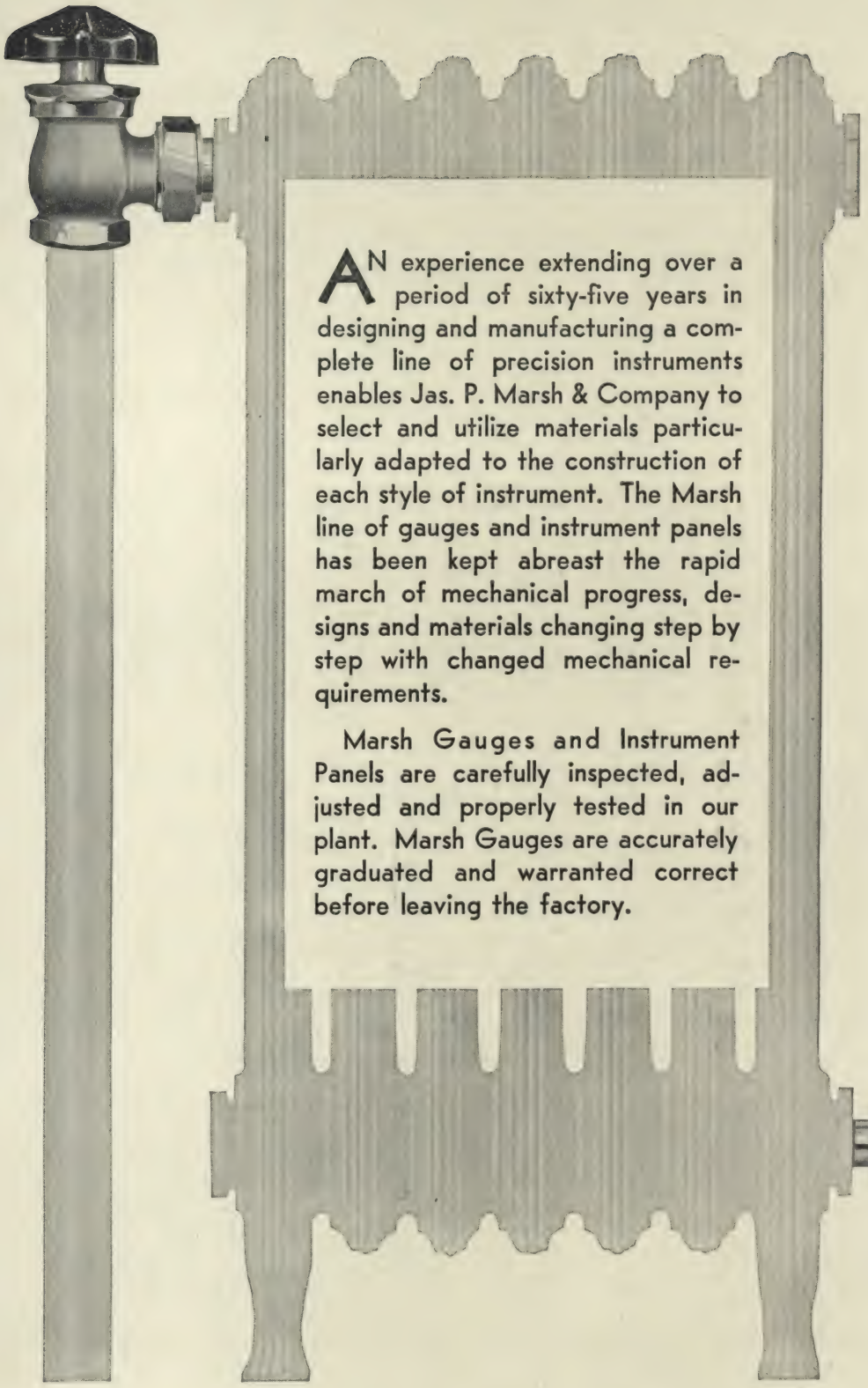
Showing Application of Marsh Air Line Valve to Air Line System

MARSH GAUGES AND INSTRUMENT PANELS

Bulletin No. 200

Indicating and Recording Gauges Clocks and Instrument Panels

JAS. P. MARSH & COMPANY
CHICAGO



AN experience extending over a period of sixty-five years in designing and manufacturing a complete line of precision instruments enables Jas. P. Marsh & Company to select and utilize materials particularly adapted to the construction of each style of instrument. The Marsh line of gauges and instrument panels has been kept abreast the rapid march of mechanical progress, designs and materials changing step by step with changed mechanical requirements.

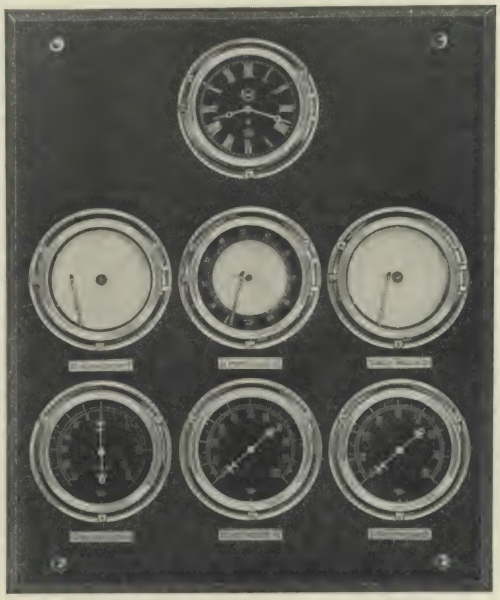
Marsh Gauges and Instrument Panels are carefully inspected, adjusted and properly tested in our plant. Marsh Gauges are accurately graduated and warranted correct before leaving the factory.

MARSH GAUGES AND INSTRUMENT PANELS

OUR long experience in producing instrument panels as kindred products of Marsh Gauges, enables us to create these panels in pleasing designs and to assure a durability and efficiency comparable to that of the instruments mounted on them.

Marsh Gauges

The Marsh line of indicating and recording gauges is complete, embracing all fields of pressure, vacuum, and altitude measurement.



Construction

Marsh Gauges (except steel spring hydraulic and steel spring refrigeration gauges) are fitted with springs of ovaliform solid drawn seamless brass tubing of proper weight, thickness and length — carefully selected and determined by experts and with the benefit of our experience of more than sixty years in the manufacture of the full and complete line of Marsh Gauges. After the springs are rolled and bent to shape, they are then treated under actual working conditions, including heat and steam for steam gauge springs. This process includes over-pressure and seasoning—producing a finished spring guaranteed against liability to set. These scientific methods produce the Marsh Gauge Spring, which, after being carefully fitted to case and adjusted to movement, completes an instrument suitable for the purpose intended and, with intelligent use, good for the life of the apparatus upon which it is installed.

The movement is made of non-corrosive materials, properly seasoned to withstand variations of high and low temperatures. All teeth in segments and pinions are cut by machinery designed specially for that purpose, assuring uniformity, smooth, even indication, and eliminating friction. The adjustment permits accuracy and precision in adjustment for even the most sensitive pressures. Movement in any style or pattern of Marsh Gauge is selected for construction, weight and materials after service requirements of instrument are taken into consideration.

Marsh Gauges are equipped with silvered dials having black figures and graduations; black dials having white figures and graduations; or with oven baked, white enameled metal dials having dead black numerals, lettering and graduations.

Marsh Gauges are with case and ring so assembled as to assure a dust and moistureproof instrument.

Marsh Instrument Panels

Marsh Panels can be furnished in a wide range of materials. They may be specified of electrical, ribbon or Monson slate, white and pink Tennessee or Alabama marble, woods of all kinds, asbestos ebony or steel plate. We recommend asbestos ebony where it is not intended to attain the beauty that marble gives. It will not crack or warp, it is immune to heat, moisture or chemicals and has great dialectric strength. Its appearance is that of highly surfaced ebony or hard rubber and its chief advantage is that it may be used in smaller thicknesses than other materials.

The growing popularity of the flush mounted type of mounting is due to the neat appearance they give to the panel surface. Only the face of the instruments and front flanges are exposed.

The surface mounted type of panel utilizes Marsh Flanged Case Instruments which are fastened to the surface of the panel by means of bolts inserted through the back flange. In this type the entire instrument is exposed on the surface of the panel but all piping and connections are concealed behind the board.

Marsh Instrument Panels may also be designed to include other types of instruments not included in the Marsh line such as flow meters, recording thermometers, electrical instruments and temperature regulation instruments and switches. Panels can be furnished with electric lighting fixtures for illumination.

On page 4 we illustrate our recommended method of mounting gauge boards. The methods there illustrated utilize piping. This construction requires no threading except for floor, ceiling and wall flanges. Ample strength, rigidity and ease of adjustment are attained.

No special work such as blacksmithing is required as in the case of angle or channel iron construction.

Continued on next page

Marsh Gauges

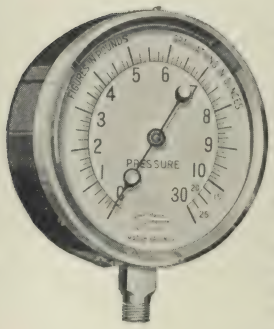
Most of the mechanical equipment, such as vacuum pumps, circulating pumps, fire pumps, heating and power boilers, oil burners, air compressors, pneumatic controlling systems, etc., entering into the construction of the fine buildings of today are equipped, by their manufacturers, with Marsh instruments. And in the same way for piping application and for instrument panels similar Marsh Gauges fill every need.

All gauges described on this and the following page are available in the following finishes:

Chromium plated cast brass case and ring, chromium plated ring with black enameled case, nickel plated cast brass case and ring, nickel plated ring with black enameled case, polished brass case and ring, polished brass ring with black enameled case, black enameled case and ring.

All gauges shown are made for either surface or flush mounted gauge board application.

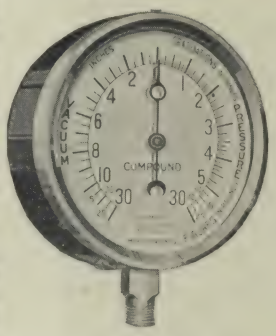
Marsh Fig. 82 Low Pressure Ounce Graduated Retard Gauge



For low pressure boilers, low pressure steam lines and natural or manufactured gas pressures.

The instrument indicates pressure from 0 to 10 pounds in 1-ounce pressure per square inch intervals and with 1-pound numerical graduations. From 10 to 30 pounds indications are at 5-pound intervals. For household boilers manufactured in 3½-inch size, 4½-inch size and 5-inch size. For larger size boilers manufactured with flanged case and flared ring.

Marsh Fig. 83 Low Pressure Ounce Graduated Compound Retard Gauge



For boilers on vapor, air line, vacuum return line and one pipe vacuum systems. Also for low pressure steam lines and gas pressure lines.

This instrument being of the compound construction indicates even the first ounce of pressure. It is calibrated to 5 pounds in 1-ounce divisions and 1 pound numerical intervals in 5-pound divisions up to 30 pounds. The vacuum side is calibrated to 10 inches in ½-inch divisions and 2-inch numerical intervals to 30 inches in 5-inch intervals.

For household boilers manufactured in 3½-inch size, 4½-inch size and 5-inch size. For larger size boilers manufactured with flanged case and flared ring.

Marsh Standard Pressure Gauge

For high pressure boilers, power boilers, steam, water and air lines, circulating pumps, fir epumps and air compressors.

Manufactured in pressure ranges varying from 30 to 1000 pounds per square inch, depending upon the service application.

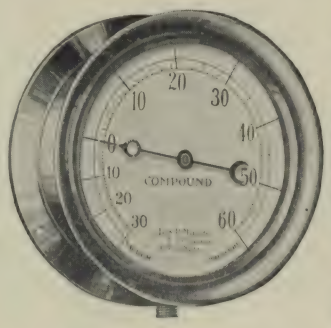
Manufactured in sizes 2½, 3, 4½ and 5 inches for application to equipment or pressure lines where the instruments are accessible for close reading. Manufactured in larger sizes to 12 inches for larger equipment and for high points where reading must be taken at a great distance. Manufactured in 6-inch dial and larger in flanged case, flared ring, for bolting onto apparatus or for gauge board application.

Marsh Double Spring Pressure Gauges

For heavy duty service on steam, water, gas or air lines, fire pumps, etc.

Manufactured in pressure ranges varying from 60 to 1000 pounds per square inch depending upon the service application. Manufactured in sizes 4½ and 5 inches for application to equipment or pressure lines where the instruments are accessible for close reading. Manufactured in larger sizes up to 12 inches in flanged case, flared ring for larger equipment, for high points and for gauge board application.

Marsh Standard Compound Gauge



For indication of both pressure and vacuum on the same gauge for such service where both pressure and vacuum conditions occur in the same line or the same apparatus.

Manufactured in pressures from 0 to 30-inch vacuum by 0 to 15-pound pressure to 0 to 30-inch vacuum by 0 to 1000-pound pressure. Manufactured in sizes 2½, 3, 3½, 4½ and 5 inches for application to equipment or pressure lines where the instruments are accessible for close reading. Manufactured in larger sizes to 12 inches in flanged case, flared ring for larger equipment for gauge board application.

Marsh Standard Vacuum Gauges

For vacuum pumps, vacuum return line piping and process apparatus where steam is circulated under sub-atmospheric pressure.

Dial is calibrated 0 to 30 inches in 1-inch divisions and 5-inch numerical intervals. Manufactured in sizes 2½, 3, 3½, 4½ and 5 inches for application to equipment or pressure lines where the instruments are accessible for close reading. Manufactured in larger sizes to 12 inches in flanged case, flared ring for larger equipment, for gauge board application.

Continued on next page

Marsh Recording Gauges

For application to all services of pressure, vacuum, altitude, or combination, where it is desired to maintain permanent record of conditions.

Furnished in round form to match Marsh Indicating Gauges and supplied in all designs, styles and finishes in which Marsh Indicating Gauges are manufactured. Manufactured in sizes 6¾, 8½, 10 and 12 inches. Supplied for wall mounting made with bottom connection and for gauge board mounting with back connection.

The Marsh Combined Indicating and Recording Gauge incorporates in the one instrument the two functions of indicating pressure, vacuum or altitude conditions and recording the conditions from the same source through one set of piping and with single connection. This instrument is specially recommended where a large number of instruments are desired and the available space limited.

Marsh Illuminated Dial Gauges

For application to all indicating gauge services on boiler fronts, as master pilot gauges or on instrument panels and eliminates necessity for electric light accessories.

So constructed with non-breakable glass dial and glass back that with electric light hung down in the gauge, all graduations, numerals and indicating hand stand out clearly in silhouette. With electric light turned off, hand and graduations show up black against the white background. As constructed in flush mounted casing and installed upon gauge boards, all that shows on the front of the board is the front mounting flange and the dial with graduations and hand. When electric light is turned on these light up in silhouette.

Manufactured in sizes 6, 8½, 10 and 12-inch dial and in all types and finishes as other Marsh Indicating Gauges are made.

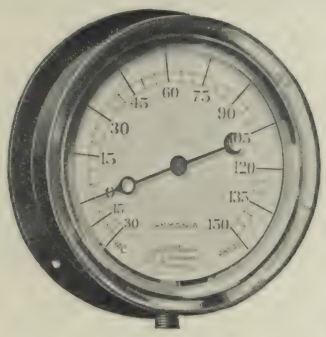
Marsh Clocks

For use in stationary engine rooms and on gauge board panels.

Constructed with a choice of several high grade clock movements, including Seth Thomas, Boston and Chelsea. For general service we recommend and standardize upon the Seth Thomas movement.

Made in sizes 6¾, 8½, 10 and 12 inches and in all types and finishes as Marsh Indicating and Recording Gauges.

Marsh Refrigeration Gauges



For application to compressors, circulating lines or gauge board panels to indicate pressures on ammonia, sulphur dioxide, methyl chloride, carbon dioxide and other types of refrigerating equipment.

Manufactured in both high pressure and low pressure graduations for all types of refrigeration systems to indicate pressures in both suction and compression side. Manufactured in sizes 2½, 3, 3½, 4½ and 5 inches for application to equipment or pressure lines where instruments are accessible for close reading. Manufactured in larger sizes to 12 inches for larger equipment and for high points where readings must be taken at a great distance. Made in 6-inch dial and larger with flanged case and flared ring for bolting onto apparatus or for gauge board application.

Marsh Electrical Alarm Gauges

For application to sprinkler systems, tanks, water towers, standpipes, steam boilers or any other service where an instrument is required to give alarm when pressure reaches above or below a predetermined point.

Manufactured in sizes 3½, 4½ and 5 inches for application to equipment or pressure lines where the instruments are accessible for close reading. Manufactured in larger sizes to 12 inches for larger equipment and for high points where readings must be taken at a great distance. Made with 6-inch dial and larger in flanged case, flared ring, for bolting onto apparatus or for gauge board application. For application to low voltage, battery or lighting circuits to operate a bell, gong or signal light. As furnished for application to standpipes or elevated water towers can be constructed so that the indication and the electrical alarm gong operate only within the range of the tank proper.

Marsh Flush Mounted Instruments

For application to gauge board panels. All Marsh instruments are obtainable in this construction. Recommended for gauge board panels where the most pleasing and highest grade of installation is desired.

Made in sizes 6, 8½, 10 and 12-inch dial and in all finishes. Can be supplied with all variations of dials. White dial with black graduations, black dial with white graduations or silvered dial with black graduations. Also made in the illuminated dial construction.

Continued on next page

Methods of Mounting Marsh Instrument Panels

Framework made of piping and fittings is recommended by JAS. P. MARSH & COMPANY as the best means of mounting instrument panels. This method is superior to angle or channel iron construction, first, because a better framework is secured and, second, because it is more easily and economically set up.

In the three recommended types of construction below 1¼-inch pipe is used. The fittings illustrated herewith and described in the table will fulfill any required position and angle of pipe in constructing a framework.

PIPE FITTINGS
For Panel and Base Mounting

Description	Fig. No.	Size of Pipe			
		A	B	C	D
End clamp for single panel or base..	1	1¼"	...	2½"	1¼"
Intermediate clamp for panels or bases	2	1¼"	...	2½"	$1\frac{9}{16}$"
End clamp for single panel and tie rod	3	1¼"	1¼"	2½"	1½"
Clamp for horizontal and vertical pipes at right angles.....	4	1¼"	¾"	$1\frac{15}{16}$"	2⅝"
Oval floor flange.....	5	1¼"	...	3½"	2½"
Clamp for fastening horizontal pipe to wall.....	6	1¼"	...	⅜"	2⅞"
Ball floor brace for tie rod.....	7	...	...	...	...
Ball pipe brace for tie rod.....	8	1¼"	...	...	...
Cap	9	1¼"	...	...	...

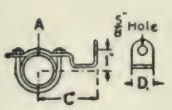


Fig. 1

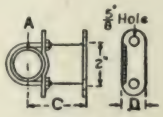


Fig. 2

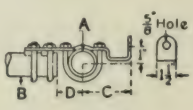


Fig. 3

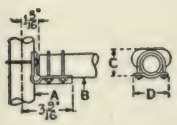


Fig. 4

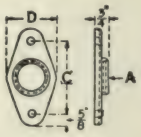


Fig. 5

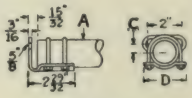


Fig. 6

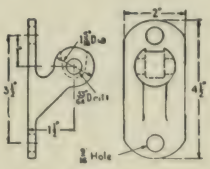


Fig. 7

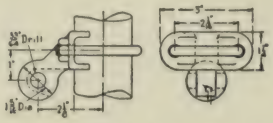


Fig. 8

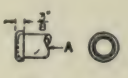
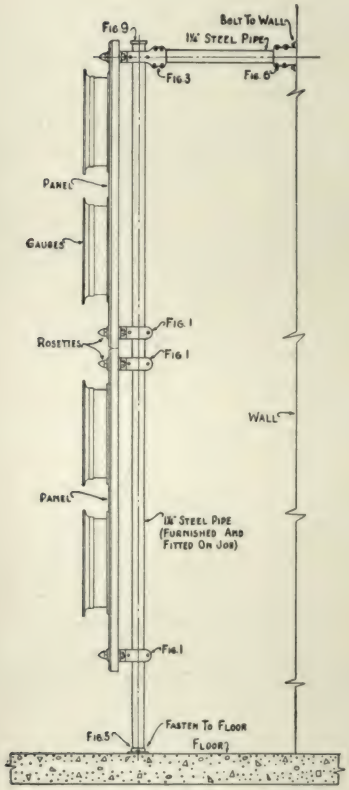
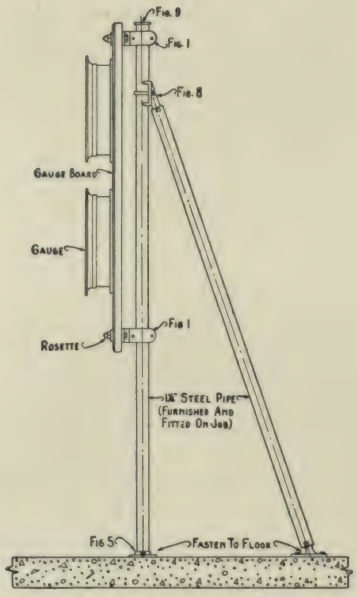


Fig. 9

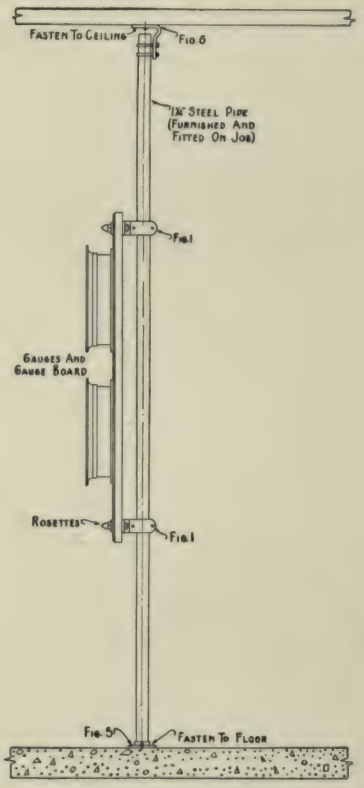
Recommended Methods of Supporting Marsh Instrument Panels



The above application of panel pipe fittings is used when a gauge board is to be located near a wall. The vertical pipe is fastened to the floor with a floor flange and extends to the height of the board, where it is connected with an end clamp and tie rod. To this another length of 1¼-inch pipe is fastened. This is bolted by a horizontal fastening clamp to the wall.



When a gauge board is away from the wall and cannot be fastened to the ceiling, the above arrangement will be found satisfactory. A vertical pipe is extended to the height of the board and is held in place by panel and clamps fastened with bolts and rosettes. This vertical pipe is braced to the floor at a desired angle with a tie rod fitting extending to the floor.



The above may be used where the ceiling is not very high. The 1¼-inch pipe is threaded at one end on which is screwed a floor flange. This is bolted through the floor. The top of the pipe is held in place by a ceiling clamp which is affixed to the ceiling.

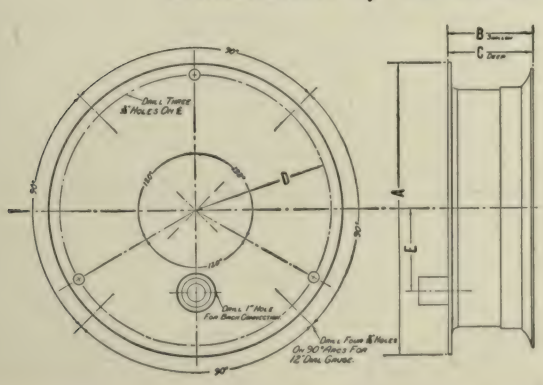
Continued on next page

Typical Layouts of Marsh Instrument Panels

The schedule given below indicates the approximate size of an instrument panel having a given number of instruments mounted thereon. For instance, should a panel require five gauges for the service intended, the gauges being 6-inch size, the schedule indicates a panel 28x28x1¼ inches thick. For special creations in panels, a tentative layout will be furnished upon receipt of specifications.

Outside Diam.	6½"	7⅝"	8 7/16"	10 1/16"	11 13/16"	14"	Outside Diam.
Size of Dial	5"	6"	6¾"	8½"	10"	12"	Layout
Size of Board	12"x12"x1"	13"x13"x1"	14"x14"x1"	16"x16"x1"	18"x18"x1"	21"x21"x1"	
Size of Board	21"x12"x1"	24"x13"x1"	26"x14"x1"	29"x16"x1"	33"x18"x1¼"	39"x21"x1¼"	
Size of Board	30"x12"x1"	34"x13"x1"	37"x14"x1¼"	42"x16"x1¼"	43"x18"x1¼"	57"x21"x1½"	
Size of Board	21"x21"x1"	24"x24"x1"	26"x26"x1¼"	29"x29"x1¼"	33"x33"x1¼"	39"x39"x1½"	
Size of Board	25"x25"x1¼"	28"x28"x1¼"	30"x30"x1¼"	34"x34"x1¼"	39"x39"x1½"	47"x47"x1½"	
Size of Board	30"x21"x1¼"	34"x24"x1¼"	37"x26"x1¼"	42"x29"x1½"	48"x33"x1½"	57"x39"x1½"	
Size of Board	39"x20"x1¼"	45"x22"x1¼"	48"x24"x1¼"	55"x27"x1½"	63"x31"x1½"	76"x39"x1½"	
Size of Board	30"x28"x1¼"	34"x31"x1¼"	37"x34"x1½"	42"x38"x1½"	48"x44"x1½"	57"x53"x1½"	
Size of Board	30"x30"x1¼"	34"x34"x1¼"	37"x37"x1½"	42"x42"x1½"	48"x48"x1½"	57"x57"x1½"	
Size of Board	39"x28"x1¼"	45"x31"x1½"	48"x34"x1½"	55"x38"x1½"	63"x44"x1½"	38"x53"x1½" Two Panels	
Size of Board	39"x28"x1¼"	45"x31"x1½"	48"x34"x1½"	55"x38"x1½"	63"x44"x1½"	38"x53"x1½" Two Panels	
Size of Board	39"x30"x1¼"	45"x34"x1½"	50"x37"x1½"	55"x42"x1½"	63"x48"x1½"	38"x57"x1½" Two Panels	

Dimensions of Marsh Instrument Panel Gauges and Clocks



The template drawing and table given below will supply the dimensions for Marsh Gauges and Clocks from 5-inch to 12-inch dial.

For clocks the 1-inch drilling for connection is omitted.

DIMENSIONS

Size	5"	6"	6¾"	8½"	10"	12"
A	6½"	7⅝"	8 7/16"	10 1/16"	11 13/16"	14 "
B	2¼"	2½"	2½"	2¾"	3¼"	3¼"
C	3 1/16"	4 "	4 "	4⅛"	4¼"	4⅜"
D	3 1/16"	3 17/32"	3 23/32"	4 23/32"	5 13/32"	....
E	1 23/32"	2 9/32"	2 7/16"	2 11/16"	2 23/32"	2 23/32"

Continued on next page

Typical Specification for Marsh Instrument Panels

In the boiler room, where hereinafter directed, the heating contractor shall furnish and install one gauge board with all gauges (and clock) as shown on the plan, made of .... inch thick (material to be selected).

All instruments are to be of the (surface) (flush) mounted type. All instruments shall match in design and form.

Contractor shall mount the panel on a frame work of piping.

Note: See page 4 of this Bulletin for complete information on fittings and piping for mounting gauge boards.

Wherever the pipe connections are taken off any part of the system and run over to the gauges there shall be a shut-off valve provided near the connection as well as a shut-off cock near the gauges and a valve drip line back of the board on each connection. A total of (number .....) recording gauges and (number .....) indicating gauges, and (one clock) shall be provided as hereinafter specified.

These instruments shall be mounted on the board in accordance with layout to be made by JAS. P. MARSH & COMPANY and submitted by the contractor to the architect for approval.

All instruments to be of JAS. P. MARSH & COMPANY manufacture.

For each of the recording gauges this contractor shall furnish and turn over to the owners' engineer and take receipt for, a total of 400 twenty-four hour charts.

Under each gauge there shall be mounted on the board a 1 x 6-inch service plate plainly engraved indicating the service for which the gauge is used.

Note: Alternate. There shall be engraved on the face of each gauge, service for which the gauge is used.

All gauges shall be equipped with water leg and shall be back connected with no connections showing on the front of the board.

On the gauge board this contractor shall drill (number .....) openings of the size and kind as directed by the electrical contractor for the illumination of the gauge board.

All instruments shall be (chromium plated cast brass case and ring), (chromium plated ring with black enamel case), (nickel plated cast brass case and ring), (nickel plated ring with black enamel case), (polished cast brass case and ring), polished brass ring with black enamel case), (black enamel case and ring).

It is intended that the heating contractor shall make connections to all gauges to be furnished by him on the gauge board, connected to any portion of the work done by him.

The following instruments shall be furnished and installed on the gauge board:

One Marsh Clock with Seth Thomas eight-day movement.

An indicating gauge shall be connected to the main boiler pressure line and shall be graduated from 0 to 200 lb. pressure. *(Note: This gauge for high pressure only.)*

An indicating gauge shall be connected to the process steam line and shall be graduated 0 to 80 lbs. *(Note: For high pressure only.)*

An indicating gauge shall be connected to the indirect units heating system and shall be graduated 0 to 30 lb.

An indicating gauge shall be connected to the vacuum heating system and shall be graduated 15 lb. pressure by 30 in. vacuum.

An indicating gauge shall be connected to the main return header and shall be graduated 15 lb. pressure by 30 in. vacuum.

An indicating gauge shall be connected to the city water pressure supply and shall be graduated 0 to 100 lb.

An indicating gauge shall be connected to the house pump discharge and shall be graduated 0 to 100 lb. pressure and corresponding feet in altitude.

An indicating gauge shall be connected to the fire pump and sprinkler system and shall be graduated 0 to 200 lb. and corresponding feet in altitude.

An indicating gauge shall be connected to the compressed air system and shall be graduated 0 to 200 lb. pressure.

A recording gauge shall be connected to the main boiler pressure line and shall be equipped with 200-lb. charts.

A recording gauge shall be connected to the process steam line and shall be equipped with 80-lb. charts. *(Note: The above two gauges for high pressure only.)*

A recording gauge shall be connected to the indirect units heating system and shall be equipped with 30-lb. charts.

A recording gauge shall be connected to the vacuum heating system and shall be equipped with 15 lb. by 30 in. charts.

A recording gauge shall be connected to the main return header and shall be equipped with 15 lb. by 30 in. charts.

Contractor shall furnish and install on the board a name plate (4x6 in.) (6x9 in.) (9x12 in.) made of brass with stippled background and with raised lettering finished to match instruments and to be lettered as follows:

(Name of Building or Owner)
(Year)
(Architect's Name)
(Heating Contractor's Name)

THE ORGANIZATION BEHIND

COMMERCIAL INSTRUMENT CORPORATION

A Delaware Corporation

▼

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MARSH

& COMPANY

SARCO COMPANY, INC.

Manufacturers of Steam Specialties
183 Madison Avenue, NEW YORK, N. Y.
BRANCHES IN ALL PRINCIPAL CITIES
SARCO (CANADA) LIMITED
660 Saint Catherine Street, West, MONTREAL

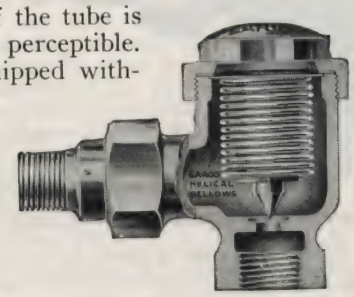
Products

SARCO RADIATOR TRAPS, PACKLESS INLET VALVES, AIR ELIMINATORS, ALTERNATING RECEIVERS, FLOAT TRAPS, TEMPERATURE REGULATORS and SELF-CLEANING STRAINERS.

Sarco Type E Radiator Trap

The Sarco Radiator Trap is operated by the expansion and contraction of a very sensitive liquid. Its positive action keeps radiators thoroughly drained, preventing air binding, and increasing the heating value of every pound of coal.

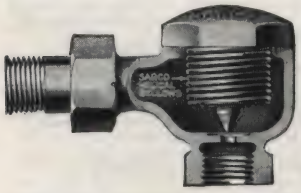
The life of the helical corrugated expansion motor element in the Sarco exceeds many times that of annularly corrugated tubes because its movement at any point of the tube is so slight that it is hardly perceptible.



The Sarco can be shipped without elements so that when operating in a gravity system, all the scale and dirt can be washed out. The elements can then be easily dropped into place and the trap will function perfectly. Removing the elements does not affect the adjustment.

Brass castings have no defects and are exceptionally heavy. No danger of cracking or straining when connecting. Made in ½, ¾ and 1-in. sizes for vacuum, vapor and steam heating systems at pressures up to 25 lbs.

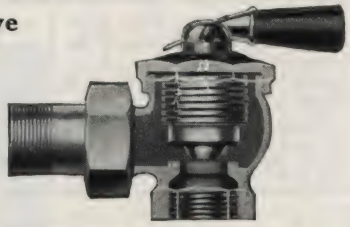
Sarco Type H Radiator Trap



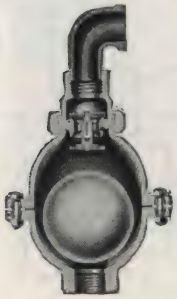
The Sarco Type H Radiator Trap is a companion to the Type E trap. Designed for small heating units it is used for living room, bedroom and bathroom radiation in apartments and hotels.

Sarco Packless Inlet Valve

The Sarco Packless Inlet Valve is made in sizes from ½ to 1½ in. for graduating or modulating the flow of steam to radiators.

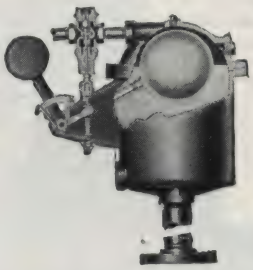


Sarco No. 11 Air Eliminator



The Sarco Air Eliminator vents air from the entire plant at one central point, in the basement.

The discharge orifice is protected by two separate check valves, operating independently in opposite directions. The outer valve serves to keep air from being drawn into the system at times when a vacuum is created by condensing steam. The inner valve is closed by the copper float in the event of water filling the eliminator. Has cast iron body, a copper float and brass valves, rubber surfaced to insure tightness.

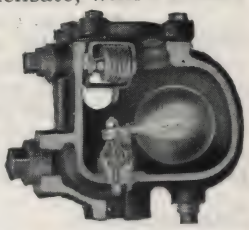


Sarco Alternating Receiver

The Sarco Alternating Receiver insures minimum operating pressure and, therefore, maximum economy. It keeps condensate flowing freely back to the boiler.

Sarco Float Traps

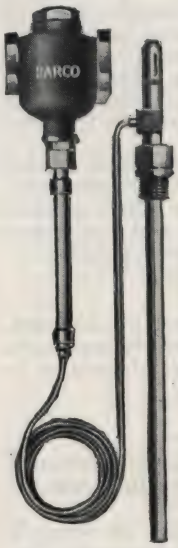
Sarco Float Traps are designed for the rapid removal of very hot condensate, which cannot be handled by thermostatic means alone.



The 1¼ in., FT-1 and the 2-in. FT-2 are designed for pressures up to 10 lbs.

The 1¼-in. FT-3 is designed for pressures up to 125 lbs.

Sarco TR-21 Temperature Regulator

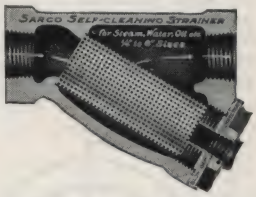


The Sarco Temperature Regulator is operated by an extremely sensitive liquid and is instantly responsive to the slightest fluctuation in the temperature of atmosphere or liquids. It requires no external operating means, such as compressed air, water or electricity.

Sarco Regulators are substantially constructed. The valve is fully balanced and packless. Suitable for steam, water and gas, and can also be had in the "reverse acting" type, to open with rise of temperature. A 6-ft. connecting tubing between the thermostat and valve is furnished with the regulator, but when needed, longer tubings are supplied at slight additional cost.

The TR-21 is designed for hot water control tanks and boilers and has an adjustable range of 20° F.; 10° above and 10° below the setting point.

Sarco Self-cleaning Strainer



The Sarco Strainer is suitable for use on steam, gas, water, oil, etc. It has a cast iron body with perforated cylinder placed at such an angle as to offer the minimum obstruction to the flow of gas or liquid, but allowing ample cleaning space. The standard screens are made of perforated brass but, where specified, monel or other metal screens can be supplied to practically any specification.

Can be placed in horizontal or vertical lines or at any angle, and a blowoff connection permits the strainer being cleaned instantly, merely by opening a valve.

Made in sizes from ½ to 8 in.

STERLING ENGINEERING CO.

Manufacturers of the Thermotrol
1630 Holton Street, MILWAUKEE, WIS.

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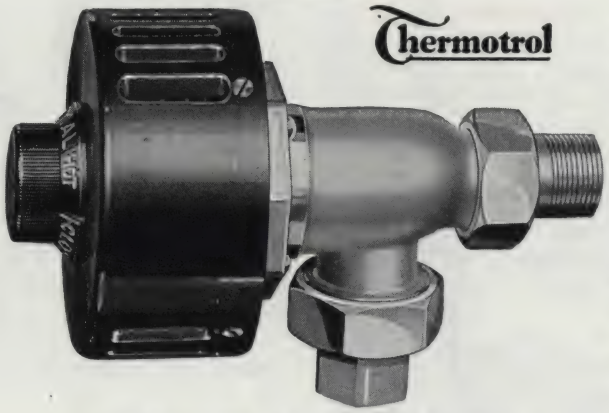
Thermotrol Automatic Regulator

The Thermotrol is a self-contained, automatic temperature regulator, requiring no outside attachments or power, no wall thermostats, compressed air or electrical connections to operate it. It is installed as easily as the ordinary hand valve and costs only a fraction of other types of temperature control systems. It automatically controls the amount of steam admitted into the radiator, thus holding the room temperature at any desired degree.



The Thermotrol Temperature Regulator

Description

The Thermotrol consists of a bronze valve with tapered seat and guided stem, upon which is mounted the thermostatic control. The valve is so constructed that it operates easily at common heating pressures. The valve mechanism is effectively insulated from the thermostatic units by means of a metal baffle, bakelite flanges, and the bakelite housing. The actuating diaphragms are of special composition, and contain a volatile fluid which expands and contracts with change in temperature.

Two types of adjustment are available. The hand adjustment permits regulation at will by turning the ratchet knob on which different temperature graduations are plainly marked. The loose key type is designed for schools and institutions where heat regulation is made by authorized persons only.

Application

The Thermotrol is adaptable for use on new or old buildings, equipped with two-pipe heating systems—atmospheric steam, vapor, vacuum or hot water. Complete information in Catalog No. 130.

Standard Specifications

Install at the supply end of each radiator a Thermotrol temperature control valve, as manufactured by the STERLING ENGINEERING CO. of Milwaukee, Wis.

This control valve consists of a bronze valve on which is mounted a thermostatic unit consisting of a compound diaphragm enclosed in a bakelite housing and equipped with an adjusting knob. (Either hand adjustable or loose key type.)

The control valve shall be of the straight line type so constructed that the action of the diaphragm is conveyed to the valve stem along a straight line. The valve shall have no levers, cams or other devices for changing the line of direction in transmitting the diaphragm motion to the valve stem.

The control valve shall be so designed that it can be tightly closed, manually, when it is desirable to prevent any heat from entering the radiator regardless of room temperature.

The control valve shall be designed to maintain any desired room temperatures between ....° F. and ....° F. and shall be guaranteed to be free from mechanical defects.

Guarantee

The STERLING ENGINEERING COMPANY guarantees that the Thermotrol will control the amount of heat radiated from the radiator to which it is attached so as to maintain a room temperature within 1° F. above and 1° F. below the point of adjustment, provided:

1. That the temperature of the room is not affected by any source of heat other than the radiator to which the Thermotrol is attached.
2. That all doors and windows are kept closed.
3. That a sufficient and continuous supply of steam is furnished to the radiator and that there is sufficient radiation to heat the room to the required temperature.
4. That the radiator is continuously properly vented and properly drained.

The temperature of the room shall be determined by means of a recording test thermometer placed at approximately the center of the room and 5 ft. above the floor but not within 8 ft. of the radiator or within 3 ft. of an outside wall.

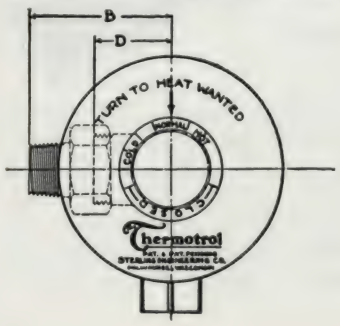
The STERLING ENGINEERING COMPANY guarantees the Thermotrol to be free from defects in workmanship and material under normal use and service. The Company's obligations under this guarantee are limited to repairing or refurnishing at its factory any part or parts, which shall, within three years after delivery of equipment to the original purchaser, be returned, transportation prepaid, and which on examination shall disclose to its satisfaction to have been thus defective.

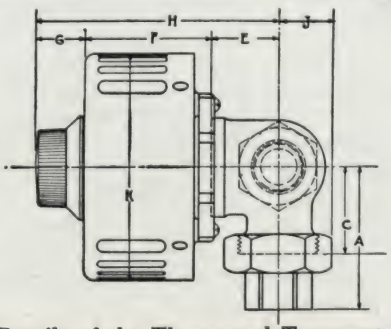
The Company neither assumes nor authorizes any other person or persons to assume for it any liabilities in connection with the sale of the Thermotrols except under the conditions of this guarantee.

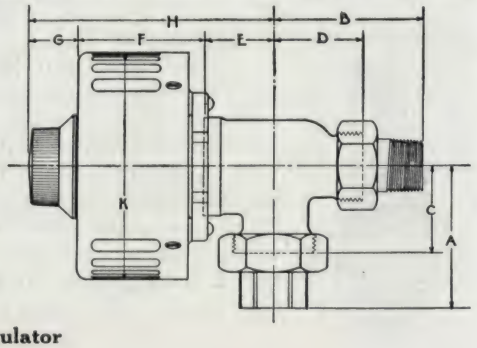
This Guarantee will become null and void if the Thermotrol, or Thermotrols, which are claimed defective, have been taken apart or repaired by others than the Company or its representatives.

SIZES, CAPACITIES, ROUGHING-IN-DIMENSIONS
Referring to detail drawings below

Inlet and outlet	Radiation, sq. ft.	A, in.	B, in.	C, in.	D, in.	E, in.	F, in.	G, in.	H, in.	J, in.	K, in.
½ in.	50	2⅝	2⅝	1 11/16	1⅜	1⅜	2 7/16	1 5/16	4 9/16	⅞	4 3/4
¾ in.	100	2¾	2¾	1 11/16	1 11/16	1 5/16	2 7/16	1 5/16	4 11/16	1 1/16	4 3/8
1 in.	200	3	3	1 13/16	1¾	1½	2 7/16	1 5/16	4⅞	1 3/16	4 3/8
1½ in.	350	3¾	3¾	2	2	1 5/8	2 7/16	1 5/16	5	1 1/16	4 3/4







Details of the Thermotrol Temperature Regulator

WEBSTER TALLMADGE & CO., INC.

Specialists in Steam Engineering

50 Church Street, NEW YORK, N. Y.

Product

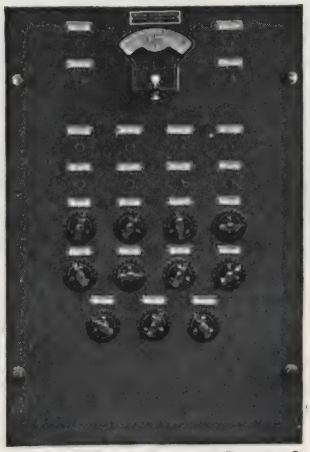
The TALLMADGE ZONE HEATING SYSTEM, with Simplified Orifice Distribution and Remote Electrical Control.

The Tallmadge System

The Tallmadge principle of zoning with simplified orifice distribution and electrically remote control divides the heating system of a building or group of buildings into separately controlled subdivisions. Each subdivision serves one distinct zone with independent heating effect, variable at will and unified throughout the zone, and not intermittent in operation. The amount of steam supplied to each zone is regulated by a control valve. The heating effect within each zone is unified by use of a low-pressure high-resistance orifice at each radiator proportioned to its capacity. All radiators of the same size, regardless of location, have orifices of the same size. This arrangement, in times of reduced steam supply (mild weather) overcomes the uneven distribution effect of the unequal pipe resistance and admits to each radiator only that portion of steam supply consistent with the radiator capacity, but ample supply in extreme weather.

The steam supply valve of each zone is under simplified manual or automatic electrically remote control which permits regulation of all zones independently of each other, from a single centralized panel in the heating plant or located at any other convenient point.

The Tallmadge System is not affected by the method of generation of steam and is preferably applicable to new buildings, but in remodeling, under any pressure and fired by any means, or receiving steam from an outside (district) heating system, the steam consumption is reduced and comfort is greatly improved.



Tallmadge Central Control Panel for 11-Zone System

The zone steam supply controls have their handles fitted with dials graduated in percentage of maximum steam flow. The panels are also frequently equipped with a remote reading electrical temperature indicator having push button connections to temperature indicating elements outside at and inside in each zone. In many instances only one sunny side and one shady side outside indicator is needed. Humidity indicators, wind velocity and direction indicators, pressure gauges and recorders may also be installed on this panel as desired. Together these instruments place within the operator's easy reach, all facilities for keeping tab on inside conditions, for thorough regulation of heat to every part and for observing or recording all performance of the heating system, without time loss or physical effort.

Zoning

Zoning by the Tallmadge System produces exactly the temperature or temperatures desired at different parts of the building or buildings, provides for the temperature variations desired at different times of the day, and during the mild parts of the heating season permits a fractional steam supply to meet the demand without underheating at the shady or windy, or overheating the sunny or quiet locations. The zones may be formed by dividing the radiation into groups with respect to the sidewalls, or by grouping radiators that are above each other along the corresponding wall of several floors.

Zoning for exposure takes into consideration the local temperature range, partial protection from adjoining buildings, prevailing direction and velocities of the wind, degree of exposure to sunlight and the seasonal variations.

Zoning for occupancy provides for the different temperatures required at various locations, due to the kind and degree of occupancy; as, for instance, in a factory where office employees want 70°, machine shop workers a little less, storage rooms require only a little heat, etc.

Heated by a Tallmadge System of Eleven Zones

Zoning for elevation in a tall building provides for heat equalization at lower and upper floors by correcting the effects of air becoming buoyant and rising to upper floors in being heated.

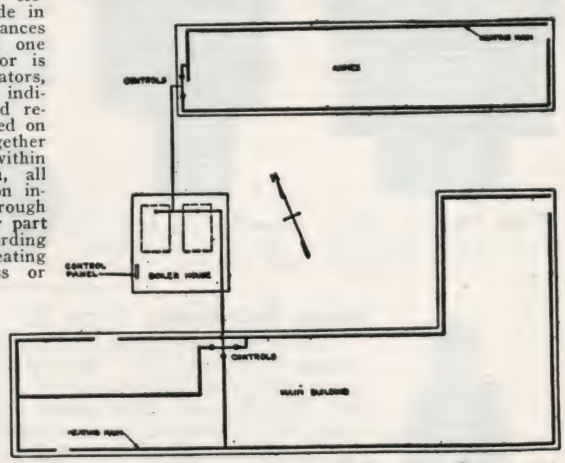
The most desirable zoning arrangement takes these factors into consideration and is simply determined by natural matter-of-fact analysis when laying out the piping. The extent to which zoning is carried depends upon the value placed on comfort, on the initial expense and upon the return on the investment.

The possibilities as to size and location of the zones are so flexible that the designer has unlimited opportunity to meet individual requirements and interdependent needs.

Cost and Economic Advantages of the Tallmadge System

The cost of Tallmadge Equipment in a new installation is offset by savings through the elimination of return traps on the radiators, vacuum equipment on the returns, and by the safe use of smaller and less expensive piping.

In the remodeling of an existing ordinary system, the fuel saving produced by adding Tallmadge Equipment is usually sufficient to fully repay the installation costs within two heating seasons, and the heating effect is perfect.



Typical Application of the Tallmadge System

Used in small industrial plant where occupancy zoning is the prime consideration.

The steam supply in the five zones is so regulated that each department is entirely independent and easily kept at its most desirable temperature

Numerous installations on remodeled heating systems have effected from 30% to 50% fuel saving with decidedly better heating service.

The maintenance and operating costs in either a new or a remodeled system are less than for the ordinary systems.

Parts of the System

The Tallmadge System consists of:

(1) One valve control mechanism for the steam inlet of each zone, (2) one special bushing or inlet valve with orifice for each radiator, (3) central control panelboard with necessary instruments, (4) wiring and piping diagrams, detailed instructions for the guidance of contractor, and expert service.

Engineering Co-operation

We co-operate with architects, consulting and managing engineers, owners, etc., and gladly submit suggestions with data.

Literature will be mailed on request.

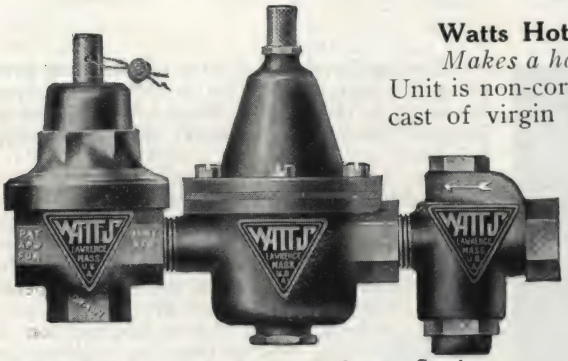
ESTABLISHED 1874

WATTS REGULATOR CO.

Manufacturers of Steam, Water and Air Specialties

LAWRENCE, MASS.

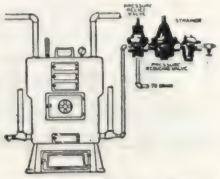
EXCLUSIVE DISTRIBUTERS UNITED STATES and CANADA: JOHN C. KELLY, INC., 210 East 45th Street, NEW YORK, N. Y.



Relief Valve Reducing Valve Strainer

Watts Hot Water House Heating Unit, Type 38

Makes a hot water heating system automatic. The Watts Unit is non-corrosive throughout. The bodies and domes are cast of virgin bronze—springs are bronze—diaphragms are especially designed for flexibility and durability. Large waterways prevent clogging. The units can be installed readily on new or old systems.



Installation of Unit

The unit consists of a ½-in. strainer; a ½-in. reducing valve (set and sealed 10-13 lb.) and a ½-in. relief valve (set and sealed 25-30 lb.) A.S.M.E. standard.

Height, 5½ in.; length, 8½ in.; weight, 5 lb.

Watts Relief Valves

Made only in iron pipe size threads, built of brass and bronze, diaphragms laminated monel and phosphor bronze. Large diaphragm area makes operation positive and accurate. Furnished in three styles: (1) non-adjustable, see Type 29; (2) adjustable with seal cap, range 30 to 175 lb., see Type 28; (3) calibrated, range 75 to 125 lb., see Types 30 and 31.

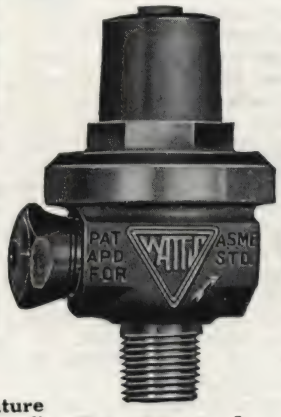
For tank in basement systems, furnished non-adjustable, set at 30 lb. For domestic range boilers, set at 125 lb.

Type 30—Sizes ¾ to 2 in. Furnished in Styles 1 and 2 only. Range of adjustment, 30 to 125 lb.

Type 28—½" Only
Female inlet; female drain
Pressure relief only

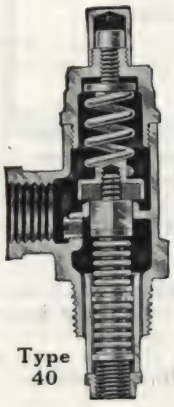
Type 30—½ to 2" Inc.
Male inlet; female drain

Left:
Adjustment Feature
Top view of calibrated style. Can be set in the field without a gauge. Arrow points to relieving pressure. Range of adjustment 75-125 lb.



Type 29—½ In. Only
Temperature pressure, vacuum
Male inlet; female drain

Type 31—½ In. Only
Temperature pressure
Male inlet; female drain



Type 40

Watts Autotherm, Type 40

Automatic, for range boilers, hot water storage tanks, etc. The thermostatic bellows opens valve when temperature is between 200° and 212° F. and closes when temperature drops 10°. Designed to be installed in or near top of boiler. Will operate in any position. Pressure relief is set at 125 lb.; adjustment range 50 to 125 lb. ¾-in. iron pipe size male inlet and ½-in. female drain.

Watts Vacuum Relief Valve, Type 32

Prevents collapse of boiler when water is drained from mains. Valve operates on vacuum equal to 7-in. mercury. ½-in. iron pipe size only.

Type 32

U-tube Heat Interchangers

Copper tubes, bronze head, wrought iron shell. Instantaneous direct or indirect heating. Water tubes tested to 500 lb., shell to 300 lb. Suitable for heating water, oil or gas, using steam vapor or hot water.

U-tube Heat Interchanger, Type 100

Watts Automatic Water Pressure Regulator

A household water pressure regulator. Castings from virgin bronze, diaphragms gum rubber. Valves single seated, close tight. Discs medium hard, seat against well-rounded seat.

Stock valves are set to deliver 45 lb. pressure and are adjustable from 20 to 100 lb.

Sizes ⅛ to 2 in. Female iron pipe size connection.

Pressure Regulator, Type 23

Automatic Water Pressure Regulator with Strainer

Same as Type 23, but with bronze strainer. Strainer screen is a perforated brass cylinder, readily removable for cleaning. Sizes ⅛ to 2 in.

Strainer, Type 34, sold separately. Made with large sediment space and clean-out plug. Water flows from inside. Sizes ½ to 2 in.

Pressure Regulator, with Strainer, Type 23S

MODERN HEATING

Warren Webster & Company, Camden, N. J.
Pioneers of the Vacuum System of Steam Heating
60 U. S. Branches—In Canada, Darling Bros., Ltd., Montreal

ESTABLISHED 1888

WARREN WEBSTER & COMPANY

Steam Heating Systems and Steam Specialties

FACTORY AND MAIN OFFICE

CAMDEN, NEW JERSEY

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REPRESENTATIVES FOR BRITISH EMPIRE (Except Canada)

THE ATMOSPHERIC STEAM HEATING CO., LTD., 22 Broadway, WESTMINSTER, LONDON, ENG.

Products and Services

WEBSTER MODERATOR SYSTEM of STEAM HEATING.

IMPROVED WEBSTER VACUUM and IMPROVED TYPE "R" SYSTEMS of STEAM HEATING.

WEBSTER VACUUM and TYPE "R" SYSTEMS of STEAM HEATING.

WEBSTER SYSTEM EQUIPMENT.

MODERNIZATION of Obsolete and Faulty Heating Systems.

-since 1888 Webster Systems of Steam Heating
TRADE-MARK

Webster Systems and Webster Systems Equipment are fully covered by patents and patents pending

The Company

WARREN WEBSTER & COMPANY have grown steadily since 1888 and at present have an ample plant, more than 60 United States branches and Canadian and British representatives. As owners of the recognized basic vacuum system patents, the Company was the pioneer in the development of the vacuum system of steam heating and has specialized continuously in the problem of steam economy and steam circulation.

WARREN WEBSTER & COMPANY do not manufacture, sell or assume responsibility for boilers, piping or other equipment not of their manufacture, nor for service to such apparatus. The Company does not install heating systems—Webster Systems are installed by heating contractors—but does go to great length to insure that installations shall be made correctly.

Webster Systems Are Endorsed by Architects, Engineers and Heating Contractors

Almost one-third of the country's leading architects have specified Webster Systems for their finer buildings; many of the largest consulting engineers use Webster Systems; while more than 2600 heating contractors install Webster Systems. Most of these use Webster Systems and Equipment repeatedly.

Four Elements of Webster Systems of Steam Heating

Webster Systems combine the following four elements, each of which is essential:

(1) Service—By a comprehensive organization of trained steam heating specialists covering every State in the Union. Webster Service is part of every Webster System. It includes carefully prepared printed instructions and personal co-operation of a corps of trained steam heating engineers. It provides help on each of the following points:

(a) Determines the type of system best suited to the particular building, locality and specialized operating conditions.

(b) Decides the correct Webster System Equipment to insure perfect circulation of steam at least cost.

(c) Provides printed instructions for steamfitters.

(d) Inspects work during installation and, on completion, as conditions warrant.

(e) Provides printed instructions for the engineer or janitor in correct operation of the Webster Systems when necessary.

(2) Experience—Gained in providing more than 60,000 successful Webster Systems of Steam Heating.

(3) Webster System Equipment—Comprising a complete line of steam heating appliances proven correct in design by test and use.

(4) Webster Engineering Methods—Developed by our experience and in our extensive laboratories. They assure *correct* application of Webster System Equipment.

Consulting Service

Architects and engineers are invited to call in the nearest Webster sales-engineer at an early stage of the planning in order to assure best co-ordination of effort.

Continued on next page

A SYSTEM FOR EVERY HEATING NEED

Webster Systems can be adapted to meet the heating requirements of practically every type and size of building. These systems include a complete line of heating system equipment.

A Webster System can be provided that is *specifically adapted to every heating need or problem.* The architect can now select from a number of basic Webster Systems—each built to meet certain conditions; each a combination of service, experience, equipment and engineering methods varied to meet the heating requirements of the individual installation.

Webster MODERATOR System of Steam Heating

"Controlled-by-the-Weather"

The Webster MODERATOR System, properly operated, varies the supply of steam to the entire heating system and to all parts of it in accordance with changes in demand resulting from changes in weather and occupancy conditions. It solves the overheating problem by obtaining the following results:

(1) Fully automatic variation for changes in outdoor temperature, shutting off or turning on radiation, variation of steam pressure and variation in vacuum.

(2) Convenient manual variation for changes in weather conditions other than temperature and for quick heating up and night load conditions.

The Webster MODERATOR System does not control the temperature in each room but *moderates* the excesses of overheating and underheating. It delivers to all radiators simultaneously and regardless of distance from the boiler, the quantity of steam necessary to heat, without overheating. If certain radiators are shut off, the MODERATOR System immediately and automatically alters the supply of steam to the remaining radiators to correct for the change in demand. If the outside temperature goes up, the MODERATOR System immediately and automatically *moderates* the quantity of steam delivered to each radiator to meet the changing temperature. If firing is uneven the Webster MODERATOR System automatically irons out the resulting variations in steam supply. A "runaway" fire causes no overheating with its constant waste.

The Webster MODERATOR System is adaptable to buildings requiring approximately 5000 sq. ft. or more of radiation. It may be applied either to new buildings or to the modernization of systems in existing buildings.

The IMPROVED Webster Vacuum System

Basically, this is the well-known Webster Vacuum System with the addition of a specially selected standard metering orifice in each radiator valve. The IMPROVED System assures correct distribution—all radiators get steam at the same time and substantially in proportion to the need for steam. Eliminates the last "cold spot," operates equally well with fluctuating boiler pressures, high and low vacuum. Increases flexibility, permits quicker heating up, paves the way for economy producing operation. Operating requirements of the newer fuels such as oil and gas are fully met. Better-than-ever heating service with older fuels is obtained.

The IMPROVED Webster Type "R" System

This Webster System is specially fitted for use with oil and gas burners, light-weight radiation and installations where burners are controlled by a thermostat located in a "key" room. In addition improved heating service is obtained with coal and other fuels and with older types of radiation.

As in the IMPROVED Webster Vacuum System, a specially selected standard metering orifice is placed in each radiator valve to provide equalized and balanced steam distribution.

The IMPROVED Webster Type "R" System is an open return or gravity system adaptable to any type of building in which the boiler may be placed with its water-line below the level of water of condensation flowing back to it.

The Webster Vacuum System

The Webster Vacuum System provides positive circulation of low pressure steam, either live or exhaust, or a combination of both. Particularly well adapted for heating industrial plants; where a group of buildings are scattered over a considerable area; where one or more buildings are so located with respect to the boiler plant that lifts are necessary in the return piping; where exhaust steam from engines is utilized for heating; and in cases where it is impossible to pit the boiler at the lowest point in the system. Adapted for use with unit heaters of either the floor or suspended types as well as with cast iron and pipe coil radiators.

The Webster Type "R" System

Webster Type "R" System of Steam Heating is adaptable to almost every type building, except the very largest, where Webster Vacuum Systems are used—practically the only limitation being the necessity for a basement or other depression, so that the boiler may be placed with its water line below level of water of condensation flowing back to the boiler. In some cases where the boiler cannot be so placed, a Type "R" System may be used in conjunction with a suitable condensation pump.

A Type "R" System may be used in connection with boilers burning coal, oil, gas or any other fuel. It may be used with steel or with cast iron boilers and, with slight modification, with steam taken from a street supply.

Provided for installations up to 32,000 sq. ft. of equivalent direct cast iron radiation. Adapted for use with unit heaters of either the floor or suspended types, as well as with cast iron and pipe coil radiators.

Simple in design, economical and responds quickly. Can be operated safely and satisfactorily by unskilled labor.

Webster System Equipment

Used as needed in Webster Systems of Steam Heating includes the following:

Sylphon Traps; Series 7 Traps; Type "W" Supply Valves; Sylphon Quick-opening Packless Valves; Three-point Valves; Dirt Strainers; Dirt Pockets; Drip Traps; Heavy Duty Traps; Double Service Valves; Lift Fittings; Suction Strainers; Vacuum Governors; Damper Regulators; Vent Traps and Vent Valves; Boiler Return Traps; Boiler Protectors; Air Separating Tanks; Expansion Joints; Steam and Oil Separators.

Webster Series "78" Traps for use at "Process" pressures (10 to 100 lb. per sq. in.).

Continued on next page

WEBSTER MODERATOR SYSTEM

The Following Description and the Diagrammatic Illustration on the Following Page Explain the Principles of the Webster MODERATOR System

The Principles of the Webster MODERATOR System

The Webster MODERATOR System solves the overheating problem by obtaining the following results:

Fully automatic variation for changes in outdoor temperature; shutting off or turning on radiation; variation of steam pressure; variation in vacuum.

Convenient manual variation for changes in weather conditions other than temperature and for quick heating up and night load conditions.

Properly operated, this system varies the supply of steam to the entire heating system and to all parts of it in accordance with changes in demand resulting from changes in weather and occupancy conditions.

The Webster MODERATOR System does not control the temperature in each room, but moderates the excesses of overheating and underheating.

Why These Results Are Desirable

In order to understand why these results are desirable it is necessary to examine briefly the operation of conventional low-pressure steam heating systems. Conservative engineers for years past have aimed to provide boilers, piping and radiation of such size that the inside temperature of the building may be maintained at 70° F. with an outdoor temperature of 0° F. (more or less, depending on location). This basic assumption has been generally used to determine the *maximum size* or *maximum output* of the conventional system.

Since this severe load exists only on rare occasions it is necessary to throttle or *moderate* the output most of the time to prevent overheating, with its discomfort and waste. When the weather *moderates* the supply of heat must be correspondingly *moderated* or reduced.

Existing means for *moderating* inside heating fall far short of the desired end. They only partially solve the problem of conforming the supply of heat to changes in demand. Using the present methods it is necessary to fill the entire system with steam before the furthest radiators can be kept warm, resulting in overheating and window opening where heat is less needed. The methods usually employed for limiting the amount of steam depend on manual attention, which they rarely get. Tenants and employees, having no pecuniary interest in reducing fuel waste, find it easier to "moderate" room temperature by opening the windows.

Thermostatic control devices on individual radiators have been successful in maintaining inside temperatures within fixed limits, but in most cases they aggravate rather than reduce the wastes due to window opening. However, thermostatically controlled radiator supply valves, together with the Webster MODERATOR System, make an ideal combination which may be used wherever desired.

How It Works

Air Circulating System—The Air Compressor (1) maintains a constant pressure on a small air line leading to the Roof Thermostat (2). The amount of air flowing past the valve of the Roof Thermostat (2) and into the line A-B is varied by changes in outdoor temperature. This air is continuously discharged to the atmosphere at (B) through a restricted opening. When the temperature decreases. the amount of air flowing into line A-B increases and the pressure ahead of (B) is correspondingly increased. When temperature increases, amount of air flowing into A-B decreases and pressure ahead of (B) is correspondingly increased.

The area of the restricted opening at (B) may be changed by the operating engineer by merely moving the Variator lever (C). Reducing the opening increases the pressure ahead of (B); increasing the opening decreases the pressure. The pressure ahead of (B) is therefore always under the influence of both the Roof Thermostat and the Variator; the operation of one does not nullify the effect of the other, but the air pressure produced ahead of (B) is always the result of operation of both units.

Control Panels—The air pressure ahead of (B) is transmitted to a Sylphon Bellows. A change in the pressure ahead of (B), resulting from a change in outdoor temperature or in Variator setting, expands or contracts the Sylphon Bellows and thus produces a mechanical movement.

Pilot Valve—The mechanical movement produced by the Sylphon Bellows or Mercury Balance is transmitted to the Pilot Valve (E), causing a flow of oil through the circuit.

Oil Circuit—Oil pressure is maintained by a pump built into the Air Compressor Unit (1). Movement of the Oil Pilot Valve (E) in one direction sends additional oil to the operating piston of the Main Steam Control Valve (4), opening this valve and increasing the steam supply until the difference in pressure between supply and return is maintained equal to the air pressure ahead of (B). Movement of the Oil Pilot Valve in the opposite direction produces an opposite effect by permitting oil to flow from the operating piston of the Main Steam Control Valve back to the Oil Reservoir at (1).

Sylphon Bellows—A second Sylphon Bellows is connected to the steam main and a third Sylphon Bellows to the return main. These two Sylphon Bellows are rigidly connected with a third Sylphon Bellows (subject to the air pressure at (B)) in such a manner that a movement of either operates the Oil Pilot Valve. In other words an increase in steam pressure, due to shutting off certain radiators or to increase in boiler pressure or other causes, results in a mechanical movement of the bellows which operates the Oil Pilot Valve.

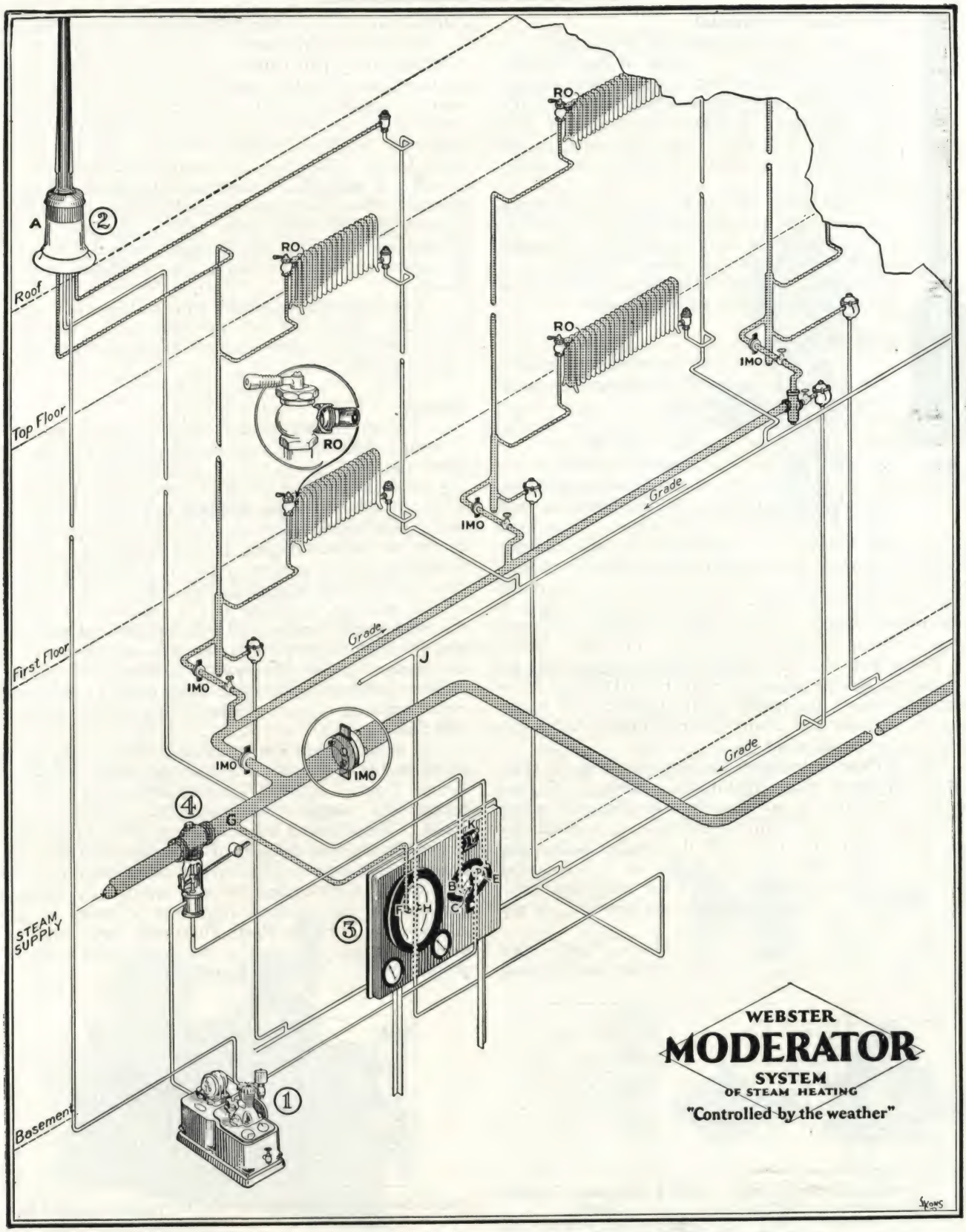
Orifices—The amount of steam delivered to all or any part of the system is dependent on the difference in pressure between the point from which the flow starts and the point at which the flow terminates.

In the MODERATOR System at mild outdoor temperatures, say 60°, the amount of steam passing the Main Steam Control Valve would be very slight and in the normal system would fill only the main and possibly a few of the nearest radiators. By introducing resistance to flow at appropriate points (called Metering Orifices) we assure that any change in steam flow through the Main Steam Control Valve will be reflected in a corresponding change to every radiator. Intermediate Metering Orifices are installed in the branch mains and riser laterals. Radiator orifices are installed in the nipple of each radiator supply valve.

The Variator—The Variator is the only manual

Continued on next page

control necessary in the standard MODERATOR System. Normally the MODERATOR System furnishes enough heat to all parts of a building to maintain comfortable temperature without excessive overheating and without underheating for condition of average wind and daylight. For unusual conditions, such as excessive wind or dark clouds, added heat can be provided by moving the Variator Lever from normal (or 100%) to a higher percentage. For heating up quickly in the morning, the Variator can be moved to double heat, or 200%. For night load conditions it is usually desirable to shut off heat completely, but where this is not possible the Variator can be set as low as 50% to keep a moderate heat on the building.



Diagrammatic Arrangement of Elements of Webster Moderator System

Continued on next page

Webster MODERATOR System Equipment

The basic MODERATOR System Control Equipment consists of a Roof Thermostat, a Control Panel, an Air Compressor and Oil Pump Unit, a Main Steam Control Valve and Special Metering Orifices.

Roof Thermostat

The Roof Thermostat

The Roof Thermostat gives the *"Controlled-by-Weather"* feature of the MODERATOR System. The thermostat elements consist of an outer steel tube and an inner brass tube. The difference in linear expansion of these metals operates the air valve, varying the flow of air in proportion to changes in outdoor temperature.

The entire unit is supported on a rugged cast iron base and provision is made to protect all working parts from the weather. Constant temperature of valve parts is assured by steam jacketing. The air valve is protected by an easily accessible, fine mesh screen.

Control Panels

Made in a number of different models, each designed for particular operating conditions and size of buildings.

No. 2 Control Panel—Used for installations ranging in size from 10,000 sq. ft. of radiation to the very largest, where the arrangement is such as to permit the conventional grouping of equipment in the basement with one Main Steam Control Valve. This panel includes the Variator, an instrument to indicate and record air pressure produced by the combined action of the Roof Thermostat and the Variator (or steam and return pressure difference if desired); two gauges to indicate the steam pressure and the return pressure. Three Sylphon Bellows operate the Oil Pilot Valve.

No. 3 and No. 4 Control Panels—Applicable for installations of minimum size up to 20,000 sq. ft. of radiation, where conventional arrangement of equipment is possible and Main Steam Control Valve can be located in a basement.

No. 4 Panel—Includes the Variator, and the three Sylphon Bellows which operate the standard Oil Pilot Valve. This panel is particularly to be preferred where the likelihood of operating attention is at a minimum, such as is usually the case with the smaller boiler-fired jobs using relatively low cost fuel. It will be noted that No. 4 Panel performs all of the operating functions of the No. 2 Panel but does not provide for any record or indication of pressure.

No. 3 Panel—Similar to the No. 4 Panel except that it has, in addition, a mercury column used to indicate but not record steam and return pressure difference.

No. 5 Control Panel—A secondary control panel. The secondary panel cannot be used alone but only in conjunction with other panel equipment. This type of panel is used to operate main Steam Control Valves where these are located at a remote distance from the basement. Three Sylphon Bellows operate the Oil Pilot Valve. There is no Variator included.

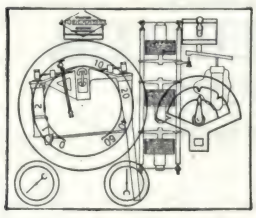
No. 6 and No. 7 Control Panels—Used in conjunction with a secondary control panel as none of them include the Oil Pilot Valve which operates the Main Steam Control Valve. In all other respects No. 6 Panel is similar to No. 2 Panel; No. 7 Panel to No. 3 Panel.

The selection of these panels depends upon the operating conditions of the individual installation. However, No. 6 meets most of the requirements of this type of panel.

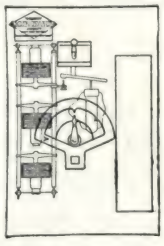
Zoning

Our experience with the MODERATOR System has indicated that zoning may be dispensed with in most cases and particularly for all parts of the building having the same normal hours of occupancy. The control of steam delivery to the building as a whole by one central means lessens materially the need for supplementary control of various zones. However, in certain types of buildings where a section or two of the building requires heat for a much longer period than the main portion of the building, provision can be made by (1) making this section a separate zone with suitable valve arrangement to shut off the portion not in use or (2) *not* placing the section under MODERATOR Control. If either of these provisions is not made, steam must be kept on the entire building for unnecessarily long periods and waste will result.

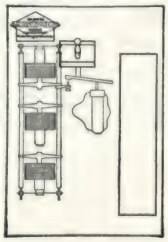
If two or more zones are desired they may be provided in the MODERATOR System by means of Manual Branch Control Valves (Variable Orifices) installed just beyond the single MODERATOR Main Steam Control Valve. These branch control valves will provide manual control, modifying delivery of steam to each zone. Each branch valve may be set at any position from 0 to 150% of normal. Corrections for sun, wind, etc., on certain portions of the building may thus be made by hand. At the same time, the Roof Thermostat will continue to vary the supply of steam to the building as a whole in proportion to outdoor temperature.



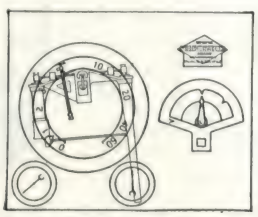
No. 2 Complete Control Panel
Primary and secondary combined, with pressure indication and record



No. 4 Complete Control Panel
Primary and secondary combined, *without* pressure indication and record



No. 5 Secondary Control Panel
Without pressure indication and record



No. 6 Primary Control Panel
Used in conjunction with secondary panel. Has pressure indication and record

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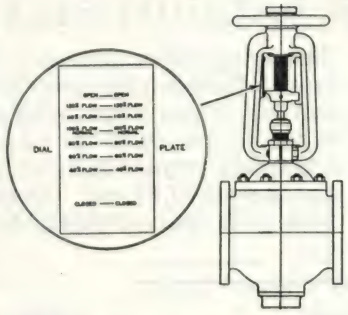
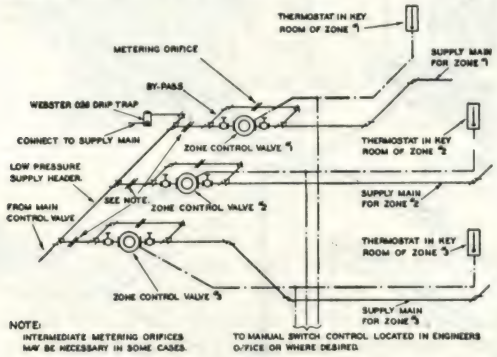
Automatic Zoning—If manual zoning is not considered sufficient, semi-automatic zoning may be provided by means of electrically or pneumatically operated valves. The main is divided beyond the MODERATOR Main Steam Control Valve and each branch provided with a MODERATOR Control Valve connected to a key-room thermostat in the zones served (and also to a switch in the control panel if desired). A by-pass is provided around this valve with a fixed orifice of size sufficient to permit enough steam to flow into the zone to heat the mains and risers.



Webster Manual Branch Valve for Zoning

"Three-Point" Valve—Where demand for heat cannot be predicted or where an unusual degree of flexibility is desired, the Webster "Three-Point" Valve can be used to advantage. This is a radiator supply valve which is, in effect, a zoning valve on each radiator. To meet various demands for heat, the valve may be set at *shut, normal* or *excess* position, the latter giving 140% of normal steam requirements. For detailed description see page 12.



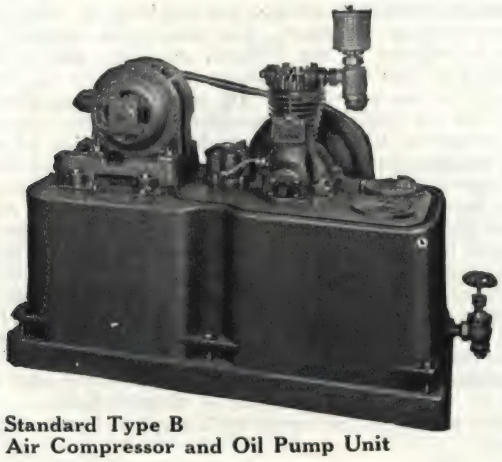
Diagrammatic Arrangement of Automatic Zone Control Equipment

Air Compressor and Oil Pump Unit Type "B"

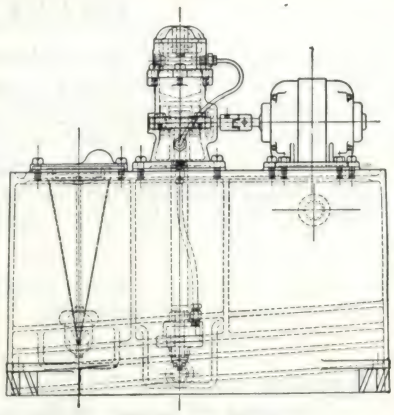
The standard Air Compressor and Oil Pump Unit Type "B" consists of a single cylinder, air cooled air compressor, driven through a twin V-rope drive by a ¾ hp. General Electric motor.

Included in the base of the unit is an oil tank holding ten gallons of oil in the operating range and of ample storage space for oil that returns when the system is shut down.

An oil relief valve of the weighted type assures constant oil pressure to the Oil Pilot Valve. An oil level gauge, visible at all times, provides full instructions for filling the tank with oil and the periodical drawing off of water and sludge. The oil pump is of the piston type driven by a cam on the crank shaft of the air compressor. All assemblies are removable as units through the top of the base and can be replaced by new units with the minimum amount of pipe work. Where arrangement of equipment is such that it is desirable to have separate sources of compressed air and oil supply, the air compressor and oil pump can be furnished as individual units.



Standard Type B Air Compressor and Oil Pump Unit



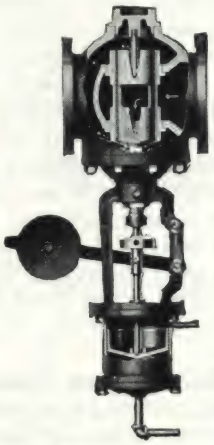
Oil Pump Unit

Special Main Steam Control Valve

The main steam control valve is a piston or sleeve type valve fitted for minimum clearance at the actual operating temperature of the valve.

The sleeve is fitted with V ports specially designed to pass a predetermined quantity of steam. This valve is non-wire drawing at high pressure and is also seatless.

It is provided with a suitable piston for hydraulic operation together with necessary counterweight.



Left

Main Steam Control Valve

If control system is thrown out of operation, valve automatically opens wide and allows steam to circulate through heating system

Special Metering Orifices

These orifices are manufactured to an accuracy which will deliver steam within one per cent of the calculated amount.

Metering orifices for radiators are made of monel metal to resist erosion and corrosion resulting from steam flow and mounted integrally in the union connection of the supply valve to the radiator.

For installation in branch mains and riser laterals they are made of $\frac{3}{16}$ in. brass plate and provided with two copper asbestos gaskets and suitable lugs for mounting in pipe lines between union flanges or with companion flanges.

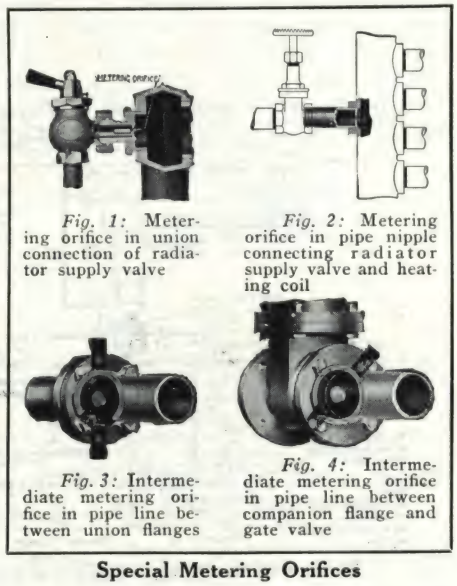


Fig. 1: Metering orifice in union connection of radiator supply valve

Fig. 2: Metering orifice in pipe nipple connecting radiator supply valve and heating coil

Fig. 3: Intermediate metering orifice in pipe line between union flanges

Fig. 4: Intermediate metering orifice in pipe line between companion flange and gate valve

Special Metering Orifices

Continued on next page

IMPROVED WEBSTER VACUUM SYSTEM

Basically, this is the well-known Webster Vacuum System with the addition of a specially selected standard metering orifice in each radiator valve.

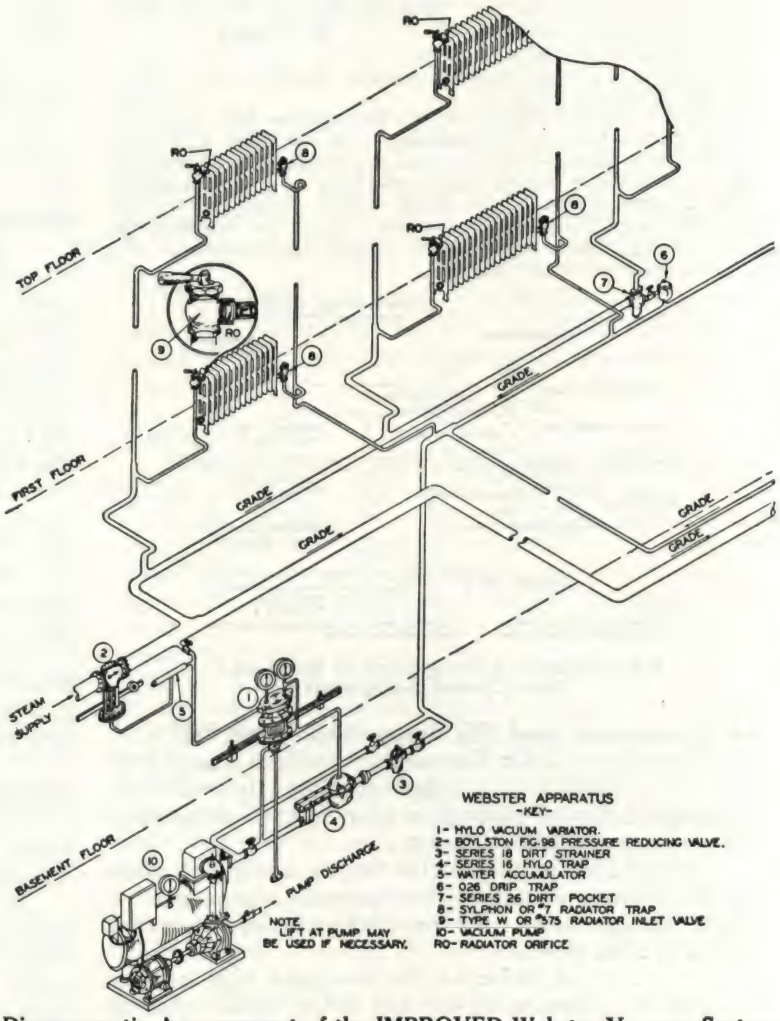
The IMPROVED System assures correct distribution of steam—all radiators get steam at the same time and substantially in proportion to the need for steam. Eliminates the last "cold spot," operates equally well with fluctuating boiler pressures, high and low vacuum. Increases flexibility; permits quicker heating up; paves the way for economy producing operation through the application of a wide choice of centralized control methods. Operating requirements of the newer fuels such as oil and gas are fully met. Better-than-ever heating service with older fuels is obtained.

Operation

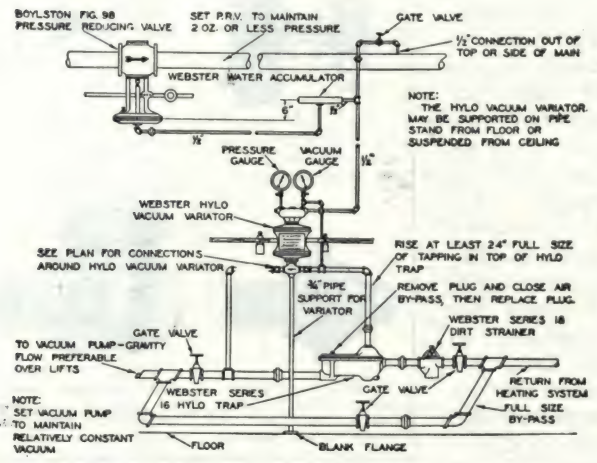
Pressure on supply mains is controlled by a Fig. 98 Boylston Reducing Valve operated either manually or by a key-room thermostat. Steam is admitted to radiators through Webster Supply Valves, each equipped with a specially selected metering orifice. Condensation and air are discharged from radiators into return mains through Webster Return Traps, which prevent discharge of steam, thus avoiding waste. The return mains are connected to the suction end of a vacuum pump, which draws out the condensate and air. The air is discharged to atmosphere and the water returned to the boiler. A Webster Boiler Protector may be used to prevent breakage of the boilers should the water level become inadequate.

Webster HYLO Vacuum Variator

A manual control for use with IMPROVED Vacuum Systems. This device, used in conjunction with IMPROVED Webster Vacuum Systems, provides a means for regulating manually, according to outside temperature and weather conditions, the amount of steam supplied to the entire system. Two regulating weights are moved by hand to various positions on a graduated beam, each position representing a pressure difference for a certain condition of outside temperature and weather. Economy of operation, surpassed only by the MODERATOR System, is obtainable with an IMPROVED System using the HYLO Vacuum Variator.



Diagrammatic Arrangement of the IMPROVED Webster Vacuum System
Using the Webster HYLO Variator and Radiator Metering Orifices



Method of Installing HYLO Vacuum Variator

Metering Orifices

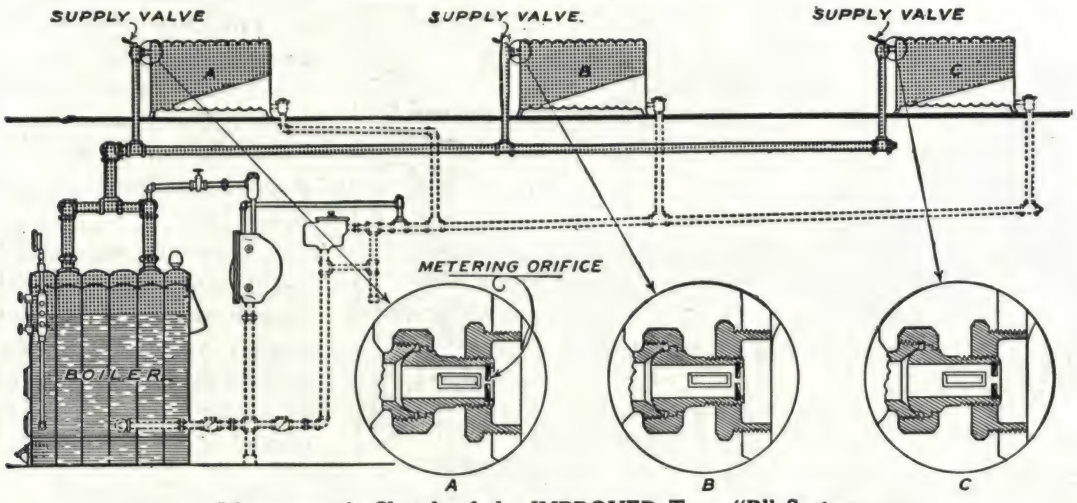
Standard metering orifices are made in a wide range of sizes for all types of valves. The size to be installed at each radiator is selected by the Webster engineer, who is equipped with complete data to make proper selection. In the older type of system the nearest radiator got warm first and the furthest radiator did not begin to get warm until the others were filled. In the IMPROVED Webster Vacuum System, the use of metering orifices insures that *all radiators get steam at the same time and substantially in proportion to the need for steam.*

The metering orifice in the radiator nearest the source of steam supply is quite small. When steam reaches this radiator the amount that can enter is restricted. The result is that steam soon flows on through the piping to the next radiator where the orifice is slightly larger and, therefore, the restriction proportionately less. And so it goes, radiator by radiator, to the furthest point. The "pressure drop" to each radiator has been *equalized* by the installation of the *properly sized metering orifice* and all the radiators in the system receive the required amount of steam. This principle is clearly shown in the diagrammatic sketch of the IMPROVED Type "R" System at the top of page 8.

Continued on next page

IMPROVED WEBSTER TYPE "R" SYSTEM

This Webster System is specially fitted for use with oil and gas burners, light-weight radiation and installations where burners are controlled by a thermostat located in a "key" room. In addition improved heating service is obtained with coal and older fuels and with older types of radiation. As in the IMPROVED Vacuum System a specially selected standard metering orifice is placed in each radiator valve to provide equalized and balanced steam distribution. The IMPROVED Webster Type "R" System is an open return or gravity system adaptable to any type of building in which the boiler may be placed with its waterline below the level of water of condensation flowing back to it.



Diagrammatic Sketch of the IMPROVED Type "R" System

Showing how "pressure drop" is *equalized* or *balanced* by installation of standard metering orifices of proper size

Operation

Initial steam pressure may be controlled by the sensitive Webster Damper Regulator. Steam is admitted to the radiators through Webster Supply Valves which are equipped with specially selected metering orifices.

Condensate and air are discharged from radiators into the return mains by Webster Return Traps and then carried by gravity to a Webster Vent Trap, which automatically vents air from the system. Return of water to boiler is assured by the Webster Boiler Return Trap.

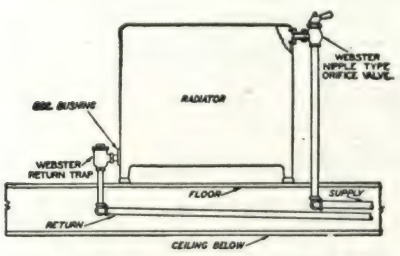
Advantage of the Improved Type "R" System

With the IMPROVED Type "R" System it is no longer impossible to quickly build up a reasonable pressure on a boiler. This difficulty with old type systems was due to the fact that the "pressure chamber" included the boiler and all of the piping and radiators—a really enormous space to be filled with steam and kept filled before a pressure difference and positive flow of steam could be created. The use of metering orifices closes off the larger portion of the radiator space and thus materially reduces the size of this "pressure chamber." The result is a much shorter time for the heating-up period.

In the average vapor system, when the fire in the boiler is banked, steam reaches only the first few radiators. With the IMPROVED System, the available steam is distributed proportionately to each radiator. Another advantage of this proportionate distribution is that in mild weather "hot water" temperatures will be maintained in the radiators, i.e., the radiator temperatures will vary with the demand for heat.

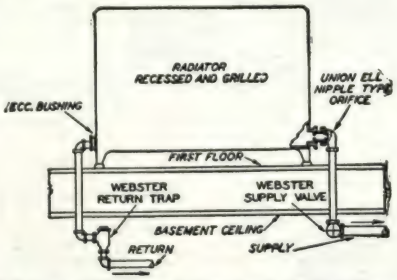
The damper regulator can be set to maintain the desired pressure and the fire will build up this pressure without being unduly forced. This is because the metering orifices *are checking* the flow of steam into the radiators, making it easy to build up a pressure in the boiler and piping which serves to deliver some steam to *every* radiator.

Where the damper is connected to an automatic temperature control system, the advantages of even distribution afforded by the IMPROVED Type "R" System are also obtained. In this case the damper regulator is actually a safety device preventing the boiler pressure from rising above the maximum for which the regulator is set.



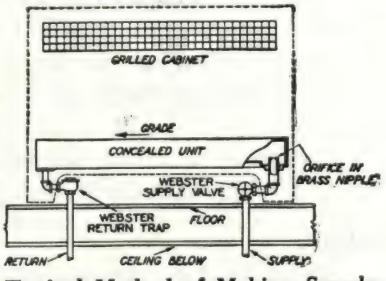
Typical Method of Making Supply and Return Connections to Radiators

Using Webster Supply Valves with standard nipple-type metering orifices and Webster Return Traps



Another Typical Method of Making Supply and Return Connections to Radiators

Using Webster Supply Valve, Webster Return Trap and standard metering orifice in nipple of brass union elbow



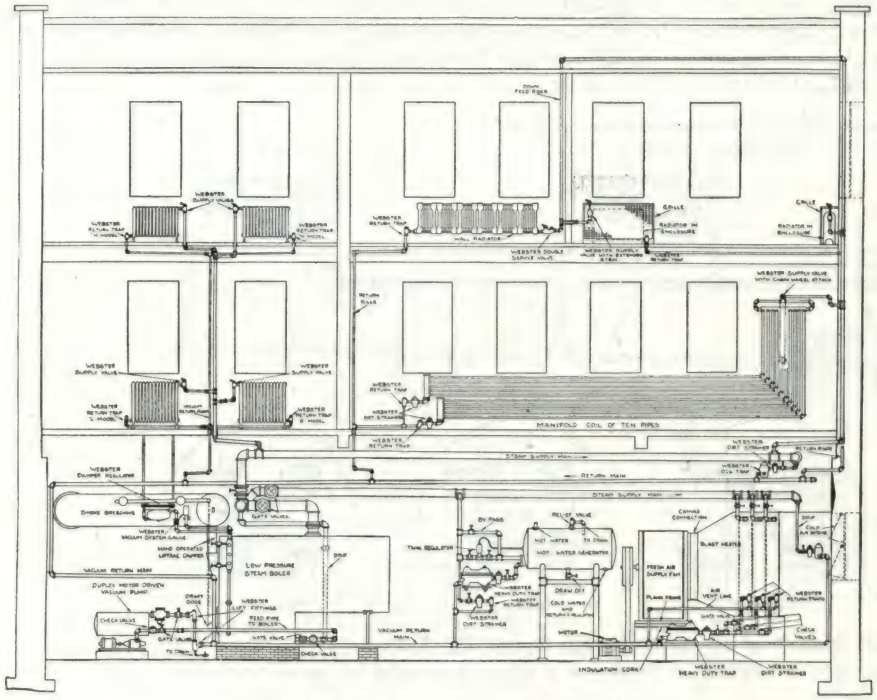
Typical Method of Making Supply and Return Connections to Light-weight Radiation

Using Webster Supply Valve, Webster Return Trap and standard metering orifice in brass pipe nipple

Continued on next page

WEBSTER VACUUM SYSTEM

A two-pipe system, the return mains of which are joined together and connected to the suction end of a vacuum pump which draws out the condensate and air. For large buildings of every type, for groups of buildings and for many varied conditions.



Typical Webster Vacuum System

Diagrammatic layout using a low pressure boiler and motor-driven vacuum pumps, with up-feed riser shown at left and down-feed riser at the right, illustrating two of many possible arrangements. The flexibility of Webster Vacuum System permits many variations in piping arrangements, radiation and other equipment

Operation

A partial vacuum is created and maintained by a steam or power driven vacuum pump. Steam is admitted to radiators or other heating units through Webster Valves. Condensation and air are discharged from each heating unit through Webster Return Traps which close to prevent the passage of steam, thus preventing waste.

Water of condensation and air are removed from the system through the return piping by the vacuum pump. The air is discharged to the atmosphere and the water is returned to the boiler by means suited to particular conditions.

Bulletin

Write for *Bulletin No. B-500* containing detailed description of Webster Vacuum Systems. It will be sent promptly on request.

WEBSTER TYPE "R" SYSTEM

This system is adaptable to almost every type of building, except the very largest—practically the only limitation being the necessity for a basement or other depression so that the boiler may be placed with its water line below the level of water of condensation flowing back to it. For use with cast iron or steel boilers burning any type of fuel. The simplicity of the piping arrangements and the safety provided by the Webster Boiler Return Trap and Vent Trap combination, together with the elimination of power consuming devices, all combine to make the Webster Type "R" System particularly suitable for many installations.

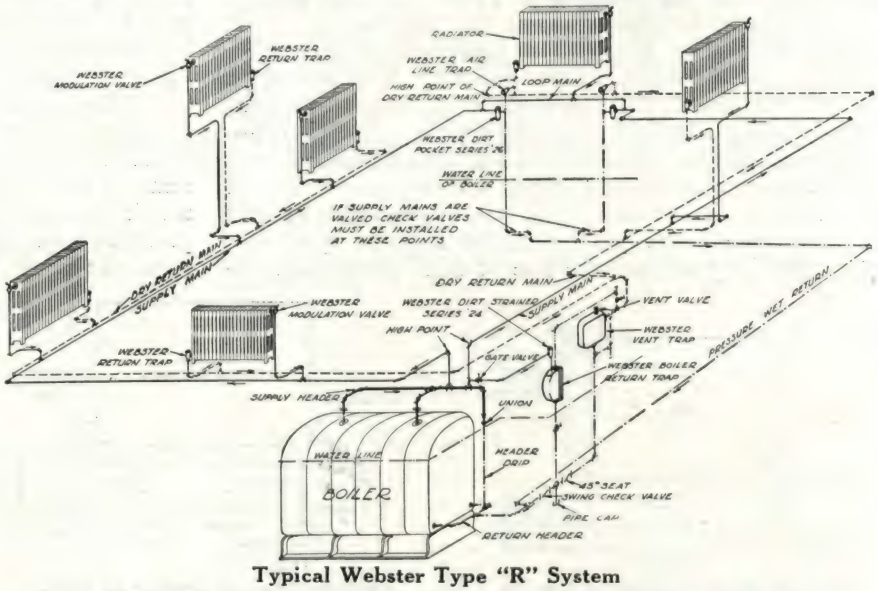
Operation

Initial steam pressure may be controlled by a sensitive Webster Damper Regulator. Steam is admitted to radiators through Webster Supply Valves. Condensation and air are discharged from radiators by Webster Return Traps, and carried to a Webster Vent Trap, which automatically vents air from the system through a vent valve, permitting operation under partial vacuum for long periods under certain conditions.

Return of water to boiler is assured by Webster Boiler Return Trap.

Bulletin

For complete information concerning Webster Type "R" Systems, write for *Bulletin No. B-600,* which will be sent promptly on request.



Typical Webster Type "R" System

Showing the supply and return mains graded in opposite directions, the supply away from the boiler and the return line toward the boiler. The ends of the mains are dripped through a Webster Dirt Pocket and the air that collects at the ends of the mains is relieved through a Webster Thermostatic Trap. The returns from these drips are carried back to the boiler through a pressure wet return line. Both the vent trap and boiler return trap are placed adjacent to the boiler

Continued on next page

WEBSTER SYSTEM EQUIPMENT

Used as needed in Webster Systems of Steam Heating and includes the following:

Webster Boiler Return Trap and Vent Trap Combination

Quick circulation, despite variations in boiler pressures, is assured in Webster Type "R" Systems through the combination of the Webster Boiler Return Trap and Vent Trap. Air escapes from the system through the Webster Vent Valve. Water returns direct to the boiler by gravity at low pressures. An increase of pressure causes the Webster Boiler Return Trap to fill and operate, equalizing the pressure and making positive the prompt return of water to the boiler. Units are made to provide six sizes of the Webster Boiler Return Trap and Vent Trap combination, having the range of capacities given in Table I.

Webster Boiler Return Trap—Positive acting reciprocating device for returning water to boilers in Webster Type "R" Systems.

Construction of sizes 0023, 023 and 123 is shown in Fig. 1. The float is of heavy gauge metal with no exposed seams. The entire mechanism is held in place by two studs and is removable as a unit. It turns on a single monel metal shaft. Steam valve opens quickly when high level is reached. No wire drawing. Valves are all-metal and self-aligning. Operation is silenced by stainless steel bumper springs and large area baffle.

Webster Vent Trap with Vent Valve—Used in conjunction with the Webster Boiler Return Trap, to provide a dependable method of removing air from heating systems and automatically preventing its return, at the same time making overflow of condensation impossible.

Fig. 1. Webster Boiler Return Trap

TABLE I. BOILER RETURN TRAP CAPACITIES

Size No.	*Range in sq. ft.
0023	Up to 1500
023	1500 to 2500
123	2500 to 4000
223	4000 to 8000
323	8000 to 16,000
**623	16,000 to 32,000

*Equivalent to direct cast iron radiation.

**Uses 2–323 boiler return traps with duplex vent trap.

Fig. 2. Webster Vent Trap

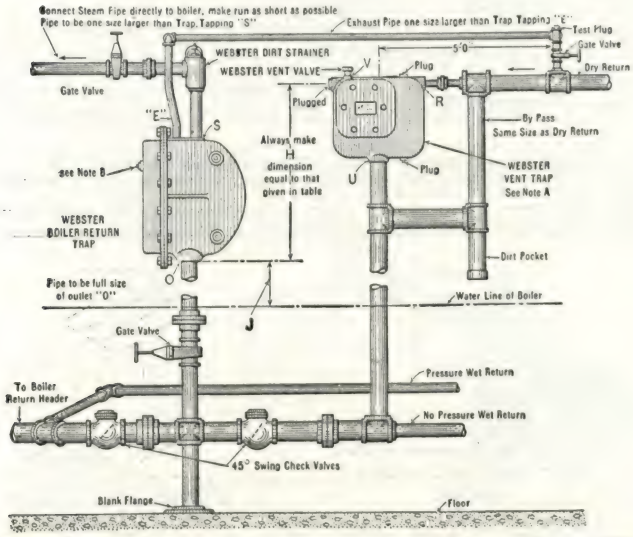


Fig. 3. Conventional Arrangement of Webster Type "R" System Equipment

TABLE II. DIMENSIONS IN FIG. 3*

Size boiler return trap	Rating sq. ft. direct radiation	Dimensions		Tappings			Number of ½-in. vent valves	Size vent trap	Tappings		
		H	J	O	S	E			R	U	V
0023	1500	14¼	5	1½	¾	½	1	0023	1	1	½
023	2500	16¾	6	2	1¼	½	1	023	1	2	½
123	4000	18¾	6	2½	1¼	½	1	123	1¼	2½	1¼
223	8000	23	6	3 flg.	1½	¾	2	223	1¼	3 flg.	1¼
323	16000	26¾	6	3½ flg.	1½	¾	3	323	1¼	3½ flg.	1¼

*All dimensions in inches.

Webster Boiler Protector

Provided to prevent breakage in low pressure cast iron boilers when the water level becomes inadequate. Automatically supplies raw water to boiler when water level reaches set position. It is primarily a protective device, but may be used as a boiler feeder.

Body is made of cast iron with three principal parts bolted together. Interior parts of copper, brass or monel metal to withstand corrosion. Seamless float of standard type actuating cone valve on sharp-edged seat. Water valve with standard Jenkins composition disc actuated by difference in water pressure between exterior and interior of Sylphon Bellows to which it is attached.

Adapted to almost all types of low pressure heating boilers where maximum pressure will not exceed 15 lb. per sq. in. Maximum cold water main pressure is 150 lb. per sq. in.; minimum is 20 lb. per sq. in.

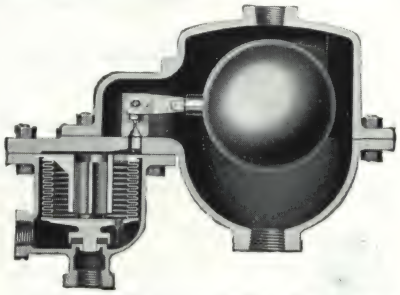


Fig. 4. Webster Boiler Projector

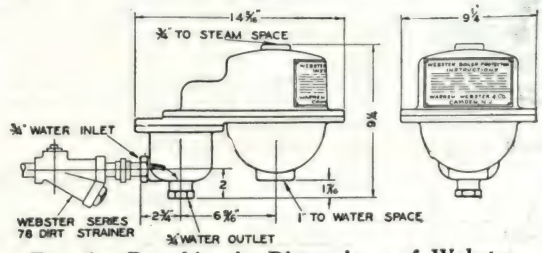


Fig. 5. Roughing-in Dimensions of Webster Boiler Protector

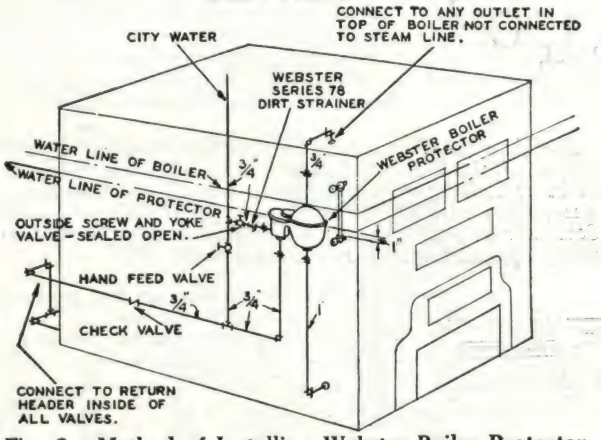


Fig. 6. Method of Installing Webster Boiler Protector

Webster Damper Regulator

Used for controlling dampers on boilers. Used with Webster Vacuum and Type "R" Systems of Steam Heating where very low steam pressure is normally maintained to insure circulation. Controls and maintains pressure of only a few ounces.

The well, diaphragm casing and plates are made of cast iron, the lever of steel, and the diaphragm of rubber. An asbestos disc between the lower casing and the well prevents the transfer of heat to the diaphragm chamber from the steam in the upper part of the well.

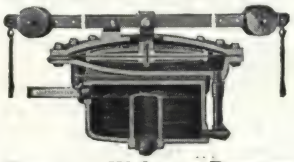


Fig. 7. Webster Damper Regulator

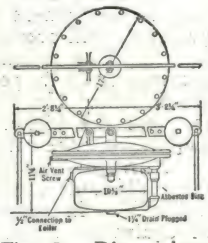


Fig. 8. Dimensions Damper Regulator

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Webster Traps

Six different types of low pressure traps are provided for use in Webster Systems to discharge condensation and air from radiators, drips, unit heaters, blast radiation, etc., giving a choice to meet every operating condition.

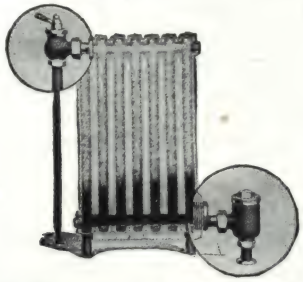


Fig. 9. Application of Webster Supply Valve and Webster Trap to Typical Radiator

Webster Sylphon Trap—Original and highly perfected type of low pressure thermostatic bellows trap.

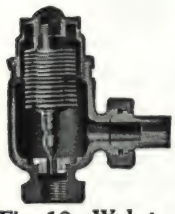


Fig. 10. Webster Sylphon Trap

Effectively discharges all condensation and entrained air from radiators or coils without permitting passage of steam.

Operation is by means of a liquid contained in the rugged sylphon bellows.

Factory adjusted, and made in sizes from ½ to 1 in. which will handle up to 750 lb. of condensation per hour at 1 lb. pressure difference.

Maximum pressure 10 lb. per sq. in.

For normal operating pressures not exceeding 5 lb. per sq. in.

See Table V for Ratings.

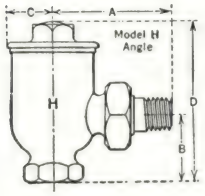


TABLE III. WEBSTER SYLPHON TRAP DIMENSIONS*

Size	A	B	C	D
½–512	3 1/16	1 5/8	1 1/8	4
**¾–513	3 1/8	1 3/4	1 1/8	4 1/16
½–522	3 1/4	1 7/8	1 3/16	5 1/4
**¾–523	3 1/4	2	1 3/16	5 3/8
¾–533	4	2 3/8	1 3/4	5 3/8
1 –534	4	2 5/8	1 3/4	5 5/8

*All dimensions in inches.
**Sizes 513 and 523 can be supplied with ½-in. inlet nipples if specified on order.

Specification—The return end of every radiator shall be provided with a Webster Sylphon Trap. The size of the trap shall be as called for on the plans. Installation shall be made in accordance with the standard practice of WARREN WEBSTER & COMPANY *who will provide the contractor with service details showing approved methods of connection.*

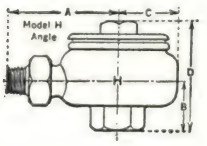


TABLE IV. WEBSTER NO. 7 TRAP DIMENSIONS*

Size	A	B	C	D
½–712	3 1/4	1 7/8	1 1/8	3
½–722	3 1/2	1 7/8	1 7/8	3 1/16
¾–713	3 3/4	1 7/8	1 5/8	3 1/8
¾–723	3 3/4	1 7/8	1 7/8	3 1/4
¾–733	4 1/2	1 7/8	2 1/4	4 1/16

*All dimensions are in inches.

Webster No. 7 Return Trap—A return trap of the highest quality and efficiency. Has as operating member a multiple flat diaphragm made of phosphor bronze. Made in sizes ½ and ¾ in. with same ratings as sylphon trap. See Table V.

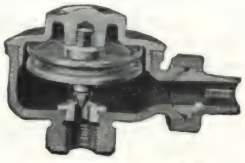


Fig. 11. Webster No. 7 Trap

Webster No. 7-M Trap—This trap is used where normal operating pressures will prevail up to 15 lb. per sq. in. The maximum occasional pressure is 25 lb. per sq. in. The No. 7-M Trap is similar to the Standard No. 7 type, but has been still further reinforced to meet the higher pressures by heavy gauge monel metal diaphragm, cone valve piece and seat insert.

Ratings—Ratings of the above Webster Return Traps for three different conditions of pressure difference are given in Table V. In each case the rating is given in square feet of equivalent direct cast iron radiation. In the selection and sizing of traps individual consideration and careful judgment should be used, and the table should never be followed blindly.

TABLE V. RATINGS OF WEBSTER LOW PRESSURE RETURN TRAPS*

Size and symbol of trap, in.	Type "R" Systems for residences and other small buildings	Type "R" Systems for schools, apartments, factories and public buildings, etc.	Vacuum Systems for all types of buildings
	Sylphon and No. 7		
	Press. diff. 4 oz.	Press. diff. 8 oz.	Press. diff. 1 lb.
½–512 & 712, ¾–513 & 713	75	105	150
½–522 & 722, ¾–523 & 723	125	175	250
¾–533 & 733, 1 –534	375	530	750
	No. 7-M		
Size trap	5 lb.	10 lb.	15 lb.
712M–713M	335	475	580
722M–723M	555	792	967
733M	1675	2376	2900

*In square feet of cast iron radiation.
1 sq. ft. of radiator is assumed as condensing ¼ lb. of steam per hour for this table.

Specification—The return end of every radiator shall be provided with a Webster No. 7 Return Trap. The size of the trap shall be as called for on the plans. Installation shall be made in accordance with the standard practice of WARREN WEBSTER & COMPANY *who will provide the contractor with service details showing approved methods of connection.*

Webster 026-T Drip Trap—A heavy duty trap, capable of handling large volumes of condensation and air, and at the same time compact and light in weight. Suited for drips of mains, blast radiation, unit heaters and similar applications. The specifications calling for a heavy duty float-type trap is fully met, while the advantages of the thermostatic element and ease of installation are both retained.

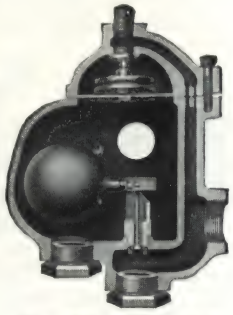
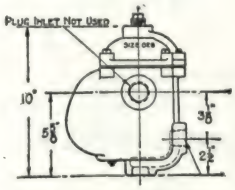


Fig. 12. Webster Drip Trap

Outlet opening 1¼ in. on end permits the discharge of water, or water and air. An opening in the cover of the trap is provided so that air may be discharged separately when desired. In the bottom of the trap are two plugged openings which serve for cleaning and flushing.



Two inlet openings of 1¼ in. are provided. Weight complete only 18 lb., so that it may be handled easily and mounted in pipe line without other support. Maximum working pressure, 15 lb. per sq. in.

TABLE VI. RATINGS OF WEBSTER 026 DRIP TRAP

Press. diff., lb. per sq. in.	¼	½	1	2	5	7½	10	15
Lb. per hr., condensation	500	650	900	1170	1460	1630	1800	2200

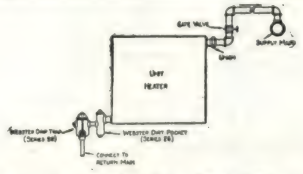


Fig. 13. Dripping Unit Heater Through a Webster 026-T Drip Trap and a Dirt Pocket

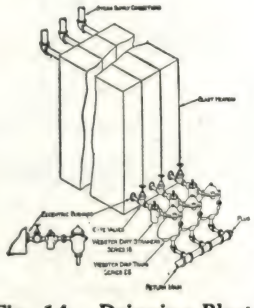


Fig. 14. Dripping Blast Heaters Through Webster 026-T Drip Traps

Specification—The ends of mains, drip points, return ends of blast coils and unit heaters shall be provided with Webster 026-T Heavy Duty Drip Traps. The sizes of these traps shall be as called for on the plans. They shall be installed according to the standard practice of WARREN WEBSTER & COMPANY *who will provide contractor with service details showing approved methods of connection.*

Webster 026-O Drip Trap—Similar to the 026-T Drip Trap but without thermostatic element.

Preferred for all applications where concentration of air does not occur, such as on ends of mains and risers, flash tanks and dripping gravity heating systems into vacuum return lines.

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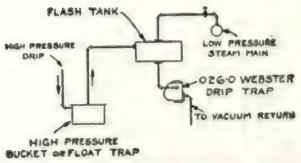


Fig. 15. Dripping a Flash Tank Through a Webster 026-O Drip Trap

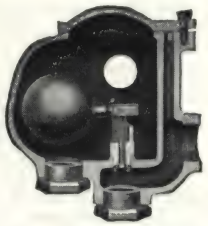


Fig. 16. Webster 026-O Drip Trap

Specification—At drip points where concentration of air does not occur, Webster 026-O Heavy Duty Drip Traps shall be provided. They shall be installed according to the standard practice of WARREN WEBSTER & COMPANY *who will provide contractor with service details showing approved methods of connection.*

Webster Heavy Duty Trap, Series 19-T—Used to remove condensation where it accumulates in large quantities, as in large steam mains, hot water generators and fan heater coils. Operates on the float principle for discharge of condensation and has a large water outlet to withdraw it quickly from the unit to be drained. Air is discharged through thermostatic by-pass. Sizes, ¾ to 2 in.

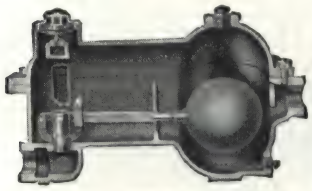


Fig. 17. Webster Heavy Duty Trap, Series 19-T

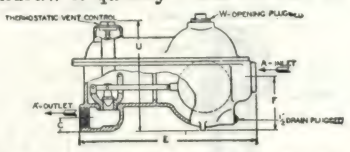


TABLE VII. WEBSTER HEAVY DUTY TRAP*

Symbol	A	C	E	F	U	W
0019-T	¾	1	12⅝	1¼	9½	½
019-T	1	1	15	4⅛	9¾	¾
119-T	1¼	1½	18¾	5¾	11½	1
219-T	2	1⅝	19⅞	6⅛	13¼	1½

*All dimensions in inches.

TABLE VIII. RATINGS OF WEBSTER HEAVY DUTY TRAPS, SERIES 19-T

Size of trap	Pressure difference through the valve						
	½ lb.	1 lb.	2 lb.	3 lb.	4 lb.	5 lb.	10 lb.	15 lb.
	Pounds of water per hour							
0019-T	700	1000	1400	1700	2000	2200	3150	3900
019-T	1250	1800	2500	3050	3600	4000	5700	7000
119-T	2100	3000	4200	5100	6000	6700	9500	11700
219-T	5600	8000	11200	13600	16000	17900	25300	31100

No allowance made for pressure drop in the connecting piping between radiation and trap or from trap through run-out to return.

Webster Heavy Duty Trap, Series 16—Similar to Series 19-T, but has no thermostatic means for discharge of air. Used to discharge condensation from gravity heating systems into vacuum return lines.

Specification—The ends of mains and drip points shall be provided with Webster Heavy Duty Drip Traps as called for on the plans. They shall be installed according to the standard practice of WARREN WEBSTER & COMPANY *who will provide contractor with service details showing approved methods of connection.*

Webster Sylphon Packless Quick-opening Supply Valve

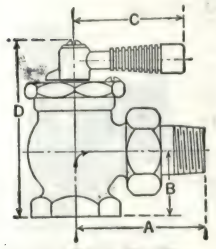
Opens with less than a turn of lever or wheel handle. Positively packless, having flexible laminated sylphon bellows completely enclosing stem. Body of steam brass, composition disc, bakelite handle.

Made in ½ to 2-in. sizes.

Made in angle, right-hand, left-hand and straightaway models with lever, wheel, lockshield and extension stem handles.

See Table XI for ratings.

Fig. 18. Webster Sylphon Packless Quick-opening Valve



Lever Handle Type

TABLE IX. WEBSTER SYLPHON PACKLESS Q. O. VALVE DIMENSIONS*

Size	All types		Lever handle type		Wheel handle type
	A	B	C	D	D
½	2⅝	1 1/32	2 3/16	3⅝	4 11/16
¾	2¾	1 11/32	2 3/16	3⅞	4⅞
1	3⅛	1 23/32	2 7/16	4¾	6
1¼	3⅝	1⅞	2 7/16	4⅞	6 3/16
1½	3⅞	2 5/32	2⅝	5⅜	6⅞
2	4⅜	2 7/16	2⅝	5⅝	7⅛

*All dimensions in inches.

Webster Type "W" Modulation Valve

This is a valve of the highest quality both in design and construction. So designed that admission of steam is varied in progressive volume with the lift of the valve piece. Is quick-opening—opening and closing in less than a single turn of the handle.

With the exception of the disc and handle, all parts are of high grade steam brass. Outside is nickeled with polished connections. Handles are special, non-heat conducting composition.

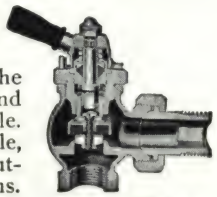
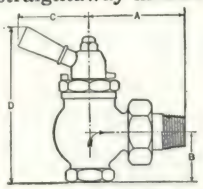


Fig. 19. Webster Supply Valve Type "W"

Made in angle, right-hand, left-hand and straightaway models with either lever, wheel, lockshield and extension steam handle. Sizes ½ to 1¼ in.



Lever Handle Type

TABLE X. WEBSTER TYPE "W" VALVE DIMENSIONS*

Size	A	B	C	D (lever)	D (wheel)
½	2¾	1¼	2⅛	4⅛	4½
¾	2¾	1½	2⅛	4⅝	4⅞
1	3⅛	1¾	2¼	5½	5⅞
1¼	3½	2	2¼	6	6⅜

*All dimensions in inches.

Ratings—Ratings of Webster Valves for three different conditions of pressure difference are given in Table XI. In the selection and sizing of valves individual consideration and careful judgment should be used, and the table should never be followed blindly.

TABLE XI. RATINGS OF WEBSTER SUPPLY VALVES*

Size of valve, in.	Type "R" Systems for residences and other small buildings	Type "R" Systems for schools, apartments, factories, public buildings, etc.	Vacuum systems all types of buildings
	Press. diff. 4 oz.	Press. diff. 8 oz.	Press. diff. 1 lb.
½	35	50	75
¾	80	110	160
1	130	185	265
1¼	225	315	450
1½	365	515	725
2	365	515	725

*In square feet of cast iron radiation.

Specification—Each radiator shall be provided with a Webster Type "W" Modulation Supply Valve [Webster Sylphon Packless Quick-opening Valve] of such size as called for on the plans. Installation shall be made according to the standard practice of WARREN WEBSTER & COMPANY *who will provide contractor with service details showing approved methods of connection.*

Webster "Three-point" Valve

Designed especially for MODERATOR and IMPROVED Webster Systems where orifices are used to obtain correct distribution. This valve includes a sleeve orifice fitting into the seat opening and easily replaceable if radiation or occupancy changes require a new orifice size. Valve may be set at *shut, normal* and *excess* position, the latter giving 140% of normal steam requirements. This feature is especially desirable for hospitals, hotels, etc., where quick heating-up or higher temperature are desired in different rooms.

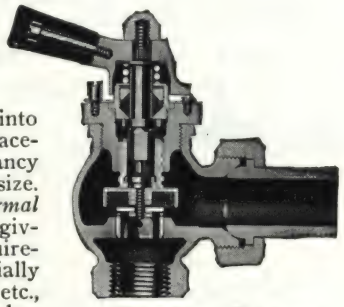
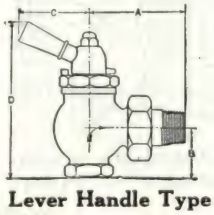


Fig. 20. Webster "Three-point" Valve

Where the *excess* position is not desired, the dial on valve cover may be reversed and the stop pin changed. When reversed the dial shows only *open* and *shut* positions. Installation of "Three-point" Valve with special sleeve provides for future installation of MODERATOR or IMPROVED Systems by simply removing valve interior and inserting correctly sized orifice.

With the exception of the disc and handle, all parts are of high grade steam brass. Outside is nickeled with polished connections. Handles are special, non-heat conducting composition.

Made in angle, right-hand, left-hand and straightaway models with either lever, wheel, lockshield and extension steam handles. Sizes ¾ to 1¼ in.



Lever Handle Type

TABLE XII. WEBSTER "THREE-POINT" VALVE DIMENSIONS*

Size	A	B	C	D (lever)	D (wheel)
¾	2¾	1½	2⅛	4⅝	4⅞
1	3⅛	1¾	2¼	5½	5⅞
1¼	3½	2	2¼	6	6⅜

*All dimensions in inches.

Continued on next page

Webster Double Service Valves

The purpose of this valve is to simplify piping connections in down-feed risers as used in one-story buildings, where they effect important savings in pipe-fitting labor. It performs double service —combines a thermostatic trap with a quick-opening valve. Acts as trap for draining down-feed riser and as a radiator supply valve.

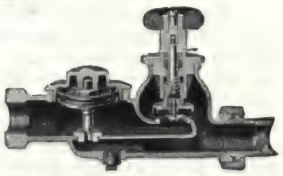
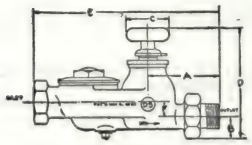


Fig. 21. Webster Double Service Valve

TABLE XIII. WEBSTER DOUBLE SERVICE VALVE DIMENSIONS*



Size		A	B	C	D	E	F
Inlet	Outlet						
¾	¾	3 3/16	1	2 3/8	6 1/4	9 1/16	1
1	1	3 3/4	1 1/4	2 3/8	6 3/8	9 1/2	1
1 1/4	1 1/4	4 1/8	1 3/8	2 3/8	7 1/4	10 1/2	7/8
1 1/2	1 1/2	4 1/2	1 5/8	2 3/8	7 1/2	10 5/8	1

*All dimensions in inches.

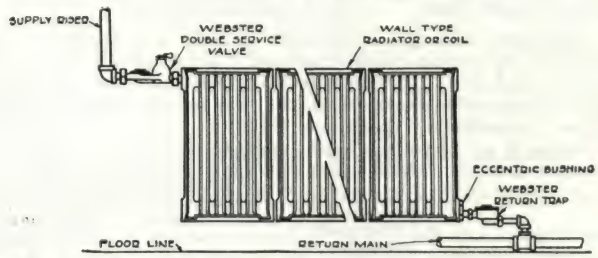


Fig. 22. Application of Webster Double Service Valve

Specification—Webster Double Service Valves shall be provided for such radiators as called for on the plans. Installation shall be made according to the standard practice of Warren Webster & Company *who will provide contractor with service details showing approved methods of connection.*

Webster Dirt Strainers

Placed in return lines of steam heating systems to catch dirt, rust, scale and other particles, preventing them from impairing the tightness of traps. More dependable than pockets made of pipe and fittings, cost less to install, and are more readily cleaned.

Sizes from ½ to 2 in.

Fig. 23. Webster Dirt Strainer

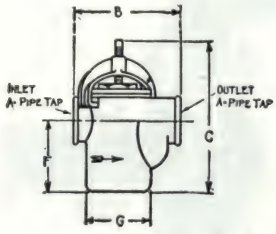


TABLE XIV. WEBSTER DIRT STRAINER DIMENSIONS*

Symbol	Size, A	Class B-Straightway B	C	F	G
018	¾	4¼	6	2¾	2½
118	1¼	5½	7⅜	3½	3¼
218	2	7¼	9¼	4¾	4¼

Note: ½, 1 and 1½ in. sizes are secured by bushing the next larger strainer.

*All dimensions are in inches.

Specification—Webster Dirt Strainers shall be provided at points indicated on the plans and in the sizes specified. Installation shall be made according to the standard practice of Warren Webster & Company *who will provide contractor with service details showing approved methods of connection.*

Webster Suction Strainers

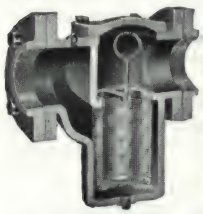
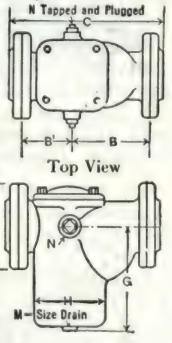


Fig. 24. Webster Suction Strainers

Installed ahead of vacuum pumps to keep dirt and scale, brought down with condensation from vacuum system, from damaging pump with its resultant troubles.



Made of heavy cast iron with flanged connections and generous dimensions throughout to provide adequate capacity. Cleanout cover is bolted on with composition gasket joint. Baskets are easily removable for cleaning.

TABLE XV. WEBSTER SUCTION STRAINER DIMENSIONS*

Size, A	B	B¹	C	E	G	H	J	K	M	N
2	5 5/8	4 3/8	12	6	6 7/8	5 1/4	4 3/4	4–5/8x2	1/2	3/4
3	6 5/8	4 7/8	13 3/4	7 1/2	8 7/8	5 3/4	6	4–5/8x2 1/4	1/2	3/4
4	8 5/16	5 13/16	16 3/8	9	10 5/8	7 1/2	7 1/8	8–5/8x2 3/4	1/2	3/4
5	9 5/8	6 3/8	18 5/8	10	12 1/8	8 1/4	8 1/2	8–3/4x2 3/4	1/2	3/4
6	10 15/16	7 1/16	20 7/8	11	13 11/16	9 5/8	9 1/2	8–3/4x2 3/4	1/2	3/4
8	14 1/8	9 7/8	27 1/4	13 1/2	21	14 1/2	11 3/4	8–3/4x3 1/8	3/4	1
10	17 1/4	11 1/4	32 1/4	16	24 7/8	16 3/4	14 1/4	12–7/8x3 1/2	3/4	1
12	21	12 7/8	38	19	29	20	17	12–7/8x3 1/2	3/4	1

*All dimensions in inches and subject to slight variation.

Note: Connection N is provided on one side for line leading to vacuum gauge and on other side for cold water connection.

Fig. 25 Webster Dirt Pocket

Webster Dirt Pocket

Should be used in all cases where "pipe-and-fittings" pockets are ordinarily used, on ends of mains, drips from pipe coils, unit heaters and similar points. Ordinarily they save the cost of cutting four threads and six pipe fittings. Made in four sizes as noted in dimension Table XV.

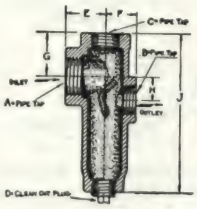


TABLE XVI. WEBSTER DIRT POCKET DIMENSIONS*

Symbol	Size A	Size B	C	D	E	F	G	H	J
526	1¼	1	1	¾	1¾	1 3/16	1 7/8	1	6 7/8
826	2	1¼	1¼	1	2 1/8	1 5/8	2 3/8	1½	7 7/8
1026	2½	1¼	1½	1¼	2 5/8	1 3/4	2 3/4	1 5/8	9¼
1226	3	1¼	1½	1¼	2 3/4	1 3/4	3 1/8	1 7/8	10 5/8

*All dimensions in inches.

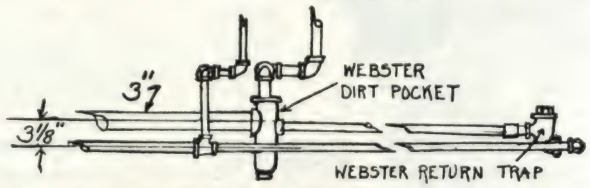


Fig. 26. Application of Webster Dirt Pocket at Drip Points Saves Head Room and Costs Less than Ordinary Pipe and Fittings

Specification—Webster Dirt Pockets shall be provided at points indicated on the plans and in the sizes specified. Installation shall be made according to the standard practice of Warren Webster & Company *who will provide contractor with service details showing approved methods of connection.*

Webster Series "78" Dirt Strainers

The Webster Series "78" Dirt Strainer has been designed to be placed ahead of every Webster Series "78" Trap located at a drip point in the supply piping or attached to apparatus which is likely to contain core sand, pipe scale, or sediment.

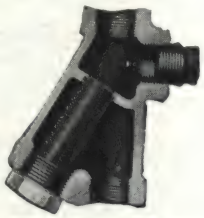


Fig. 27. Webster Series "78" Dirt Strainer

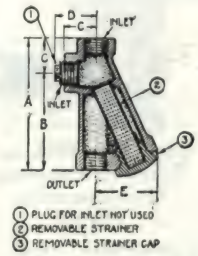


TABLE XVII. WEBSTER SERIES "78" DIRT STRAINER DIMENSIONS*

No. of Strainer	Tappings Inlet	Tappings Outlet	Dimensions A	B	C	D	E
782	½	½	4½	3 3/8	1 1/8	1 5/8	2 1/4
**782B	½	½	4½	3 3/8	1 1/8	1 1/2	2 5/16
783	¾	¾	4 13/16	3½	1 5/16	1 7/8	2 5/8
784	1	1	5 9/16	4 1/8	1 7/16	2 1/8	3 1/16

*All dimensions in inches. Maximum working pressure 100 lb. per sq. in.

**Brass body with nickel finish.

Webster Lift Fittings

The improved design of Webster Lift Fittings makes possible quicker starting of the lift and retains all the advantages of the earlier design.

For use where condensation is to be lifted to a higher level. More efficient than "lifting pockets" made of standard fittings; require less time, and costs less to install.

Sizes ¾ to 6 in.

Fig. 28. Webster Lift Fitting

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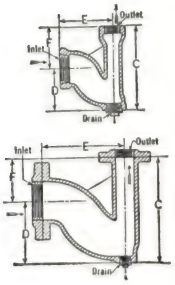


TABLE XVIII. WEBSTER LIFT FITTINGS DIMENSIONS*

Size	Inlet	Outlet	C	D	E	Drain
¾	¾ screwed	⅜ screwed	3½	1¾	2¾	⅜
1	1 screwed	½ screwed	3¾	1⅞	3⅛	½
1¼	1¼ screwed	¾ screwed	4¾	2⅜	3½	¾
1½	1½ screwed	¾ screwed	5½	2¾	4¼	¾
2	2 screwed	1 screwed	7¼	3⅝	4½	1
2½	2½ flanged	1¼ screwed	8¾	4⅜	6½	1
3	3 flanged	1½ screwed	9¼	5¼	7½	1
4	4 flanged	2 screwed	11⅝	6⅝	9¼	1
5	5 flanged	2½ flanged	13⅝	8⅛	10¾	1
6	6 flanged	3 flanged	15⅝	9⅝	12	1

Note: When openings are flanged, the companion flanges and bolts are furnished as part of standard equipment.
*All dimensions in inches.

Specification—Where lifts occur on the vacuum return lines they shall be provided with Webster Lift Fittings of the sizes called for on the plans. Installation shall be made according to the standard practice of Warren Webster & Company *who will provide contractor with service details showing approved methods of connection.*

Webster Expansion Joints

Webster Expansion Joints are constructed with cast iron bodies and brass slip sleeves, and in both single and double slip types.

The bodies of Webster Expansion Joints are provided with anchors integral with the body castings. Service connections are provided for convenience in tapping the steam main for branch piping. Drip outlets are also provided.

Made in three classes: (1) For working pressure of 15 lb. per sq. in.; (2) for 125 lb. per sq. in.; (3) for 150 lb. per sq. in.

Sizes range from 1½ to 20 in., according to class. Write for complete catalogue.

Fig. 29. Webster Expansion Joint

Specification—Webster Expansion Joints shall be provided at all expansion points as called for on the plans. Installation shall be made according to the standard practice of Warren Webster & Company *who will provide contractor with service details showing approved methods of connection.*

Webster Series "78" Traps for "Process Steam" Pressures (10 to 100 Lb. per Sq. In.)

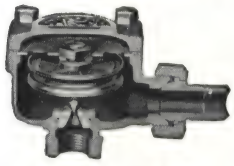


Fig. 30. Webster Series "78" Trap

A thermostatic trap used to discharge air and water of condensation from heating coils and any apparatus using steam at process pressures, *i.e.*, 10 to 100 lb. per sq. in. Built in four sizes: ⅜, ½, ¾ and 1 in. There are two classes: Class 2 for pressures of 10 to 50 lb., and Class 3 for pressures of 50 to 100 lb.

Large Savings Possible—There are many instances where the application of these traps increases production or makes large savings. A clock company recently installed steam heating coils with Webster Series "78" Traps and a complete Webster Type "R" System. The coils are used in cleaning solution and copper plating tanks where direct heating with open gas flames had formerly been used. The yearly saving amounted to $4236.00 or two and one-half times the cost of the new equipment.

Another instance is the case of a tannery which installed steam heating coils in Webster Series "78" Traps in bleachers for heating the water. Live steam had formerly been blown into the bleachers for this purpose. As a result of using the new coils and traps, the water is now evenly heated and no leather is burned. The reduction of spoilage alone makes the heating coils worth while.

Assuring Circulation in Process Steam Installations—For efficient circulation of steam at "process" pressures (10 to 100 lb. per sq. in.) it is essential to assure free, full and continuous discharge of air from steam compartments. Air leaks in and fills the steam compartments when machine is cold; it is also frequently carried over with steam from the source of supply. The resulting reduction in efficiency is indicated in Fig. 31.

Webster Series "78" Traps and Dirt Strainers installed on each individual steam compartment provide for maximum production from process-steam-using equipment through quicker heating-up and higher maintained temperatures of heating surface.

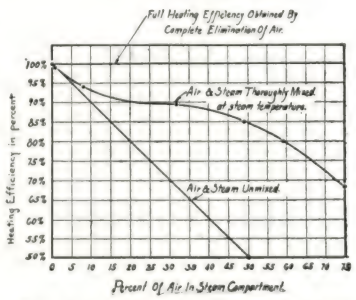


Fig. 31. Effect of Air on Heat Emission from Steam Container Based on Atmospheric Pressure Inside Container

Applications—Webster Series "78" Traps may be used to advantage in hundreds of different applications. Most of these fall into three groups.

(1) To discharge both air and water condensation from single pieces of apparatus within its capacity.

(2) For installation on each unit of a battery—as for example a battery of jacketed kettles, instead of the old-fashioned method of trying to handle the entire battery through one "master" trap.

(3) For venting air only from apparatus formerly provided with a handcock or similar inadequate means, and where a large volume of condensation is handled by a bucket type trap.

Where Used—Webster Series "78" Traps are used in heating systems, in sterilizers, in cooking and laundry apparatus, and, in the process industries on melting tanks, jacketed mixers, digesters, reaction kettles, extraction vats, pressure cookers, presses, vulcanizers, steam heated roller mills, tanks, stills, coil heaters, evaporators and dryers.

Design and Construction—Webster Series "78" Traps have been developed especially for operation at the specified pressures. Unusual construction features include automobile type copper-asbestos gasket, heavy gage monel metal diaphragm, renewable stainless steel valve piece and seat, expanded opening for quiet operation, cast steam brass body and hot forged brass cap bolted on with monel metal tap bolts.

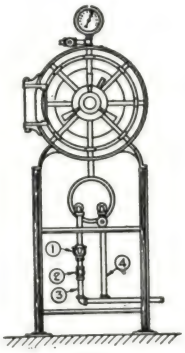


Fig. 32. Series "78" Trap on Dressing Sterilizer
No. 1 indicates Trap

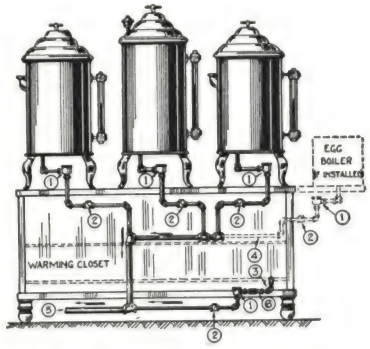


Fig. 33. Series "78" Trap on Cooking Equipment
No. 1 indicates Traps

TABLE XIX. RATINGS OF WEBSTER SERIES "78" TRAPS*

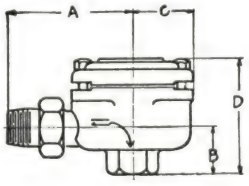
Size of trap	Size of tappings, in.		Class 2, working pressures up to 50 lb. per sq. in.				Class 3, working pressures 50 to 100 lb. per sq. in.				
			Pressure differential, lb. per sq. in.								
			10	20	35	50	20	35	50	65	80	100
	Inlet	Outlet	Pounds of water per hour								
780	⅜	⅜	20	40	80	120	30	50	68	85	100	115
782	½	½	60	95	140	185	75	110	145	180	210	245
783	¾	¾	130	225	330	435	165	245	325	405	470	545
784	1	1	300	465	685	900	375	550	725	900	1040	1210

Note: The pressure differentials given in this table refer to pressures existing at the inlet of the trap and in the return line.

Caution—In using these ratings for selecting the proper size of Webster Series "78" Trap for any piece of apparatus special care must be taken to select the size that will be large enough to handle the *maximum* quantity of condensation likely to occur. This may be either when first starting up the cold apparatus or when performing maximum work for which it is designed.

TABLE XX. WEBSTER SERIES "78" THERMOSTATIC TRAP DIMENSIONS*

No. of trap	Inlet	Outlet	A	B	C	D
780	⅜	⅜	2⅝	1 3/16	1¼	2¾
**782	½	½	3½	1 7/16	1⅝	3¼
783	¾	¾	3¾	1 7/16	1⅞	3⅞
784	1	1	4⅜	2	2⅜	4⅜



*All dimensions are in inches.
**782 trap furnished on special order with ⅜-in. nipple to fit the standard ½-in. union nut. Other dimensions unchanged.

Specification—The return end of (insert name of unit) shall be provided with a Webster Series "78" Trap and Webster Series "78" Dirt Strainer. The size and class of the trap shall be as called for on the plans. The connections shall be made according to Webster Service Details furnished the contractor by Warren Webster & Company.

Special Notice

To protect ourselves in our constant endeavor to make Webster Systems of Steam Heating and Webster System equipment even better, we reserve the right to change specifications and prices without notice.

WARREN WEBSTER & COMPANY
Camden New Jersey

BARBER-COLMAN COMPANY

Manufacturers of Electric Temperature Control Systems and Furnace Regulators

ROCKFORD, ILL.

For our page on Garage Doors and Operators, see Manufacturers' Index

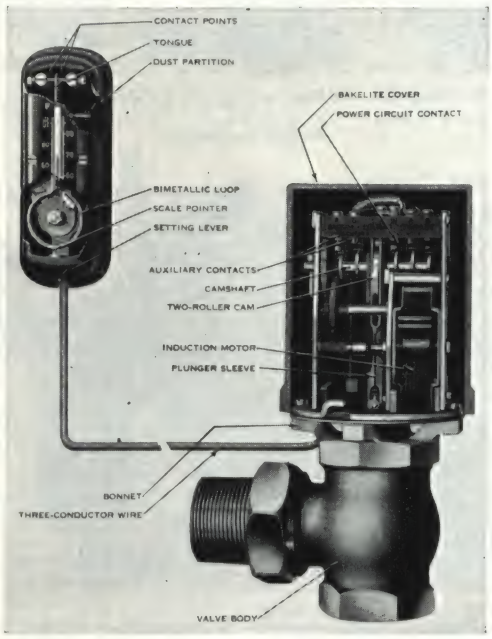
BARBER-COLMAN ELECTRIC SYSTEM OF TEMPERATURE CONTROL

Description

The Barber-Colman Systems of temperature control are fully automatic, electrically operated. They are adaptable to almost any system of heating and ventilating. The system consists of room thermostats which regulate the action of motor-operated valves on each radiator, unit heater, or other heating element. Motor-operated damper controllers, actuated by insertion thermostats, control air in ducts. Power consumption is extremely low because power is only used when valves are cycling.

Operation

The illustration shows a room thermostat and a motor-operated radiator valve with the covers in section. The regular connecting wiring is in place and the valve is in the closed position. As the temperature of the air near the thermostat falls, the bimetallic loop contracts slightly and the tongue moves over to make contact with the right-hand point. This closes the motor circuit and the motor runs, raising the valve plunger by means of a train of gears and a two-roller cam.



Room Thermostat and Motorized Valve

Soon after each cycle starts, a cam on the camshaft short circuits the thermostat and closes a power circuit to the motor, holding this closed for the balance of the cycle and breaking it when the cycle is complete. In this way the thermostat carries the motor current for only a small fraction of the cycle. With the shading-ring type of induction motor used, the starting load is no greater than the running load so there is no disadvantage in having the thermostat carry the starting current.

During the valve cycle the camshaft changes the contacts so that when the cycle is completed the motor will not operate again until, due to the rise in temperature, the tongue of the thermostat is moved over and makes contact with the left-hand point. The closing cycle, having the same series of actions as the opening cycle, then occurs and the valve plunger is pushed down, leaving the valve in the closed position. Each cycle takes about seven seconds to complete.

Wiring

On any Barber-Colman system installation the 25-volt wires for the power supply and the three-conductor wires from the thermostats to the motor-operated valves may be entirely concealed in the walls of a building during construction. The system can be economically and neatly installed in existing buildings as well.

Features

Induction Motors—Quiet operation of motor-driven units is assured. There are no brushes or commutators with their attendant troubles. No radio interference is produced.

Unit Valve Construction—The motor unit can be separated from the valve bonnet without preventing operation of the valve. The heating system can therefore be completed and tested before installing motor-operators.

Bellows Packed Valves—The flexible metal bellows construction in the valves eliminates all packing troubles. There is no chance for valve stems to stick or drag.

Thermostats—Small and compact. Valve motor-operators and other pieces of apparatus occupy minimum space. A bimetallic type of thermostat is used in which all parts are made of materials which will not deteriorate with time.

Spring-loaded Valves—Valves are held closed against seats by strong spring pressure imposed by motor-operator. This prevents wire-drawing action and assures long life for the valves.

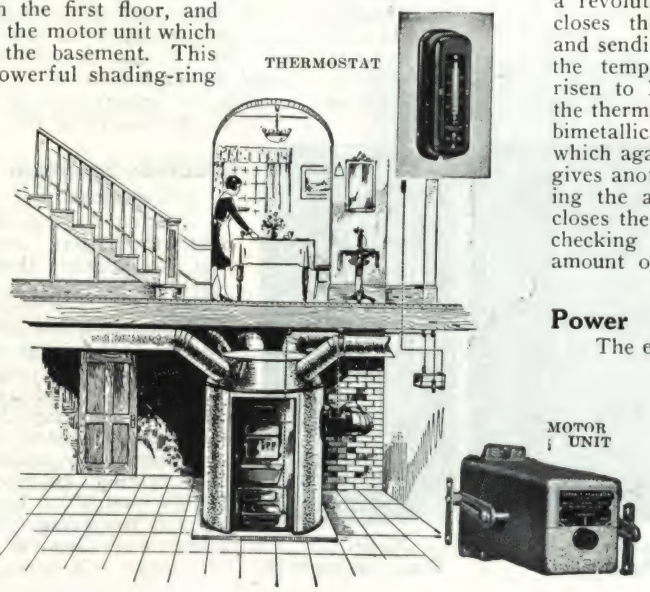
BARCOL FURNACE REGULATOR

Description

Regulator consists of a thermostat which is mounted generally in one of the rooms on the first floor, and connected by a 3-conductor wire to the motor unit which is mounted near the furnace in the basement. This motor unit contains a small and powerful shading-ring type of induction motor, which, by means of a train of gears, turns a shaft to which are attached two arms. Each of these arms has a flexible pitman connection. Chains are connected from the pitmans to the draft damper and check damper, these chains being supported by pulleys so that they run freely and are out of the way.

Operation

The operation of the unit is as follows: When the temperature near the thermostat drops 1° F. below the point at which the thermostat is set, the contraction of the bimetallic loop inside the thermostat completes an electric circuit which starts the motor in the motor unit and turns the shaft, which carries the arms through one-half a revolution. This opens the draft and closes the check, thus forcing the fire and sending heat up into the house. When the temperature at the thermostat has risen to 1° F. above the point at which the thermostat is set, the expansion of the bimetallic loop makes another contact, which again causes the motor to run, and gives another half turn to the shaft carrying the arms and pitmans. This action closes the draft and opens the check, thus checking the fire and decreasing the amount of heat being sent to the house.



Power

The electric power used is at 25 volts, supplied by a small bell-ringing transformer from 115-volt a-c. lines, and this low voltage makes possible the use of ordinary wiring without expensive conduit. No power is used, except when the motor is running, as the current is cut off completely when each half cycle is terminated.

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Engineers and contractors for the CONTROL OF TEMPERATURE or HUMIDITY for any purpose and over every range used in manufacturing purposes or buildings, furnishing and installing:

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Johnson All Metal Thermostat

Every Johnson Thermostat is *all-metal* throughout, having no soft or hard rubber parts to deteriorate and become inoperative. Every thermostat exquisitely made and thoroughly tested for accuracy, efficiency and durability.

Johnson Intermediate or Graduated Action Thermostat

This thermostat gives a true graduated motion to mixing dampers and valves. It holds them in an intermediate position to maintain the temperature of the room accurately within one degree above or below the setting of the thermostat. This thermostat is best suited for all systems of heating and ventilating except the single pipe gravity steam system. The Johnson positive movement is manufactured for use in connection with single pipe gravity systems.

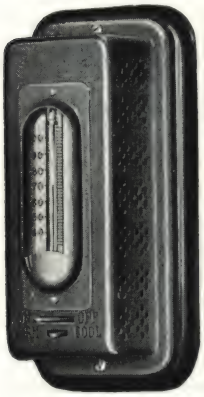
Johnson Dual or Two-temperature Thermostat

The dual, or two-temperature thermostat provides for a daylight temperature (usually 70°) and a night-time temperature (35° to 50°) as desired, for all or some of the rooms in a building, simply by the manipulation of a single push button by the engineer or other person in authority. It is an all-metal thermostat and operates valves and dampers with a gradual motion, holding them in an intermediate position to maintain the temperature of the room accurately within one degree above or below the setting of the thermostat. It is a factor for the greatest economy in school buildings, a number of rooms of which are occupied at night as well as day, and for buildings in which some of the rooms are occupied only at certain times, such as churches, auditoriums, Masonic temples and lodges.

Adaptable for use in bake ovens for enamels, japans, etc.; drying rooms for paints, varnishes, patent leather, etc.; storage rooms for tobacco, rubber or similar goods; sterilizers or pasteurizers, cold-storage rooms, fur vaults, etc.; refrigerator machine control; humidity control for air washers; flue gas tempered control; hot blast heating plants; combination tempered ventilation and hot blast systems; greenhouses, Turkish bathrooms, etc.; tempered ventilation for buildings.

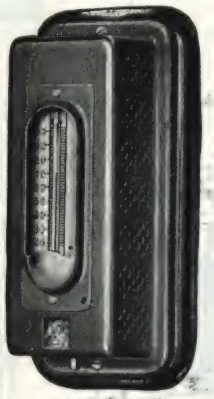
Johnson Insertion Thermostat

Designed to control temperatures within closed air chambers or ducts and tanks. The body of thermostat is a dustproof case containing the two working parts and extending outside the chamber. Designed, in the case of hot water tanks, for insertion through 1-in. tapped hole and controlling a diaphragm valve on the supply pipe to the steam coils in the tank. It can be used to control the temperature of any liquid, either hot or cold. It is especially adaptable for controlling the temperature of water in hot water heating plants by its control of the boiler draft doors.



Model "P" Lever Shutoff Lever Adjustment

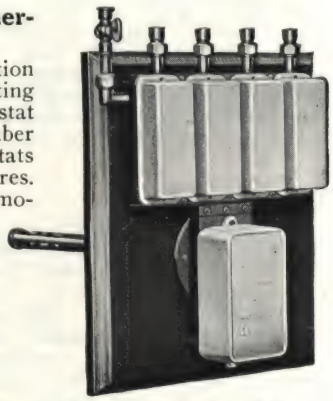
Dual Thermostat with Push Button



Model "P" Dial Adjustment

Multiple Insertion Thermostat

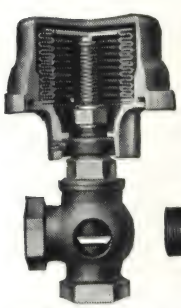
Similar to the insertion duct thermostat, excepting that one multiple thermostat takes the place of a number of separate duct thermostats set for different temperatures. The 4-point multiple thermostat shown will operate four separate diaphragm valves at as many different temperatures. It has become very popular with heating engineers for the control of heating and tempering coils where it is desired to have these coils turn on at different temperatures.

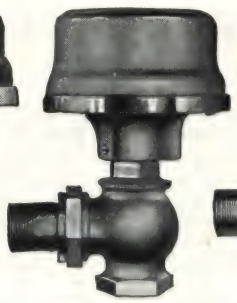


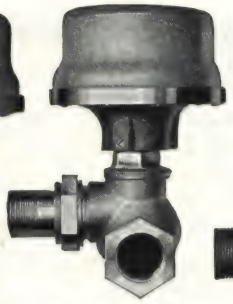
Four-point Multiple Thermostat

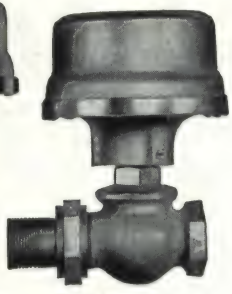
Continued on next page

JOHNSON METAL DIAPHRAGM VALVE


Sylphon Valve Sectional View


Sylphon Valve Angle


Sylphon Valve Offset Corner


Sylphon Globe Valve

Sylphon Valve Brass Three-way

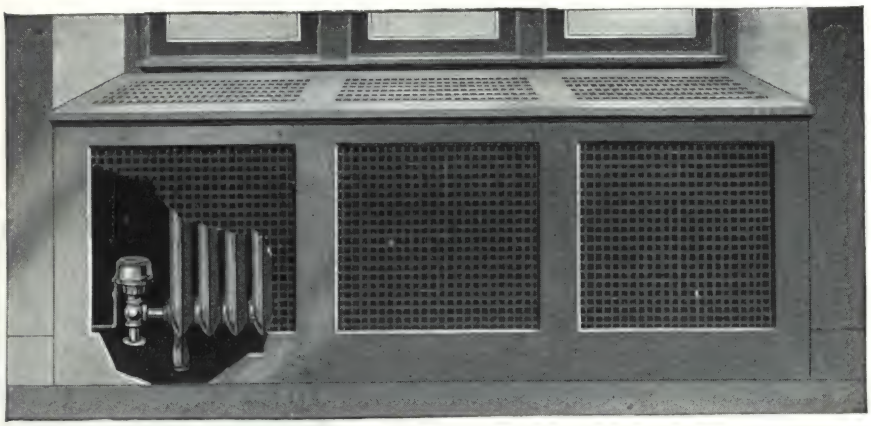
Flanged Globe Coil Valve

Screwed Globe Coil Valve

Window Seat with Radiator Behind Grille

Diaphragm valves on radiators in window seats or behind grilles or similar places, operate under very severe conditions. The Sylphon valve overcomes all of the objections to placing diaphragm valves on radiators in such places, as the Sylphon is permanent and neither heat nor moisture can destroy its efficiency.

This valve having an indestructible 1-piece metal bellows, is permanent and requires no repairs. Its value for the control of steam is obvious and particularly so in connection with steam coils, radiators in wall boxes where excessive heat would destroy rubber diaphragms.



Pneumatic Switch Control

Remote valve and damper control plays, by means of our pneumatic switches, a very important part in the economical operation of the modern heating plant, especially in schools. It saves the janitor's time for other duties, and makes it possible to accomplish results in the operation of the heating plant which can not be obtained in any other way. It makes it easy to operate the fresh air, return air and vent dampers, with the corresponding assurance that these dampers will be economically operated as intended by the heating engineer. It also makes possible and facilitates the control of risers in office buildings in accordance with latest practices for the economical use of steam.

Different types of pneumatic switches:

Lever handle switches.

Push button switch.

Indicating switch to open and close dampers partially as desired.

Electro-pneumatic switch to open and close dampers automatically—with the starting and stopping of fan motors.

Specifications and Service

The Johnson System of Temperature Regulation to be erected and assembled by trained mechanics employed by the manufacturer, the JOHNSON SERVICE COMPANY.

The JOHNSON SERVICE COMPANY maintains an engineering organization in each of its branch offices competent to render complete information regarding application of the equipment, location of thermostats, capacity of air compressors, humidifiers, etc., and layouts of air piping. Our engineering department should be consulted regarding specifications.

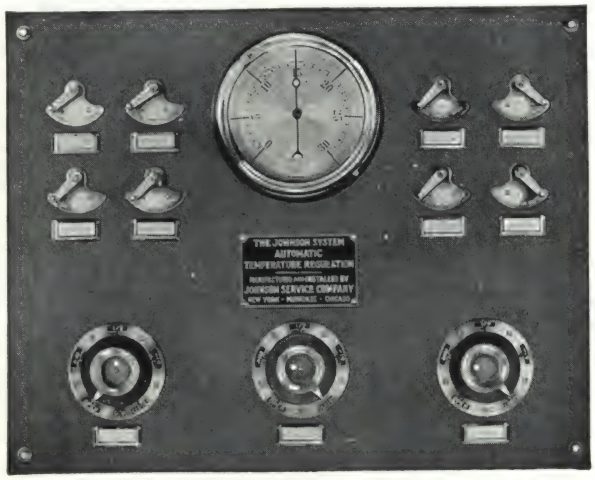
Humidity Control

The supplying of moisture to the heated air in buildings and the automatic control of the percentage of moisture in this air are recognized by authorities to be as important as maintaining proper temperature.

Humidostats and Humidifiers

The humidostat automatically controls the supply of moisture delivered to the air by a humidifier and maintains a constant percentage of relative humidity. It operates a diaphragm valve on the steam coils in the pan humidifier. The pan is provided with float box to maintain constant water level and is located in the ventilating air duct leading throughout the building.

Steam jet and water spray types of humidifiers are also furnished.



Distributing Damper Control for Ventilating Air Switchboard

MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

Manufacturers of Temperature, Pressure and Combustion Safety Controls and Motor Valves

2707 Fourth Avenue, South
MINNEAPOLIS, MINN.

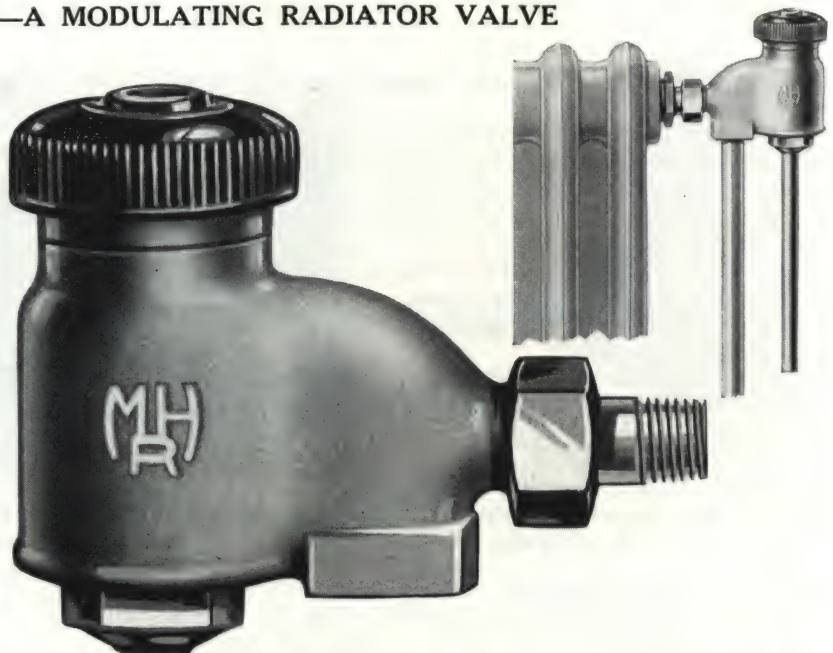
BRANCH OFFICES

NEW YORK, N. Y. | BOSTON, MASS. | DETROIT, MICH. | CHICAGO, ILL. | MILWAUKEE, WIS.
PHILADELPHIA, PA. | PROVIDENCE, R. I. | CLEVELAND, OHIO | ST. LOUIS, MO. | SAN FRANCISCO, CALIF.

IN CANADA: MINNEAPOLIS-HONEYWELL REGULATOR CO., LTD., TORONTO

DISTRIBUTORS IN ALL PRINCIPAL CITIES

THE MODUSTAT—A MODULATING RADIATOR VALVE



Based on a *new principle* that minimizes heat conduction. *Accurately responsive* to room temperatures. *All metal construction.*

The Modustat, a packless, self-contained modulating radiator valve, for direct, indirect and concealed radiation, is designed on *an entirely new principle* which reduces conducted heat, going to the thermostatic medium, to the absolute minimum. For this reason the Modustat shows surprising accuracy of control, maintaining temperatures which never vary more than 2° as long as the radiator is receiving heat from the boiler.

All metal construction of non-ferrous materials adds definitely to integral rigidity and sturdiness and makes for permanence. At the same time the danger from tampering is entirely prevented by having all operating parts completely enclosed.

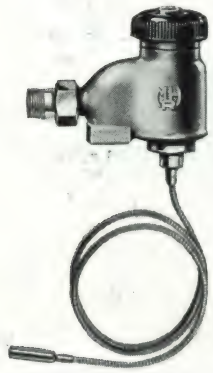
Design Features

The new principle on which the Modustat is designed features a specially constructed tube for the thermostatic medium. The volatile liquid is in the bottom of this tube which extends down from the base of the valve casing. Above the liquid is a drilled plug which divides the tube into two chambers. The volatile liquid remains in the base and only the vapor, produced by gasifying the liquid, can pass through the drilled hole in the plug.

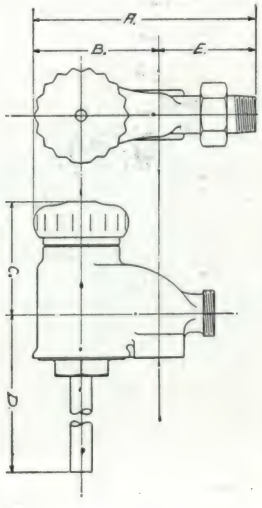
The plug virtually isolates the lower chamber in the tube from the upper, and by so reducing circulation to the valve body, effectively decreases heat conduction, which insures the accurate operation of the Modustat in response to room temperature.

The unique design features of the Modustat also minimize the effect of radiated heat from the riser so that the Modustat functions equally well on either steam or vapor systems in spite of the difference in temperature at which these systems operate.

The dialed indicator of the Modustat may be set to control temperature at any point between 60° and 80°. From complete "open" to complete "close" requires a variation of but 5°, the valve coming to its seat at the temperature for which the indicator is set.



Distance Type for Concealed Radiation



Installation

The Modustat in ¾-in. size is designed to regulate up to 100 sq. ft. of radiation on any two-pipe steam or vapor system. Will not operate on a one-pipe system. Installation is as simple as with a hand operated valve. Steam riser should be left uncovered. Where bottom outlet radiators are used, a gooseneck or loop must be installed to raise the valve to proper level above the floor so that the thermostatic element may be placed in the upper circulation of air induced by the heat in the riser.

ROUGHING-IN DIMENSIONS

Size, in.	A—in.	B—in.	C—in.	D—in.	E—in.
¾	6 5/32	3 17/32	3¼	9¾	2¾

PENN ELECTRIC SWITCH CO.

Manufacturers of Electric Switches and Other Controlling Devices

DES MOINES, IOWA

The Company and Its Product

In recognition of Penn engineering craftsmanship and superior design, some of the largest and best known national manufacturers of oil burners, electric refrigerators, unit heaters, etc., have selected Penn Controls as standard equipment on their product.

Penn Controls are outstanding for their simplicity and the well-known, patented Penn Magnet structure which eliminates mercury tubes, relays, transformers, etc.

All Penn Controls are listed as standard by Underwriters' Laboratories, Inc.

The Penn Room Thermostat

There is a certain quality about the Penn Thermostat easy to recognize, yet difficult to define, which sets it apart in your mind from the others you have seen and tested. You immediately observe this quality in its attractive finish, the symmetrical contours of the bronze cover, and the pleasing curves of the bakelite base. You sense it, too, in the complete assurance that here is a control which will render years of unfailing, accurate performance.

And again you recognize this quality in the splendid workmanship and fine engineering thought which the Penn Thermostat represents. We believe no other room control equals its simplicity of design and ease of installation. There are no fragile mercury tubes, nor relays, transformers, etc. The Penn Thermostat operates across the line on motors up to 1 hp. and carries the load direct, yet it has a differential of less than 2°.

Type A

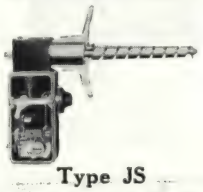
Uses—For oil burners, unit heaters, damper controls, gas fired heaters, coal fired heaters, incubators, drying rooms, heating motors, and electric radiators.

Ratings—*Type A*—Operated by a charged metal bellows. Listed—for 1 hp., single phase, a-c. and ½ hp. d-c. Maximum voltage, 250. Pilot service, 550 a-c.

Type AA—Thermostat for current loads up to 30 amperes a-c., non-inductive.

Type B—Same as Type A, except the control structure is operated by bi-metallic metal. Listed—for ⅓ hp. motor, either a-c. or d-c. Maximum voltage, 250. Pilot service, 550 volts a-c.

Penn Type JS Stack and Lock Safety Switch—A small compact device incorporating features which have been standard in other Penn switches for a number of years. Designed for oil burners as a protection against flame failure and to be connected in series with the room thermostat and motor. Bayonet type contacts have been provided which extend outside of the case and afford a convenient means for connecting and disconnecting from the circuit.



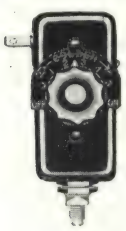
Type JS

Ratings—This device is rated to handle up to and including ⅓ hp. a-c. motors.

Hot Air (Type JH)—Either to close or open at high temperature. Designed similar to JS Stack Switch above.

Penn Type J Unit Control for Domestic Electric Refrigerators

The New Penn Type J performs the separate functions of several switches and with one dial gives complete control. Its movement, in half circles, provides outside temperature selection to suit manufacturer's specifications without altering the original factory setting. It is also used for starting and stopping when defrosting or resetting the switch if the thermal overload protector has opened the circuit. In addition, Type J is equipped with a differential and range adjuster.



Type J

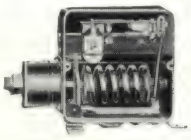
Adequate motor protection is assured. The thermal overload protector is designed to compensate for changes in room temperature, and it is impossible to close the circuit manually by means of the unit control dial until the thermal overload protector has cooled for resetting.

Unusually suitable for domestic units. It is compact, attractively finished in a bakelite case of high dielectric strength, practically airtight and vaporproof. It is quickly accessible and easily mounted. It is equipped with bayonet type contacts which eliminate the necessity of entering the switch. The mounting, too, is decidedly simple and handy, and may be done quickly.

Ratings—For a maximum of ⅓ hp., a-c. or d-c., and may be secured in a variety of models to meet all domestic refrigeration requirements, and special applications.

Penn Safety (Limit) Controls for Heating Systems

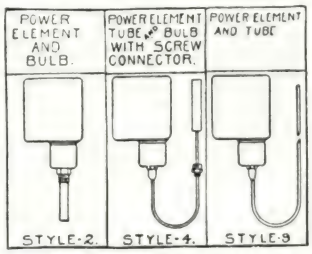
All steam, vapor, and hot water systems, fired by oil burners, should be provided with safety limit controls. The Penn Controls carry the motor circuit direct, eliminating the use of transformers and relays. They do not employ mercury tubes, consequently they may be mounted in any convenient position, without affecting their operation.



Type LRP

Steam (Type LRP)—Arranged to open at high pressure and close at low pressure, may be set to operate anywhere from zero pressure to 200 lb. Differential between opening and closing points quickly and easily adjustable, from minimum of 1½ to a maximum of 15 lb. Provided with a ½-in. male pipe thread for direct mounting.

Vapor (Type LRV)—Also arranged for direct boiler mounting. Differs from the steam pressure control in that it is provided with a large actuating element which is very sensitive to pressure changes. Very close differential varying from a minimum of 3 oz. to a maximum of 1½ lb. May be adjusted to operate anywhere from 3 in. of vacuum to 6 lb. pressure.

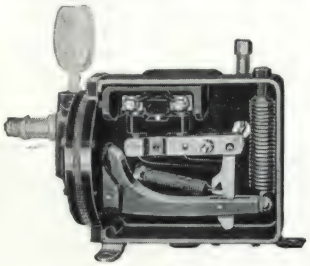


Type LRT

Hot Water and Temperature—The Type LRT furnished with charged power element to be subjected to water temperatures. May be adjusted to operate from 120° to 200°. Differential between starting and stopping points is likewise adjustable. Several styles of charged power elements are furnished with this switch. *See illustration.*

Listing—Type LRP, LRV, and LRT are listed by Underwriters' Laboratories, Inc., for the same horsepower ratings as the Type A room thermostat.

Penn Pressure Switches

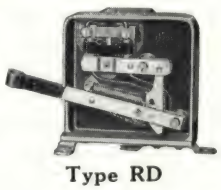


Type RBD

Type RBD—A double-pole, small, rigid and compact device for pressure equipment up to 200 lb. per sq. in. A popular switch widely known among manufacturers of automatically controlled devices, and standard equipment on many of the foremost makes of air compressors and water systems. Horsepower ratings—2 hp., single-phase, a-c., 110 volts; 3 hp., 220 volts, single-phase, a-c., and 5 hp., polyphase. Maximum voltage, 550.

Penn Float Switches

Type RD Float is designed to operate with the least possible expenditure of power so that the floats required to actuate the switches may be small, compact and inexpensive. Also designed so that they may be easily mounted, making their application more universal. All Penn Float Switches may be used to either close or open at high liquid level. All working parts are hardened to resist wear.



Type RD

The trip mechanism insures positive snap movement of the contacts from the closed to the full open position at each operation.

There is no drag or delay, thus burned contacts are practically unheard of in Penn Switches.

An assortment of Penn Float Switches can be furnished to carry motors of fractional horsepower up to and including 5 hp., polyphase, 110 or 550 volts, a-c. or d-c.

THE POWERS REGULATOR CO.

Manufacturers of Automatic Temperature Controlling Apparatus

GENERAL OFFICES AND FACTORY
2720 Greenview Avenue
CHICAGO, ILL.
TELEPHONE, BUCKINGHAM 7100

GENERAL EASTERN OFFICES
137 East 46th Street
NEW YORK, N. Y.
TELEPHONE, MURRAY HILL 3250

BRANCHES AND SERVICE STATIONS
(See Telephone Directory for Local Addresses)

ATLANTA, GA.	CHARLOTTE, N. C.	EL PASO, TEX.	LOUISVILLE, KY.	PITTSBURGH, PA.
BALTIMORE, MD.	CHATTANOOGA, TENN.	GREENVILLE, S. C.	MILWAUKEE, WIS.	ROCHESTER N. Y.
BIRMINGHAM, ALA.	CINCINNATI, OHIO	HOUSTON, TEX.	MINNEAPOLIS, MINN.	ST. LOUIS, MO.
BOSTON, MASS.	CLEVELAND, OHIO	INDIANAPOLIS, IND.	NASHVILLE, TENN.	SALT LAKE CITY, UTAH
BUFFALO, N. Y.	DENVER, COLO.	KANSAS CITY, MO.	NEW ORLEANS, LA.	SAN FRANCISCO, CAL.
BUTTE, MONT.	DETROIT, MICH.	LOS ANGELES, CAL.	PHILADELPHIA, PA.	SEATTLE, WASH.

Products and Services

AUTOMATIC TEMPERATURE CONTROLLING SYSTEMS, applied, under the supervision of Powers engineers, to heating plants, new or old, in residences, offices, factories, schools, institutions, and to any other condition of artificial heating where uniform temperature is desired.

Also Regulators to control temperature of liquids, gases and air in industrial processes. Thermostatic Regulators to control the mixing of hot and cold water, steam and cold water, and hot and cold air, to deliver a mixture at any temperature desired, Humidity Control Devices, Pneumatic Systems of Riser or Zone Control, and the Powers Shower Mixers.

For our pages on Thermostatic Water Controllers and Shower Bath Mixing Valves, see Manufacturers' Index.

Type K Heavy Duty Thermostat

Temperature Controlling Appliances

Powers thermostats are accurate in their working and will maintain their adjustment. They are of the vapor disc type, exclusive with Powers regulators, and are not thrown out of adjustment by extremes of temperature or long disuse.

Type D Thermostat
For offices and residences

In design, Powers thermostats are second to none in beauty and perfection of finish; in size, as small as is consistent with the reliability so necessary in such instruments; in operation, sure, with gradual or positive action, as conditions require.

Diaphragm radiator valves, diaphragm motors, mixing dampers and other equipment are especially rugged in construction, dependable, and durable; built regardless of expense whenever strength is needed for efficiency and long service. Motive power used in these systems is compressed air. The company builds its own air compressors, operated by electricity and characterized by their reliability, noiseless operation, perfect control and long life.

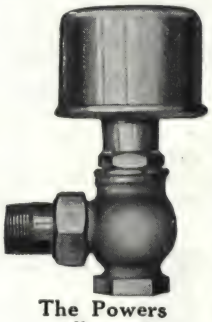
Installations—Installations of Powers systems are invariably made by this company. At each branch office is maintained a competent engineering and erecting force, sparing no expense to maintain the highest efficiency. Powers special devices, however, are easily installed by any engineer or contractor.

Prices—Price for Powers Regulation covers the system installed complete, and is named only after a careful study of the requirements.

Our price is not the lowest, but we believe no other system will be found so efficient and economical. Customers are served with the sole aim of getting results for them; and experience shows that satisfactory service from a temperature controlling system is of much more importance than its first cost.

Hygrostat

Specifications—Heating systems, and the requirements for temperature control, vary widely in detail. Much of the dissatisfaction experienced with some systems of temperature regulation is due to attempts to force a ready-made inflexible system or device to meet special requirements, taking no account of the conditions peculiar to the situation to be treated. For these reasons, we believe special study should be given each case. We shall be glad to submit to any architect or engineer a detailed specification, accompanied by a guaranteed price, to cover complete system of temperature control installed, the price to hold if specification is used.

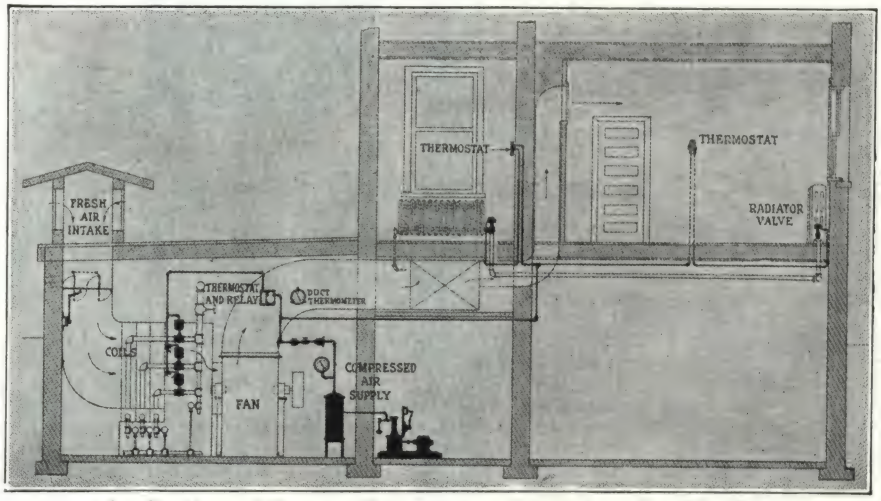


The Powers All-metal Radiator Valve

This guarantees full protection to the client against advantage being taken of a close specification. This company will gladly collaborate with architect or engineer in preliminary plans. As specialists in temperature control, THE POWERS REGULATOR COMPANY has unusual facilities for solving problems in this particular field.

These Books Sent Upon Request—"Elimination of Heat Waste," a 40-page book showing applications of Powers Control to various types of heating systems used in schools, churches, theaters, residences, etc.

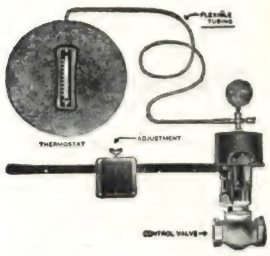
"Shop and Office Temperatures," a 52-page book showing applications of Powers Control to various types of heating systems in offices, shops, workrooms, etc.



Application of Powers Temperature Control to Combination (Split) System of Heating

Direct radiation supplies the heat; fan supplies warm air for ventilation. Thermostats control valves on radiators to maintain proper room temperature. Ventilating coils are controlled by a thermostat placed in the fan discharge duct

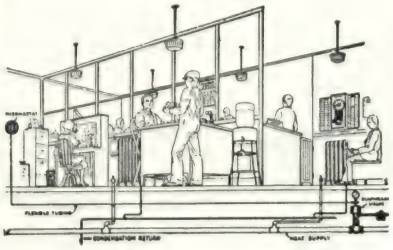
Continued on next page



At Right: Applied to direct heating system.

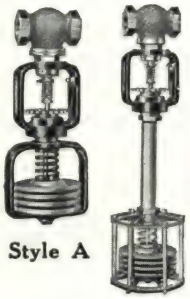
Powers No. 18 Self-contained Regulator—For factories, offices, warehouses, storage rooms, greenhouses, etc. Capable of good control between 60° to 100° F.

Write for Bulletin No. 245.



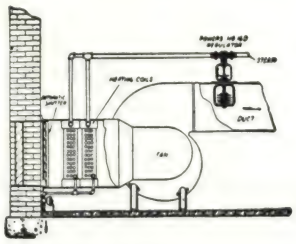
Powers No. 16 Self-contained Regulator—For unit heaters, ventilating ducts, storage rooms, brine coil control. *Write for Bulletin* No. 246.

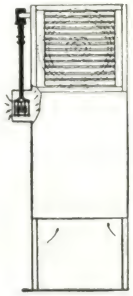
Below: Applied to ventilating duct and unit heater.



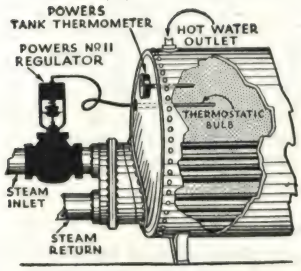
Style A

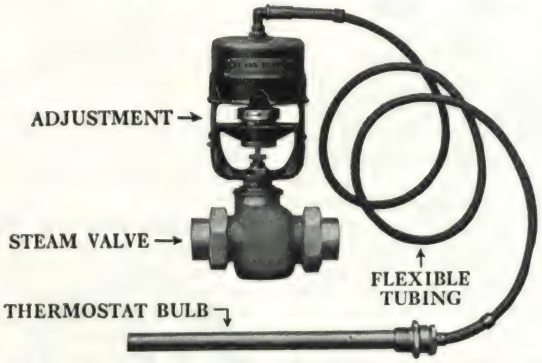
Style B



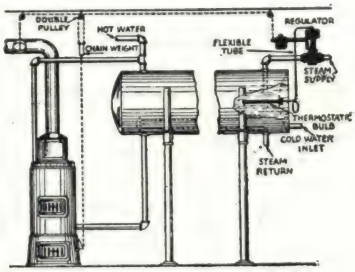


Powers Tank Regulators





No. 11 Tank Regulator—Spring Type Adjustment



Powers No. 11 Regulator

Used on steam heated hot water service in hotels, apartment buildings, offices, schools, shops, hospitals, factories, laundries, etc. Because this regulator prevents overheated water, it saves fuel and prolongs the life of valves and packing. Self-operating; easily installed. Of great durability, guaranteed accurate and positive in action.

In ordering, always give size of tank, steam pipe size, steam pressure, and temperature wanted.

The spring type regulator is commonly used for this work except in sizes larger than 4-in., when the lever type is used. Smaller sizes will be furnished in lever type if preferred.

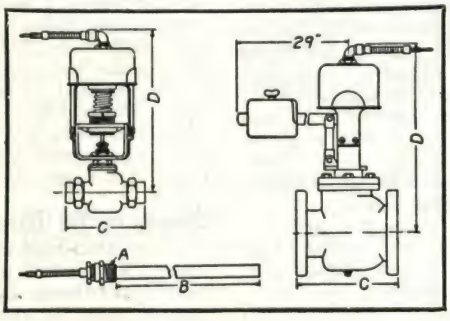
The regulator will be furnished to operate at 160° F., with adjustability 20° above and below that point, unless otherwise specified.

Flexible connection tube is 6 ft. long for sizes 1½ in. and smaller; 8 ft. for 2 to 4 in. inclusive, and 10 ft. for larger sizes. Additional lengths of tubing will be furnished at 30 cents per foot net. A net charge of $2.00 is made for flexible tubing shorter than standard.

The valve in all sizes is of the double seated balanced type. Companion flanges will be furnished, if desired, at market prices. Flanged valves will be drilled standard unless otherwise ordered.

Specify standard valve for steam pressures up to 100 lb. and monel fitted valve for steam pressures above 100 lb.

Specification—In connection with the (steam heated) hot water storage tank, furnish and install Powers No. 11 Tank Regulator with .... inch [standard] [monel fitted] valve with standard length of flexible tubing. Regulator shall maintain the temperature of the water at .... degrees with steam pressure at .... lb.



Powers Nos. 12 and 13 Regulators

Where installation is to control steam coil and auxiliary coal burning heater, specify Powers No. 12 Regulator with chains, pulleys, etc., for the control of dampers on auxiliary heater.

For coal burning heaters without steam coils, use Powers No. 13 regulator.

PRICES AND PRINCIPAL DIMENSIONS OF NO. 11 TANK REGULATOR

Valve size ..... in.	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8
List price: Standard valve	$60.00	65.00	70.00	75.00	80.00	90.00	95.00	100.00	110.00	120.00	175.00	225.00	275.00
Monel valve	$67.00	72.00	78.00	83.00	92.00	104.00	110.00	118.00	135.00	150.00	215.00	.....	.....
Style of body	Union	Union	Union	Union	Union	Screwed	Screwed	Screwed	Flanged	Flanged	Flanged	Flanged	Flanged
Material of body	Brass	Brass	Brass	Brass	Brass	Iron	Iron	Iron	Iron	Iron	Iron	Iron	Iron
Dimension A ..... in.	1	1	1	1	1	1	1	1	1	1	1¼	1¼	1¼
B ..... in.	10	10	12	14	14	16	16	18	20	20	20	20	24
C ..... in.	5⅝	6	6 11/16	6⅞	7⅞	8	9	9½	10⅜	10¾	12	13⅜	16⅞
D ..... in.	11	11 1/16	11½	11 15/16	12⅛	14 11/16	15¼	15¼	15¾	15⅝	21⅜	23	24

RAYMOND DUO-STAT

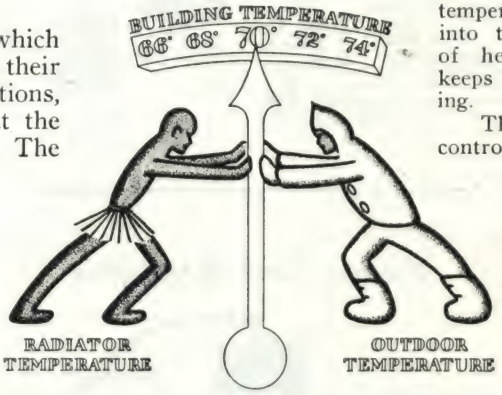
For Controlling Automatic Heating Systems by the Outdoor Temperature

MANUFACTURED BY
THE F. I. RAYMOND COMPANY
228 North La Salle Street, CHICAGO, ILL.

Purpose

Systems of heat regulation which depend on indoor temperature for their control have two inherent limitations, namely, time lag and the fact that the control is upset by open windows. The time lag causes fluctuating heat and the upset by open windows causes waste of fuel.

It is because of these limitations that the Raymond Duo-Stat has been developed to control any automatic heating plant from the *combination of radiator temperature and outdoor temperature.*

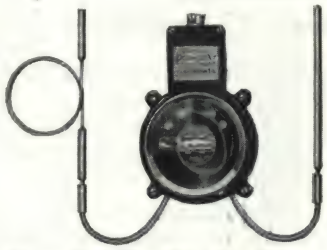


Applications

Duo-Stats are now installed in more than 700 buildings in various cities of the United States, Canada, England, Germany and Holland, including homes, apartment buildings, apartment hotels, office buildings, hospitals, stores, factories and schools. In most of these buildings, the Duo-Stat controls the oil burner, gas burner or coal stoker or the automatic steam supply valve. In large office buildings, a separate Duo-Stat controls the valve which supplies steam to each zone.

Operation

The Duo-Stat operates from the combination of the temperatures in *two* temperature elements or "bulbs," one placed outdoors and the other attached to the heating plant. In steam heating systems the heating plant bulb is attached to the last radiator on the longest steam line. In hot water heating systems the heating plant bulb is attached to a large flow main.



Type C-2 Duo-Stat for Steam

When the outdoor bulb and the radiator bulb are both at 70°, the switch in the Duo-Stat is open and the fire is off or the steam valve is closed. Cooling the outdoor bulb below 70° withdraws liquid from the Duo-Stat and closes the switch which starts the fire or opens the steam valve and thereby heats the radiators. When the radiator bulb of the Duo-Stat is heated as much as the outdoor bulb was cooled, the expansion of its liquid replaces the liquid withdrawn by the outdoor bulb and opens the switch in the Duo-Stat which stops the fire or closes the steam valve, thereby allowing the radiators to cool. When the radiator bulb of the Duo-Stat cools 10°, the switch is closed again, which starts the fire or opens the steam valve.

In this way the Duo-Stat starts and stops the fire frequently, putting small batches of steam into the radiators at frequent intervals, which keeps the radiators at a steady temperature proportional to the outdoor temperature.

The following table gives the schedule of outdoor and radiator temperatures for the average heating systems in the United States. These schedules may be changed for heating systems requiring a different schedule.

Outdoor temperature.....	70	60	50	40	30	20	10	0	−10
Radiator temperature in steam heating systems.	70	90	110	130	150	170	190	210	230
Water temperature in hot water heating systems..	90	102	115	127	140	152	165	177	190

Advantages

Duo-Stat control of a heating plant provides a steady flow of warmth into a building in exact proportion to the outdoor temperature. By keeping the flow of heat into the building balanced against the flow of heat from the building, the Duo-Stat keeps the proper temperature *inside* the building.

The steady input of heat under Duo-Stat control is more comfortable than an intermittent inflow because it eliminates the chilly feeling that accompanies cold radiators even though the inside temperature may be correct.

Fuel Saving

There is a definite minimum amount of fuel required to heat any building comfortably. Duo-State control insures the closest approach to this minimum, with any given heating plant, because it never supplies an excess of heat to be wasted in overheating, yet it always supplies enough for comfort. No system of control can use less fuel than Duo-Stat control and keep the building comfortably heated.

In Steam Heating Systems

Besides its advantage from the standpoint of uniform inflow of heat, the Duo-Stat has an especial advantage in steam heating systems because it provides a method whereby *all* the radiators of the system may be kept partially filled with steam to provide regulated heat in mild weather. This partial filling can be most perfectly obtained in a vacuum return line heating plant but it can also be obtained in a vapor system or in a one-pipe steam system to a highly satisfactory degree.

No Special Heating System Is Required

Duo-Stat control gives this desirable performance without any specially designed heating system. In large buildings, the standard vacuum return line heating plant should be used for best results. In smaller buildings, the standard vapor systems may be used and, where cost is paramount, a one-pipe steam system may be used.

Zoned Heating Systems

In large buildings, it is desirable to divide the steam lines into zones supplying the different exposures of the building. In such cases, a separate Duo-Stat is used to control an automatic steam valve which supplies steam to each zone. The outdoor bulb of each Duo-Stat is then located on the face of the zone controlled so that the amount of heat supplied to each zone is proportional to the outdoor temperature on the face of the zone. Under Duo-Stat control, due to the partial filling of the radiators, there will never be a high vacuum in one zone and low vacuum in another so that all zones may be interconnected to the same vacuum pump.

Points to Be Remembered

The Duo-Stat must be attached to the last radiator on the longest steam line of a steam heating system and this radiator cannot be turned off. In new buildings, it is desirable, therefore, to so arrange the steam lines that the last radiator will come in a hallway or in a living room where there will be no occasion to turn the radiator off. It is preferable also to have the last radiator come on the north side of the building so that the outdoor bulb of the Duo-Stat can be located on the coldest face. There is 20 ft. of tubing between the Duo-Stat and the radiator bulb and 10 ft. of tubing between the Duo-Stat and the outdoor bulb.

Engineering Service and Catalogues

Our engineering department and our representatives in principal cities will be pleased to give engineering assistance on any project. Complete catalogues and engineering manuals can be obtained from our home office.

AIRMASTER CORPORATION

Manufacturers of Ventilating Equipment

140 South Dearborn Street
CHICAGO, ILL.

BRANCH OFFICES
NEW YORK, N. Y., 55 W. 42nd Street
LOS ANGELES, CAL., 316 Commercial Street

SALES REPRESENTATIVES
BALTIMORE, MD., 107 E. Pleasant Street
BOSTON, MASS., 136 Federal Street
DETROIT, MICH., 932 Book Building
CINCINNATI, OHIO, 140 E. 6th Street
INDIANAPOLIS, IND., Illinois Building
KANSAS CITY, MO., 1204 Oak Street
MEMPHIS, TENN., 203 Monroe Street
MILWAUKEE, WIS., 137 Sixth Street
PHILADELPHIA, PA., 102 No. 5th Street
PITTSBURGH, PA., 607 Westinghouse Building
ST. PAUL, MINN., 915 Pioneer Building
SALT LAKE CITY, UTAH, Interurban Terminal Building

Products

MOTOR DRIVEN VENTILATING and EXHAUST FANS; Airmaster patented propeller blades. U. S. Patents Nos. 1372441-1623420. Other patents pending.

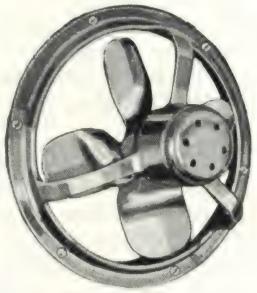
Airmaster Fan Assembly

All residence type Airmasters are equipped with this fan assembly. Airmaster patented propellers 10-in. diameter. Outside diameter housing ring 12½ in.

Revolutions per minute.....1440
Capacity .....800 cu. ft. per min.
Watts 62
Amperes ..... .78

Straight induction shaded pole motor.

A-c. or d-c., 110-120 volts, 25-30 and 60-cycle motors.



Propeller and housing are pure cast aluminum, accurately machined, balanced and highly polished.

Does not interfere with radio reception. Equipped with pull switch, 10 ft. of connecting cord and attachment plug.

Airmaster Built-in-wall Cabinet Electric Ventilator

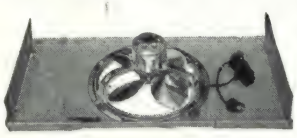
Interior View

Exterior View

Packed complete with all necessary parts and instruction sheet ready for installation. Requires wall opening 13⅛ in. square. Unit comes in two separate pieces. The cabinet and ventilator assembly and the louvres. The two are connected with operating cable. Cabinet containing ventilating unit fits flush with inside wall. Louvres fit flush with outside wall. Connecting cable between inside door and louvre takes care of any thickness of wall. When inside door is opened it automatically starts motor and opens louvres. Louvres not held open by air thrust which increases air capacity. Double protection against weather. Solid and compact.

Airmaster Adjustable Window Panel for Kitchen, Bedroom, Living Room, or Attic Installations

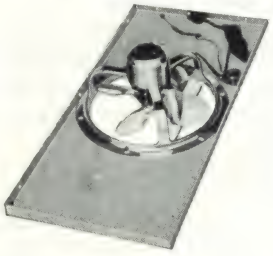
Easily placed in upper part of window and does not interfere with movement of window sashes, shades, or curtains. Panels are adjustable to fit windows 17 to 63 in. wide. Portable and interchangeable for transfer to any room. Unusually attractive. Highly polished aluminum parts, pearl gray panels. Easily cleaned and oiled. Quickly and silently removes cooking odors, greasy steam, dust, dirt, etc.



Airmaster DeLuxe Model—Plate glass panels mounted in chrome plated frame. Adjustable to fit windows between 22 and 60 in. wide. Exquisitely designed and beautiful in appearance. Glass panels permit full amount of daylight to enter. Completely harmonizes with finest interior decorating and furnishings. Very silent in operation. Packed complete and ready for installation.

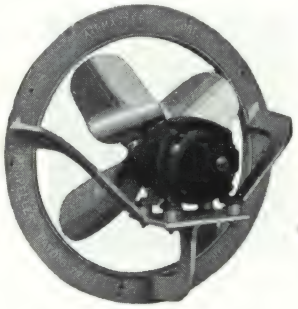
Airmaster Transom Model

Adjustable panels to fit window or door transoms. Expands from 26 to 36 in. wide. 13 in. high. Installation can be made in oversize transoms with addition of wood or metal panel to fit opening. Does not interfere with movement of transom. Automatic louvres can be furnished for outside transoms.



Airmaster Exhaust Fans for Commercial and Industrial Installations

Equipped with propellers 12, 15, 16, 18, 20, 24 and 30-in. diameter, with capacities of 900-1500, 1700-2500, 1900-2700, 2100-2850, 2600-3500, 6500-8226 and 7400-15000 c.f.m., respectively. Standard makes of motors, specially constructed. Totally enclosed. Ball thrust bearing on commutator end. Self-cooled. Propellers one-piece cast aluminum. Housing ring one-piece cast aluminum. Greater air capacity at lower initial and operating cost.



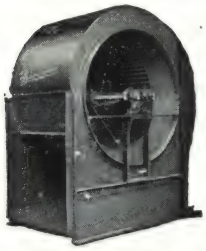
AMERICAN BLOWER CORPORATION

GENERAL OFFICES AND FACTORY
DETROIT, MICH.
BRANCHES IN ALL PRINCIPAL CITIES

Products

HEATING, VENTILATING, DRYING and AIR CONDITIONING EQUIPMENT; EXHAUST SYSTEMS; AIR BLAST APPARATUS; AIR FILTERS; DUST COLLECTORS; STEAM ENGINES.

"Sirocco" Multiblade Fans and Blowers

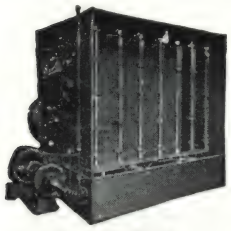


"Sirocco" Fan

The standard wherever fans are required for heating, ventilating, air conditioning, mechanical draft, drying, mine ventilation and exhaust systems.

High volumetric and mechanical efficiency. Driven by belt, steam engine, motor or turbine.

"Sirocco" Air Washer



"Sirocco" Air Washer

For purifying, cooling, humidifying and dehumidifying air in all classes of buildings and in various manufacturing processes. Thoroughly cleanses the air of all foreign materials and permits control of air temperatures and humidities.

"ABC" Air Filter

"ABC" Air Filter

For use in industrial, public, and practically all types of buildings. Cleanses the air of dust, dirt and impurities before distributing it throughout the building. Simplicity of design, and construction make it extremely easy of installation. It requires a minimum amount of attention and is quickly and readily unloaded.

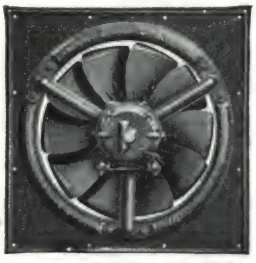
Venturafin Unit Heater

"Venturafin" Unit Heater

For use in modern industrial buildings, stores, garages, etc., and designed to keep the heat in working areas where it is needed.

Venturafin units are adaptable to high, medium or low pressure steam applications—for floor, wall or ceiling installation. Venturafin units are easy to install, economical to operate and maintain.

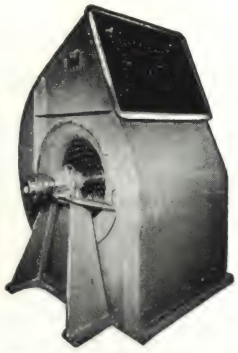
"Ventura" Disc Ventilating Fans



"Ventura" Disc Ventilating Fan

For ventilating rooms or small mines and for exhausting fumes from pickling vats; paint fog from paint spray booths, etc.; require very little space and slight operating costs make them very economical; light, strong, quiet and efficient. Built either with direct connected motor or for belt drive.

American H.S. Blowers

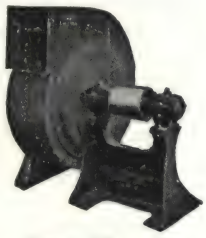


American H.S. Forced Draft Blower

These blowers are designed especially for turbine and high speed motor drive.

Distinguished by a design which insures the maximum degree of efficiency, strength and safety, while keeping the weight of rotating parts to a minimum.

Exhaust Fans and Pressure Blowers



Steel Plate Exhaust Fan, Type "E"

These are manufactured in a number of different types to meet varying requirements.

Exhaust fans remove refuse and waste of all kinds and are also used for conveying.

Blowers supply air blast to forges, furnaces and cupolas; sintering, smelting and pulverized coal machines; also used for blowing scale from dies, or other duties requiring air at pressures up to 1½ lbs.

Have many advantages over blowing engines or rotary blowers, and furnish air as needed at nearly constant pressure.

Built for either belt or direct connected motor drive, in sizes to meet any requirements.

"Sirocco" Dust Collector

"Sirocco" Dust Collector

A most practical, successful means of collecting a wide variety of fine dusts. Particularly applicable to the collection of cinders, fly-ash and the coal dust arising from the preparation of pulverized coal in powerhouses. Of rugged design and construction, each unit is gastight throughout.

Extensive laboratory facilities are maintained for testing purposes.

"ABC" Vertical, Fully Enclosed Self-oiling Steam Engines

"ABC" Vertical Self-oiling Steam Engine Direct Connected to Generator

For direct connection to fans, centrifugal pumps, stokers, generators, etc.

Enclosed, self-oiling type well known for high speed, high efficiency and small space occupied.

Will run for months without additional oil or adjustment.

Built in single and double cylinder types, developing up to 120 hp.

Catalogues and Bulletins

General catalogue or special bulletins on request.

ESTABLISHED 1883

BAYLEY BLOWER COMPANY

SUCCESSOR TO BAYLEY MANUFACTURING CO.

752 Greenbush Street, MILWAUKEE, WIS.

NEW YORK, N. Y., 225 Broadway CHICAGO, ILL., 1156 First National Bank Building

SALES REPRESENTATIVES IN PRINCIPAL CITIES

Products

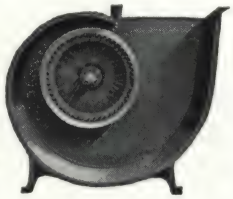
HEATING and VENTILATING EQUIPMENT; AIR WASHING and HUMIDIFYING SYSTEMS; MILL EXHAUSTERS, PRESSURE BLOWERS; MECHANICAL DRAFT FANS; AIR and GAS SCRUBBERS; INDUSTRIAL DRYING SYSTEMS.

Service

Our sales representatives in principal cities, will, upon request, assist architects and engineers in the design of systems and equipment to meet special requirements.

Plexiform Fan

Used to supply air for heating systems or heating and ventilating systems for school, public, industrial, and office buildings, for drying systems, and for industrial processes, or for forced or induced draft systems.



The Plexiform fan is suitable for handling cool or warm air, as well as high or low temperature gases.

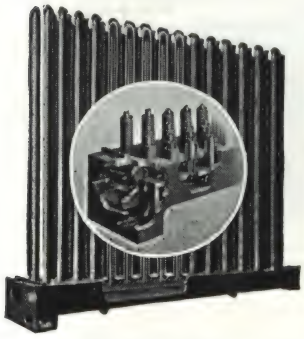
It will deliver the maximum quantity of air in applications where medium or low pressure is required. For applications where space is limited, or where economy of power is desirable, this fan is especially recommended.

The fan wheel, of distinct Bayley design, has great strength without excess weight. Due to its reinforced construction and equal distribution of stresses, vibration is reduced to a minimum. Crystallization of parts, so-called, is thus avoided. Large and unobstructed inlets and outlets, and the absence of arbitrary air cut-offs, insure free and noiseless delivery of air.

Plexiform fans are furnished in either single or double width wheel types of any required housing construction and discharge, positive sleeve or ball bearings, as specified.

Heating Systems

Chinook—The Chinook section is used with fan type heating, ventilating, and drying systems. It circulates either high or low pressure steam by gravity or under a vacuum. The heater may also be used to circulate hot water for heating purposes, or cold water for cooling purposes.



The Chinook base is of gray cast iron, having walls of sufficient thickness to withstand a working pressure of 175 lb. per sq. in. The casting is divided into two chambers by a horizontal partition. Steam enters the lower or steam chamber from which it rises through ⅜-in. steel pipes, which are located within the 1¼-in. steel pipes leading from the upper chamber. Thus the steam in the steam chamber passes up through the small pipes (which are open at the top) into the larger pipes, where condensation takes place, the water and air falling into the upper chamber and draining away through the return outlet. Each tube is evenly heated through its entire length, and air binding cannot occur. *A distinctive feature of the Chinook section is that a leak can be repaired in the middle of the bank without breaking steam connections or taking down a single section.*

Shipped assembled in smaller sizes, and knocked down in the larger units. May be installed in horizontal or vertical position.

Chinookfin—The Chinookfin heater embodies the same successful principles of construction as the original Chinook, except that the radiating element is copper tubing, carrying extended copper-fin surfaces. The manner of attaching the fins so as to remain tight under all conditions and temperature changes is unique and very efficient.

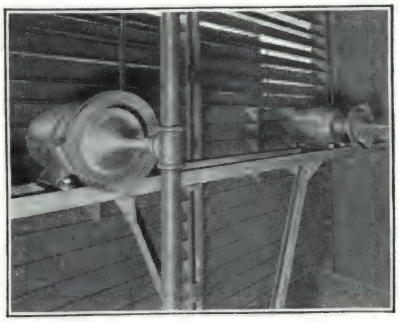
Each pipe is separate, individual, and independent; expansion and contraction of any one pipe does not affect the others; no rigid connections, return bends, nipples, or elbows, to be racked out of shape by unequal expansion and contraction. This construction permits continuous and innumerable cycles of expansion and contraction without crystallization of materials and resulting damage. The Bayley Chinookfin Heater is as safe for tempering coil service as for reheaters—a remarkable feature of this heater.

Write for Bulletin No. 29-C which describes it in detail.

Turbo Air Washer and Humidifier

The Bayley Air Washing System is offered for schools, offices, and public and industrial buildings, where a central system of air washing and humidifying is desired.

The ordinary air washing and humidifying equipment requires frequent cleaning of the spray nozzles, as the particles of dirt in the recirculated water rapidly clog the orifices. The turbo atomizer used in the Bayley Washer produces a steady, fine spray through a combination of low pressure and centrifugal force. The water is delivered to the center of a rapidly revolving cone shaped rotor provided with atomizing pins set in its periphery. This atomizer cannot clog, requires very little attention, and will operate successfully under low water pressure.



Bayley Turbo Air Washer Showing Turbo Atomizer and Eliminator

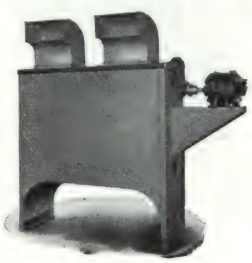
The spray is uniform, and there are never any spaces in the air washer that are not completely filled with a fine mist. Bayley Turbo Air Washers and Conditioners may be used for washing, cooling, humidifying, or dehumidifying, as required.

Bayley Plexifin Unit Heater

An experience record of many years has been brought into the development and perfection of this efficient heat machine, the Bayley Plexifin Unit Heater.

The heating element is the Bayley Chinookfin Heater, copper tubing with extended copper fin surfaces built on the approved and original Bayley Chinook "tube within a tube" principle. Its construction is unique; individual radiating tubes with individual feed through individual circulating pipes, no return bends, elbows or rigid connections, flow of steam, air, steam and water always in one direction, no air lock, steam hammer, or short circuiting—a heating element which remains sound and tight under all steam pressures and constant thermal changes.

The fan is of the multiblade type, the well known Bayley Plexiform. It furnishes a maximum volume of air against medium or low pressures, is quiet in operation, and permits the use of high speed motors. The standard bearing used is the Dodge timken roller of the pillow block type. The motor and fan assembly of the Plexifin Unit is designed and built for continuous operation over long periods of time with minimum attention for lubrication and maintenance.



These are but a few of many outstanding merits of this efficient heat machine for industry, for use where heating conditions are severe. Write for Bulletin No. 29-U giving complete information.

BUFFALO FORGE COMPANY

484 Broadway, BUFFALO, N. Y.

"Air Engineers for Over Fifty Years"

SALES ENGINEERING OFFICES

BOSTON, MASS., 10 Milk Street
CHATTANOOGA, TENN., 318 Volunteer Life Building
CHICAGO, ILL., 15 No. Jefferson Street
CLEVELAND, OHIO, 368 Rockefeller Building
CINCINNATI, OHIO, 605 Mercantile Library Building
DALLAS, TEX., 208 Construction Building
DENVER, COLO., 1621 17th Street
DETROIT, MICH., 2051 W. Lafayette Boulevard
GREENVILLE, S. C., P. O. Box 563
HARTFORD, CONN., 99 Pratt Street
INDIANAPOLIS, IND., 1125-27 Circle Tower
LOS ANGELES, CALIF., 610 Pershing Square Building, Hill Street at Fifth
MINNEAPOLIS, MINN., 459 North Western National Life Building
NASHVILLE, TENN., 117 Fifth Avenue
NEW YORK, N. Y., 39 Cortlandt Street
OMAHA, NEB., 923 W. O. W. Building
PHILADELPHIA, PA., 810 Land Title Building
PITTSBURGH, PA., 927 Union Trust Building
SAN FRANCISCO, CALIF., 365 Tenth Street
SEATTLE, WASH., 303 Alaska Building
ST. LOUIS, MO., 906 Chemical Building
TOLEDO, OHIO, 1817 No. 13th Street
WASHINGTON, D. C., 418 Washington Loan & Trust Building

COMPLETE LINE MANUFACTURED IN CANADA BY CANADIAN BLOWER & FORGE CO., LTD., KITCHENER, ONT.

Products

HEATING and VENTILATING EQUIPMENT, including: Home Ventilating Units, Multiblade Fans, Pipe Coil Heaters, Unit Heaters, Buffalo Air Washers, Exhaust Fans, Blowers, Dust Collectors, Disc Fans, Spray Nozzles, Mechanical Draft Fans, Drying Equipment, Multistage Blowers and Exhausters.

Complete illustrated literature on request.

Interior—Unit Installed and Operating

Home Ventilating Unit

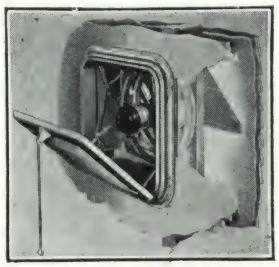
The Improved Buffalo All-steel Home Ventilating Unit is made for permanent installation in the wall of brick, stucco or frame residences. It is easily installed, and should be included in the architect's specifications wherever possible. When desired, it may be installed in buildings already erected by cutting a square hole in the wall.

The design of the box incorporates every advantage and improvement. The one-piece, die-formed steel doors are rigid and weatherproof. The fan has blades set at just the proper angle to handle a large volume of air at a comparatively low speed, thus assuring quiet operation. The fully enclosed motor is lubricated with wool-packed bearings.

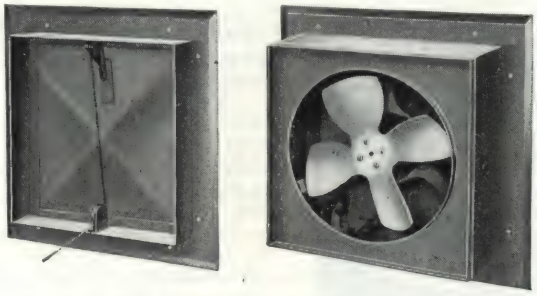
This unit may be installed in walls of varying thicknesses from 5¾ in. up, and only one pair of rods need to be adjusted to fit the box to the wall. Of importance are the doors, which are operated simultaneously by one lever, which also starts and stops the motor. A constant tension is maintained on both doors, making them rattleproof. In cold weather the doors keep out the cold when the fan is not in operation and due to the double construction, condensation does not form.

Exterior of Brick House—Unit Closed

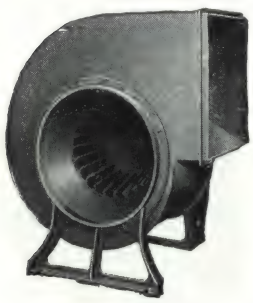
The 8-in. Home Ventilating Unit is excellent for apartment and other kitchens where wall space is limited. Easily installed, low in price and efficient.



Phantom View of 12-in. Home Ventilating Unit



Inside View of 8-in. Home Ventilating Unit



Silex Conoidal Fans

The Silex Fan is an improved type of ventilating fan, designed from our experiments and experiences to reduce audible noise to a minimum. The housing is a "rolled-up evase stack," converting air velocity leaving the rotor into static pressure. The cone is carried out beyond casing in order to get best conversion efficiency and to provide an extremely quiet stream line fan cut-off. They are particularly suited for direct connecting to motors.

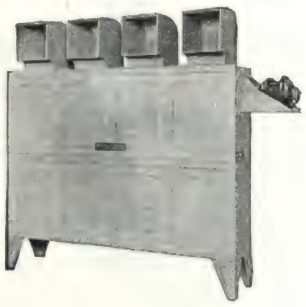
Double curved silex shells will deliver the desired air capacity even if the resistance is somewhat different than specified, and the horse power will not vary to any extent.

Unit Heaters

The Buffalo Highboy (shown) and Lowboy Heaters, units of large capacity, heat and ventilate large areas economically.

The heating coils and centrifugal fans are arranged for maximum efficiency. Every part is accessible for inspection.

Buffalo Wetboy efficiently cleans and moistens the air in addition to heating it. Removes 70% of the dirt and dust and adds 25% to 35% moisture to the air. The New Breezo-Fin Unit Heater consists of an improved fan and coil with self-adjusting louvers.



THE CINCINNATI VICTOR COMPANY

Manufacturers of Electric Ventilators

712-720 Reading Road

CINCINNATI, OHIO

REPRESENTATIVES IN ALL PRINCIPAL CITIES

THE VICTOR IN-BILT—DESIGNED FOR MODERN HOMES

Description

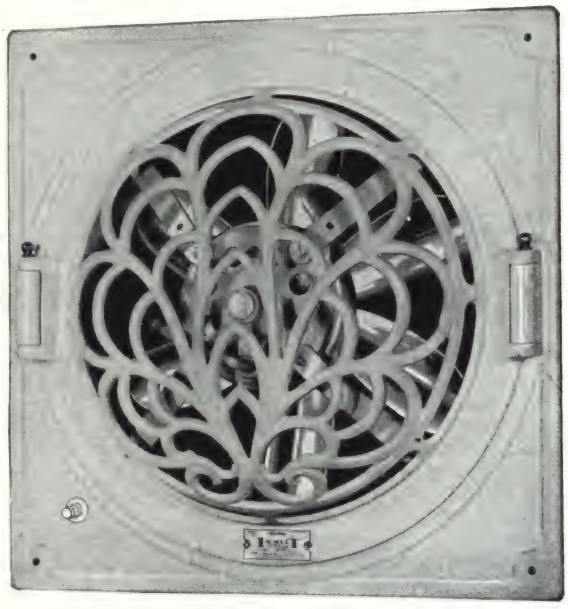
A masterpiece in engineering design, this new Victor In-Built Ventilator has many exclusive features which are evidence of its outstanding value. Its beautiful dome shaped grille gives it an unusually attractive appearance and also allows for an extremely large passage of air.

The outside weathertight shutters are opened and closed by a solenoid system which prevents rattling noises or interference by winds.

This system gives great efficiency and the extra current required is practically wattless.

A single wall switch, placed anywhere, opens the shutters and starts the fan. Motor is of the induction type and will not interfere with radio reception. It is equipped with a selective three-speed control so that the speed may be regulated to the movement of air desired. The six polished airplane type blades move over 600 cu. ft. of air per minute.

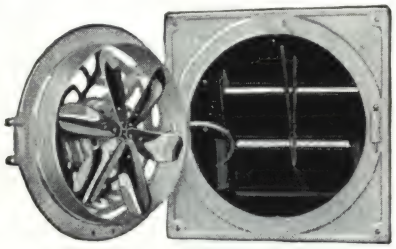
The Victor In-Bilt Ventilator fully meets the architect's requirements. It can be installed in any wall, frame or brick, of any thickness. This is truly a modern ventilator, beautiful, efficient and moderately priced.



In-Built Specifications

Built to operate on 110-v. 50 to 60-cycle alternating current only. Fan has six blades 12 in. in diameter—new airplane type. Motor is induction type, has no brushes or other parts to wear out and requires a minimum of attention. It will not interfere with radio reception. Bearings are phosphor bronze, self-aligning. Motor is provided with wick feed large capacity oil reservoirs. Shutters are positively operated by a pair of powerful solenoids. The dome is an ornamental casting of ferro alloy, hinged to swing open for easy access to moving parts. The standard finish of the dome is white enamel—parts exposed to the weather are finished in enamel baked on at high temperature. Shipped complete, ready to install with full installation instructions. Size A is for walls 7 to 13 in. thick. Size D is for walls 15 in. or thicker. Shipping weight 65 lb. crated. Can be easily installed in new or old buildings. Panel is 17 in. square.

Virtor TRADE MARK IN-BILT CLEAN-AIR



THE VICTOR PORT-AIR VENTILATOR

Ornamental Grating

All the most important features of the In-Bilt Ventilator are obtainable in this lower priced model. Its white enamel grating is 14½ in. square and fits snugly and inconspicuously against the wall. Shutter is opened and the fan put in motion simultaneously by releasing the chain control. It can be installed in walls of any material or thickness. Steel wall box furnished at slight extra cost.

Port-Air Specifications—Consists of exhaust fan and motor unit mounted on steel panel 13 $\frac{2}{16}$ in. square with single shutter, opened by spring and held closed by control chain when fan is not operating. Exhaust fan—12 in. in diameter with 6 polished airplane type blades; efficient and moves approximately 900 cu. ft. free air per minute, equivalent to moving all air in a kitchen 10x10x9 ft. once each minute.

Further Details

Write today for further details on these new Victor Ventilators.

Motor and Fan Assembly

DIEHL MANUFACTURING COMPANY

ELECTRICAL DIVISION OF THE SINGER MANUFACTURING COMPANY

Manufacturers of Electric Motors, Generators and Fans

ELIZABETHPORT, N. J.

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Products

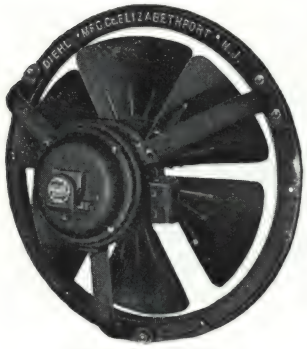
Motor Driven Ventilating and Exhaust Fans and Blowers.

Also Oscillating and Non-oscillating Desk and Bracket Fans; Ceiling Fans, Column Fans and Fans for Special Application.

For Diehl Heating and Ventilating Motors, see Manufacturers' Index.

Motor Driven Exhaust Fans (18 In. and Larger)

Diehl totally enclosed direct connected exhaust fans are intended for use in industrial plants, restaurants, hospitals, schools, public buildings, bakeries and wherever a large volume of air is to be moved. They are furnished in several types and sizes to meet the varying requirements of service and for all combinations of current, frequency and voltage generally used.



High Speed Fan

High Speed Type—Broad, shallow pitch blades, rotating at high speed, produce an exceptionally large movement of air for the size of the fan. This type fan is recommended when large and frequent air changes are required.

Low Speed Type—When quietness of operation is a factor this fan is recommended. It is equipped with scientifically designed deep pitched, pressed steel fan blades which effectively move large volumns of air without objectionable noise because of the slow speed of the fan wheel.

Mounting—Unless otherwise specified the motors are arranged to run in a horizontal position with the direction of the air current from the motor toward the fan. Fans can be furnished to operate vertically or to draw air through the fan toward the motor. Vertical fans with the motor above the fan are not recommended but will be furnished when desired.

Motors—The motors are totally enclosed to protect the internal parts from moisture, oil, dirt or other matter which might be injurious to the windings.

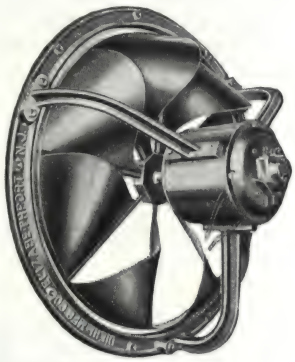
Bearings are of ample proportions, dustproof, and well lubricated to insure smooth running, long life, and maximum quietness of operation with least amount of care.

The direct-current motors are series wound and of liberal design to assure good commutation and low temperature rise. Hinged end covers on the commutator end afford easy access to the commutator and brushes.

The polyphase alternating-current motors are of the squirrel cage type having high efficiencies with low temperature rise.

The single-phase motors for the small fans are induction type which are particularly adapted to exhaust fan service. The single-phase motors for the large fans are straight repulsion type having the same general characteristics as the direct-current motors.

Speed Control—Speed regulators to give 50% reduction in speed can be furnished for direct-current fans. Polyphase and single-phase motors are designed for starting by line switch.



Low Speed Fan

Small Ventilating Fans (9, 12, 15 and 16 In.,

Bucket Blade Fan

For use where the volume of air to be moved is not large, a line of small ventilating fans fitted with bucket blades is manufactured in sizes of 9, 12 and 15-in. diameter. In proportion to their size, these small fans handle a comparatively large volume of air. They possess the same general characteristics as the large fans but are intended for lighter duty.

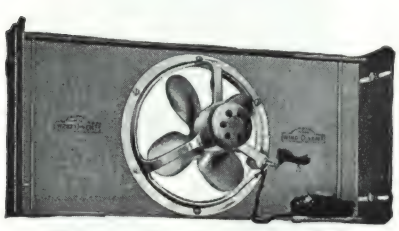
Small ventilating fans with flat blades are also manufactured for use in the ventilation of small enclosures, such as, offices, lavatories, etc., where the amount of air to be moved is small and quiet operation is desired. They may readily be installed in transoms, window frames or light partitions. Sizes 12 and 16-in.

The motors are totally enclosed and operate at low temperatures. The alternating-current motor is of induction design with a substantial winding that will not burn out even if the motor should be stalled across the line. This is the result of a careful study of the application by our engineers.

Direct-current motors are series wound.

Flat Blade Fan

Wind-O-Vent Ventilators



Window Ventilator (10 In.)

Obtainable with either glass or metal panel

Wind-O-Vent Window Ventilator—An unusually attractive, yet efficient ventilating unit which may be quickly installed in the kitchen, or any other room in the house, for the quiet and thorough removal of cooking odors, smoke, steam, etc. Its installation does not interfere with the raising or lowering of the windows nor prevent the hanging of curtains and shades.

Blades, motor housing and fittings are of highly polished cast aluminum, mounted on a metal panel finished in pearl gray enamel or a plate glass panel with chrome plated fittings.

Panels are adjustable in length, obtainable in several sizes to fit windows varying from 17 to 63 in. in width.

Furnished for 110-volt a-c., 60 and 25 cycles and 110-volt d-c., service with pull switch, 10-ft. connecting cord and attachment plug.

Wind-O-Vent Wall Cabinet Ventilator—The Wind-O-Vent Wall Cabinet may be installed in any wall—brick, concrete or mill constructed. Equipped with standard Wind-O-Vent fan assembly. Requires wall opening 13⅛ in. square.

Cabinet containing ventilating unit fits flush with inside wall. Louvers fit flush with outside wall. The two units are connected by flexible cable.

Wall Cabinet Ventilator

Continued on next page

EXHAUST AND VENTILATING FANS

Ratings, Air Deliveries and Weights

LARGE HIGH AND LOW SPEED TYPES

Diam. of wheel, in.	Rated hp. of motor	Approx. speed, r.p.m.	Motor frame	¶Approx. cu. ft. air per min.	Approx. net wt., lb.
Direct-current—Series Wound‡					
18	1/6	850	GBT-299†	2775	75
18▲	1/4	1140	GBT-299†	4000	80
24	1/3	625	G-301	4900	220
24▲	1/2	850	G-401	6500	290
30	1/2	475	G-401	8200	290
30▲	1/2	670	G-302	9150	325
36	3/8	470	G-403	12400	400
36▲	3/4	570	G-403	14400	415
42	1	425	G-304	17600	585
48	1 1/2	370	G-405	19500	750
Alternating-current—Single-phase*					
18	1/6	850	GBF-299†•	2775	75
18▲	1/4	1140	GBA-299†•	4000	80
24	1/3	575	GBF-399†•	4375	210
24▲	1/2	750	R-305§	5500	110
30▲	1/2	670	R-310§	9150	165
36▲	3/4	570	R-325§	14400	250
Alternating-current—2 and 3-phase*					
18	1/6	850	GBP-299†	2775	75
18▲	1/4	1140	GBP-299†	4000	80
24	1/3	575	GBF-399†	4375	210
24▲	1/2	850	IDE-11	6500	230
30	1/2	475	IDE-31	8200	280
30▲	1/2	670	IDE-31	9150	270
36	3/8	475	IDE-32	12400	350
36▲	3/4	570	IDE-32	14400	360
42	1	430	IDE-71	17580	525
48	1 1/2	430	IDE-7	21300	620

▲Diehl High Speed Exhaust Fan.

†These motors are equipped with ball bearings.

‡These motors can be supplied with regulators to give 50% speed reduction.

¶Volume of air moved applies for free circulation only. If movement is impeded by pipes, ducts or other obstructions the quantity will be materially reduced.

*Obtainable for all standard electrical circuits up to 550 volts a-c. and 500 volts d-c.

•Induction type single-phase.

§Repulsion type single-phase.

SMALL BUCKET BLADE AND FLAT BLADE TYPES

Diam. of wheel, in.	†Approx. speed, r.p.m.	Approx. cu. ft. air per min.	Volts	Catalogue No. D-c.	Catalogue No. A-c. 60-cycle	Approx. net wt., lb.
Small Bucket Blade Ventilating Fans						
9	1600	950	110	3900	3901	15
9	1600	950	220	3902	3911	15
12	*1500	**1575	110	3200	3201	21
12	1350	1400	220	3202	3211	21
15	1100	2400	110	3500	3501	32
15	1100	2400	220	3502	3511	32
Small Flat Blade Ventilating Fans						
12	1100	720	110	2200	2201	18
12	1100	720	220	2202	2211	18
16	1070	1200	110	2600	2601	29
16	1070	1200	220	2602	2611	29

†Wall type speed regulators can be furnished for direct-current fans only.

*Direct current 1350 r.p.m.

**Direct current 1400 cu. ft. air per min.

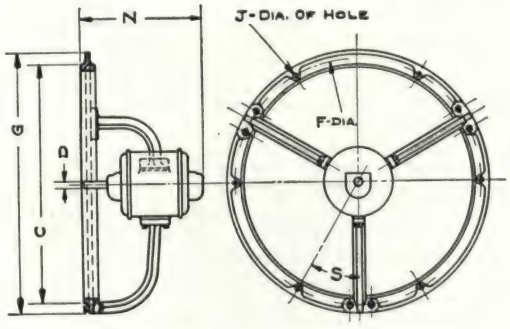
How to Determine Correct Size of Fan—

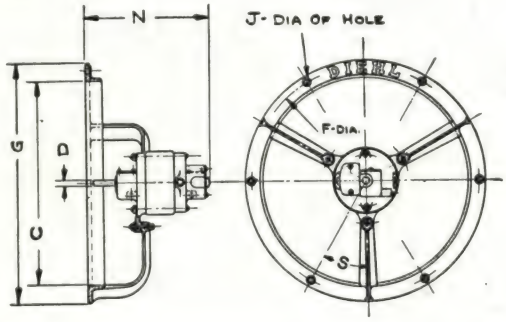
Determine the cubical contents of the room and divide this by the number of minutes in which the air should be changed as given in table below. The result will be the necessary air delivery per minute required. A fan should be selected with capacity equaling this figure.

Kind of room	Number of minutes in which air should be changed
Office	6–10
Kitchen	3– 5
Smoking room	3– 5
Lodge room	7–10
Theaters	7–10
Toilets	3– 5
Garages	5– 7
Bakeries	3– 5
Engine rooms	2– 5
Laundries and dry-cleaning plants	5– 7
Plating and galvanizing rooms	7–10

Auditoriums and theaters should have an air change of 20 to 40 cu. ft. per person per minute.

Approximate Dimensions, Inches





LARGE HIGH AND LOW SPEED TYPES

Diam of wheel, in.	C	F	G	J	D-c. motor D	D-c. motor N	A-c. motor D	A-c. motor N†	A-c. motor N‡	S	Number of bolt holes
High Speed Exhaust Fans											
18	19 1/2	20 3/4	22	7/16	1/2	11 1/32	1/2	10 1/16	.....	30°	6
24	25 7/8	2. 1/2	29 1/8	7/16	1	17 15/16	3/4	12 13/16	14 15/16	30°	6
30	32 1/8	33 7/8	35 1/2	9/16	1	19 15/16	1	1, 1/2	17 1/2	30°	6
36	38 1/4	40 1/4	42 1/4	9/16	1	21 5/8	1	1 9/16	20 13/16	20°	9
Low Speed Exhaust Fans											
18	19 1/2	20 3/4	22	7/16	1/2	12 1/32	1/2	10 7/16	.....	30°	6
24	25 7/8	27 1/2	29 1/8	7/16	3/4	1 5/16	3/4	11 1/8	.....	30°	6
30	32 1/8	33 7/8	35 1/2	9/16	1	13 1/4	1	16 1/16	.....	30°	6
36	38 1/4	40 1/4	42 1/4	9/16	1	21 5/8	1	18 1/4	.....	20°	9
42	43 3/4	46	48	9/16	1 1/16	22 15/16	1 1/16	19 3/4	.....	20°	9
48	51	54	56 1/4	11/16	1 3/16	2 7/16	1 3/16	22 7/8	.....	20°	9

†18 and 24-in. induction type. ‡24, 30 and 36-in. repulsion type.

SMALL BUCKET BLADE AND FLAT BLADE TYPES

Diam. of wheel, in.	C	D	F	G	J	N D-c. motor	N A-c. motor	S	Number of bolt holes
Small Bucket Blade Ventilating Fans									
9	9 1/8	3/8	11 1/4	12 1/4	5/16	8 11/16	8 1/8	30°	6
12	12 7/8	3/8	14 1/4	15 1/4	5/16	8 11/16	8 7/8	30°	6
15	16	1/2	17 3/4	18 3/4	5/16	9 11/32	9 9/16	30°	6
Small Flat Blade Ventilating Fans									
12	12 7/8	3/8	14 1/4	15 1/4	5/16	8 11/16	8 1/8	30°	6
16	16 3/4	3/8	18 1/2	19 3/4	5/16	9 7/16	9 5/8	30°	6

Continued on next page

Oscillating and Non-oscillating Desk and Bracket Fans

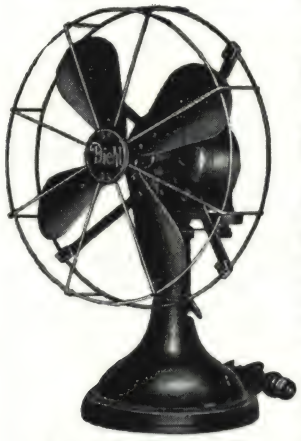
Diehl desk and bracket fans are the results of 40 years' experience in electric portable fan manufacture and are notable for efficiency, dependability, long life and attractiveness of appearance.

Scientific development of the blade contour produces maximum air delivery with practically noiseless operation. Motors are of liberal design, well insulated, cool running and free from vibration.

Finish—The 9-in. Aristocrat Fan is completely finished in bronze. All other fans are finished throughout, including blades, in Softone black, a durable lacquer finish which is attractive and easy to keep clean. Special facilities are available for furnishing all types of fans in colors to match interior decorations in any type of building. An added touch of distinction may be obtained by having the name of hotels, restaurants, clubs, etc., cast on the fan base.

The Aristocrat, 9-in., 6-blade, Bronze Finish

Mounting—A wing screw on the standard of all fans permits adjustment for desk use or wall mounting. A felt pad on the base of each fan protects polished surfaces. Three screw-holes are provided in the base for wall mounting and an additional hole for fan hanger mounting.



12-in. Oscillating Fan, Softone Black Finish

Speeds—The 9-in. standard and the 9-in. Aristocrat are single speed fans. All other fans are furnished with speed regulators in base enabling the user to vary the breeze to suit requirements. These regulators are also used for starting and stopping the fan.

Motors—Alternating current fans have self-starting induction type motors, without brushes or centrifugal switches, for 60 and 50-cycle 9, 10, 12, and 16-in. fans, and for 40-cycle 12 and 16-in. fans. All 25-cycle, 9 and 10 in., 40-cycle, and direct-current fans have series wound motors.

Voltages—The 9-in. fans are furnished for 110-volt a-c. (any cycles) and for 110 and 32-volt d-c. circuits. All other fans are obtainable for all standard alternating and direct-current circuits.

Lubrication—Fans are shipped from the factory packed with sufficient lubricant for a year's normal operation. A tube of special Diehl grease is packed with 12 and 16-in. oscillating fans.

Equipment—All fans are equipped with sturdy straight spoke guard (which may be used as a handle for carrying fan) 8-ft. cord and attachment plug.

Types—***The Aristocrat***—A 9-in., 6-blade single-speed oscillating fan completely finished in bronze. Recommended wherever beauty of appearance and extremely quiet operation are essential factors. Excellent for hospitals, homes, beauty parlors, telephone booths, elevators, etc.

9-in. Fan—Four-blade, single-speed oscillating and non-oscillating fan for use in small rooms, telephone booths, elevators, etc.

10-in. Fan—Four-blade, speed regulator equipped, oscillating and non-oscillating fan of intermediate size for homes, small offices, stores, etc.

12-in. Fan—Four-blade, three-speed, oscillating and non-oscillating fan of size generally used in medium sized offices, stores, restaurants, etc.

16-in. Fan—Four-blade, three-speed oscillating fan equipped with deep pitch duralumin blades which move a large volume of air without noise or vibration. For use in large offices, stores, restaurants, theaters, clubs, hotel lobbies, etc.

16-in. Oscillating Fan, Softone Black Finish

Ceiling Fans

32-in. a-c. Ceiling Fan, with Pull Switch

Diehl ceiling fans were first offered to the public in 1888. Year by year, as experience dictated, improvements and modifications have been made until today they are recognized as the acme of simplicity, ruggedness, quiet operation, attractiveness and symmetry of design.

Types—32 and 52-in. a-c. with regular pull or snap switch, or equipped with globe holder, for 110 and 220 volts, 60, 50, 40 and 25 cycles. 56-in. d-c. with regular pull or snap switch for 110, 220, and 32 volts.

Finishes—52-in. a-c., Softone black with walnut blades. 32-in. a-c., French Gray throughout including blades. 56-in. d-c., black enamel with mahogany blades. Special plated or sprayed finishes furnished when required.

Speed—Fans are regularly supplied with three-speed regulators (25-cycle single speed only), but single-speed fans can be furnished when specified.

Fans with globeholders, largely used for office buildings, stores, hotels, etc., are generally controlled from wall switches for both fan and light. They are regularly furnished with three-speed switches on top of the motor for setting the speed, operation being controlled from the wall switch. Provision has been made, however, for attaching pull switches for any combination of fan and light control to meet special requirements.

52-in. a-c. Ceiling Fan with Snap Switch

Equipment—All fans are regularly furnished with ceiling canopy, insulated loop, and ceiling hook but without hanger pipe, for which ¾-in. conduit is suitable on the 52 and 56-in. sizes and ½-in. conduit on the 32-in. size. Hanger pipes can be supplied when specified.

A can of gray enamel is furnished with the 32-in. fan for finishing the hanger pipe.

Motors—Alternating-current fans have self-starting induction type motors without brushes or centrifugal switches. Direct-current fans have series wound motors with liberal armature, field coil and brush capacity.

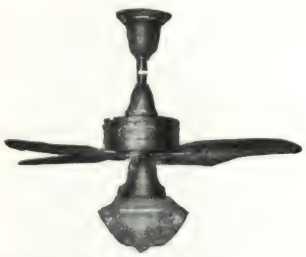
Blades—Fans are regularly equipped with four blades for down-draft. Up-draft blades supplied when specified.

52 and 56-in. fan blades are of wood. 32-in. fan blades complete with bladeholders are stamped from duralumin, a non-rusting lightweight metal.

Lubrication—A can of oil with directions for oiling is packed with each fan.

52-in. a-c. Ceiling Fan with Globe Holder

56-in. d-c. Ceiling Fan with Snap Switch



32-in. a-c. Ceiling Fan with Globe Holder

Continued on next page

Special Purpose Fans

Gyrocone Ceiling Fan—

Designed for use in hotels, restaurants, theaters, residences, offices, etc., which require efficient yet noiseless air distribution, without direct draft, and where appearance is an important factor. A distinctive feature is the seeming absence of moving vanes, the fan being entirely enclosed, giving the impression of a handsome dome light rather than a ventilating unit and making it difficult to determine the source of the breeze. The many advantages of this feature are readily apparent.

The Diehl Gyrocone Ceiling Fan consists of a sturdy 12-in. fan which gyrates through 360° at an angle of 27° from the vertical, providing a spray of air downward through an angle of 54°. Eight complete revolutions per minute cover a greater area than is possible with other types of fans. This unique principle of operation keeps the air constantly in circulation with unusual smoothness and without directed breeze in any one direction.

Gyrocone Ceiling Fan

Operating parts are enclosed in dustproof iron housings and all moving parts are ball bearing equipped. Lubrication reservoirs are sufficient to insure continuous operation under normal conditions, over a period of two years without attention.

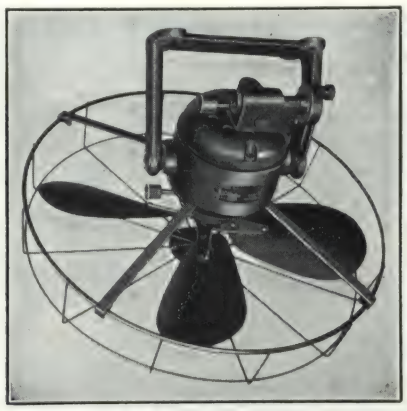
Furnished for all standard alternating and direct-current circuits.

The grilled guard illustrated is only one of a number of dignified and graceful designs which permit the adaptation of this fan to any particular style of decoration. Can be furnished in special finishes or colors.

The Gyrocone Ceiling Fan can be furnished for stem suspension for use in rooms having high ceilings.

Creel Type Ceiling Fan—

This fan was developed especially for use on creels in textile mills to prevent the lint clogging the guide spools and causing an uneven yarn, and for this purpose it is unexcelled. It has also been successfully adapted to textile mill warpers. Its use is not confined, however, to these methods of application. Restaurants, kitchens, bakeries, etc., have found it valuable, when placed over the doors as a means of preventing the entrance of flies. They have also been installed in lunch cars, where space is at a premium, both for ventilation and as fly-chasers.



Creel Type Ceiling Fan

The creel type fan consists of either a 12 or 16-in. 4-blade, oscillating fan, ball bearing mounted in a ceiling type supporting bracket. Oscillation is fixed at 90° and is not variable.

Lubrication reservoirs provide for continuous operation for one year under normal conditions without attention.

Standard finish including the blades is Softone black, attractive, durable and easily cleanable. Special finishes and colors can be supplied when specified.

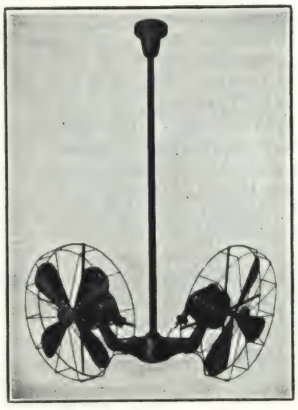
Furnished for all standard alternating and direct-current circuits.

Duplex Oscillating Fans—

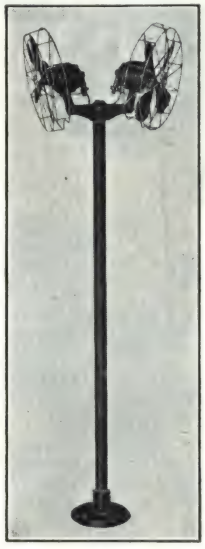
Hotels, restaurants, theaters, bakeries, telephone operating rooms, etc., have found Diehl duplex fans invaluable for large volume, localized air movement with an absence of noise and vibration.

Each fan oscillates through a maximum of 90° and may be adjusted for shorter oscillation or tilted up or down to direct the breeze where it is most needed.

They consist of two sturdy 12 or 16-in. oscillating fans fastened to a double arm bracket for either floor or ceiling mounting. Ceiling type fans are regularly furnished with ceiling canopy, insulated loop and ceiling hook but without hanger pipe for which ¾-in. conduit is suitable. Floor type fans are furnished with base for floor mounting but without pipe standard. For this purpose 2-in. conduit may be used.



Ceiling Mounting



Floor Mounting

Duplex Oscillating Fans

The method of lubrication insures continuous operation for one year, under normal conditions, without attention.

Regularly finished in Softone black, a durable lacquer finish which is attractive and easy to clean. Supplied in special finishes or colors when specified.

Furnished for all standard alternating or direct-current circuits.

Special Fan Development—

The cumulative ideas resulting from the DIEHL MANUFACTURING COMPANY'S forty years of experience in the design and construction of ventilating equipment are at your disposal for the development of fans or fan motors for new or unusual application.

Special facilities are available in the Engineering as well as the Production Divisions to enable this character of work to receive preferred attention, and we shall be glad to offer suggestions or submit samples without obligation on any ventilating problems with which you may be confronted.

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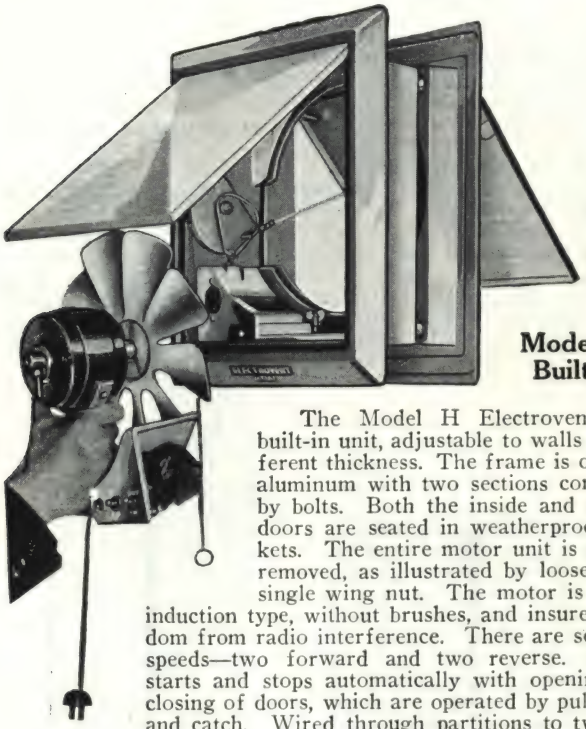
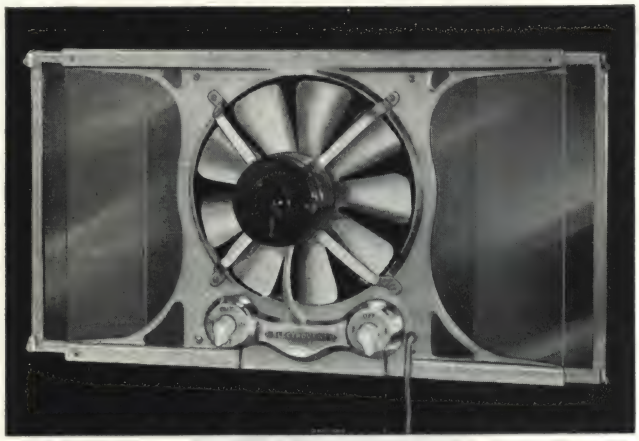
A complete line of ELECTRIC VENTILATORS, for the home, both Built-in Units and Portable Units, in a wide range of prices and styles.



Model H Built-in

The Model H Electrovent is a built-in unit, adjustable to walls of different thickness. The frame is of solid aluminum with two sections connected by bolts. Both the inside and outside doors are seated in weatherproof gaskets. The entire motor unit is quickly removed, as illustrated by loosening a single wing nut. The motor is of the induction type, without brushes, and insures freedom from radio interference. There are selective speeds—two forward and two reverse. Motor starts and stops automatically with opening and closing of doors, which are operated by pull chain and catch. Wired through partitions to two terminals provided in cabinet. No additional wiring or connections required.

Frame size: 11¼ in. wide, 12¼ in. high. Flanges extend 1¾ in. on all sides. Fan diameter, 10 in. Air capacity, 750 cu. ft. per minute at high speed; 500 at low speed.



Imperial Model A

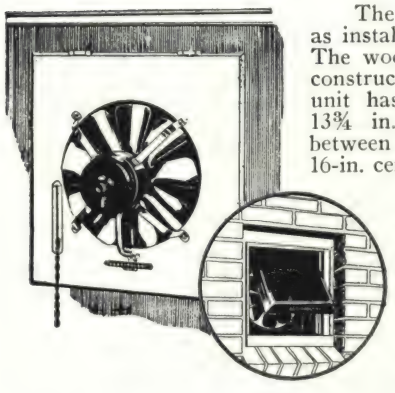
Portable for window installation in upper or lower sash. Induction type motor, two speeds forward, two reverse. Polished aluminum frame, with panels of clear plate or Florentine glass. Rotary type switches, indicating position, operated by pull cord or snap button. Aluminum 10-in. fan, with 9 blades. Adjustable in width, with sizes to accommodate windows from 19 in. to 47 in.

Complete with mounting strips for upper or lower sash, and necessary wiring connections.

Air capacity, 750 cu. ft. per minute at high speed; 500 at low speed.

General

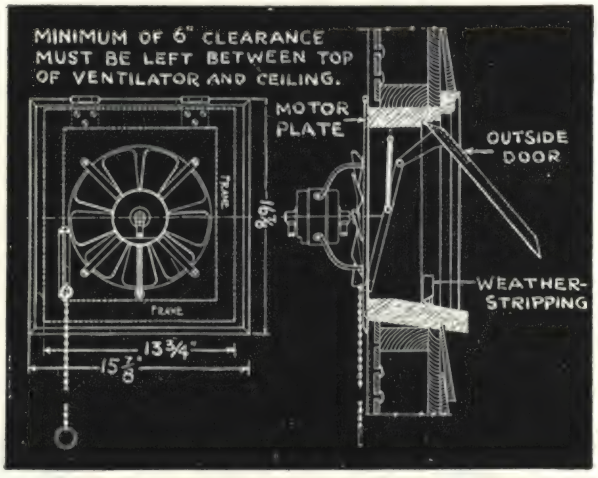
All Electrovent models are furnished standard for 110-volt, 60-cycle a-c., complete with necessary connections. Motors for other voltages, frequencies and direct current can be supplied at slight additional cost.



The installation is the same as installing a door or window. The wooden frame of standard construction furnished with the unit has an over-all width of 13¾ in. The Electrovent fits between standard studding with 16-in. centers. Distance between headers, 16 in. The inside panel carrying motor and fan is screwed and hinged to inside face of frame. Screw-holes are already located. Only standard wiring is required between the junction box and the remote control switch.

Model B—Induction type motor. No brushes or radio interference. Two speeds forward and two reverse. Remote control switch, and control positions, for high and low speeds, forward and reverse, clearly indicated. Weatherproof outside door, screened when desired.

Multiple blade, 10-in. fan. Air capacity, 750 cu. ft. per minute at high speed; 500 at low. Complete with standard wood frame.



Model J—Single speed, exhaust type. Similar in appearance to Model B, but designed to sell at a lower price.

10-in. fan and pull cord control. Weatherproof outside door. Air capacity, 600 cu. ft. per minute. Comes complete with standard wood frame.

THE EMERSON ELECTRIC MFG. CO.

Portable Fans, Ceiling Fans, Exhaust Fans and Accessories

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BRANCH OFFICES

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PORTABLE OSCILLATING and NON-OSCILLATING FANS; CEILING FANS; EXHAUST FANS; VENTILATING FANS; AUTOMATIC SHUTTERS, MOUNTING PANELS and WALL BOXES for ventilating fans.

Also makers of Electric Motors, 2 hp. and smaller, for all commercial circuits and purposes.

An Engineering Department will advise architects.

Guaranteed

Emerson exhaust and ventilating fans are guaranteed against electrical or mechanical defects for one year from date of purchase.

Emerson oscillating, non-oscillating and ceiling fans are sold with a 5-year factory-to-user guarantee which is applicable in any quantity.

Exhaust Fans

Sizes 12 to 36 in. Efficient, quiet fans with capacities of from 1000 to 10,000 cu. ft. of air per minute. Fully enclosed, cool running alternating and direct-current motors with extra large oil reservoirs, wool packed, requiring only infrequent lubrication. Temperature rise less than 40° C. Bulletin with details on request.

2758

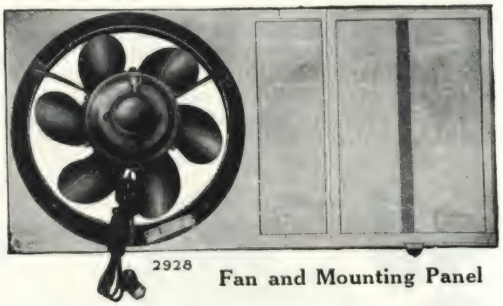
Exhaust Fan

Ventilating Fans

Sizes 9, 12 and 16 in., motor driven type; capacities 500 to 1575 cu. ft. of air per minute. Lower priced than exhaust fans described above. Designed primarily for domestic service. Fan shown with mounting panel is 12-in. size. 9-in. size, 4 blade; 12 and 16-in. sizes, 6 blade.

Mounting Panels

Mounting panels can be furnished for 9 and 12-in. ventilating fans only. Panels for 9-in. fans are metal with pebbled glass inserts suitable for windows from 26 to 38 in. in width. Wood mounting board can also be furnished for this type.



2928

Fan and Mounting Panel

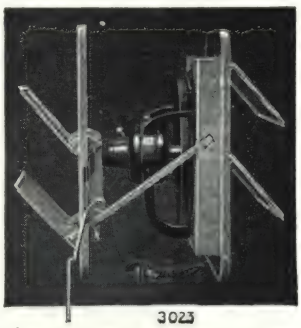
Panels with glass inserts and all-metal panels can be furnished for 12-in. ventilators. Panels with glass furnished in two sizes adjustable for windows from 27 to 46 in. in width. Three sizes of all-metal panels adjustable for windows 22 to 46 in. in width. These inexpensive combinations are especially desirable for domestic kitchens.

Wall Boxes

Equipment includes an Emerson 12-in. Ventilating Fan and inside and outside panels for permanent installation.

The inside dimensions of the wood jamb to receive this fan equipment should be 16 in. wide by 17 in. high on the interior side of the jamb and 16 in. wide by 17½ in. high on the exterior side of the jamb.

Adjustable for walls 10 to 15 in. thick. Handle operates doors and switch, single speed. Finished in French gray over all parts of box. Fan in black enamel over all parts.



3023

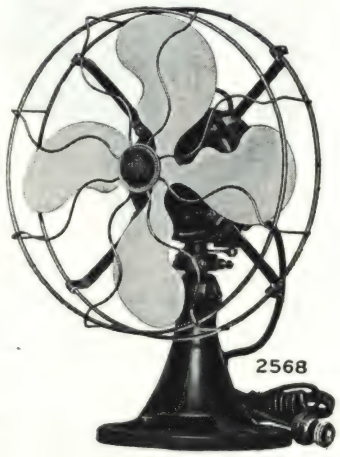
Emerson Ventilating Fan with Wall Box

Automatic Shutters

A full line of aluminum-leaf automatic shutters can be supplied in sizes suitable for 12, 16, 18, 24, 30 and 36-in. exhaust fans. They effectively shut out rain and cold air when fan is not in use.

Portable Fans

Emerson oscillating and non-oscillating fans are made in 8, 9, 10, 12 and 16-in. sizes for alternating and direct current, all with three speeds except the lower priced single speed Emerson Junior fans. Emerson fans have many unique and valuable features and are standard equipment in many hotels, hospitals, office buildings, industrial plants and chain stores throughout the country.



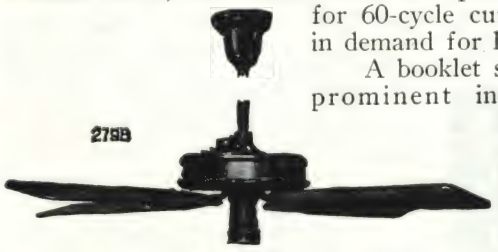
2568

Portable Fan

Ceiling Fans

Emerson alternating and direct-current ceiling fans of the type shown below (4-blade 56-in. sweep) are the most popular for commercial use, but a 6-blade, 32-in., 4-blade 36-in., and 4-blade 52-in. sweep can be supplied for 60-cycle current and are in demand for hotels, etc.

A booklet showing many prominent installations of Emerson fans in large office buildings and hotels will be sent on request.



2788

Ceiling Fan

Bulletins

Descriptive bulletins with complete, detailed data will be sent promptly on request.

ILG ELECTRIC VENTILATING CO.

Fans, Blowers, Exhausters and Unit Heaters

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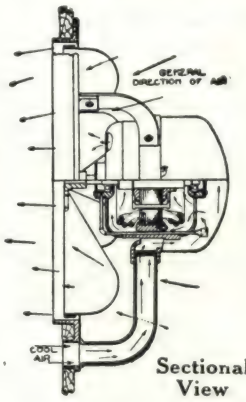
A complete line of DIRECT CONNECTED ELECTRIC PROPELLER FANS; EXHAUST FANS; HEATING and VENTILATING FANS; UNIVERSAL MULTIBLADE BLOWERS and EXHAUSTERS, direct connected and belted; VOLUME BLOWERS; AUTOMATIC LOUVERS and SHUTTERS; ILGAIR UNIT HEATERS; RESIDENCE KITCHEN VENTILATORS.

ILG Ventilation — *For Offices, Stores, Factories, Public Buildings, Theatres, Restaurants, Homes, etc.*

Also manufacturers of Farm Power Ventilators; Power Roof Ventilators; Steel Plate Fans; Ready-to-run Ventilating Sets; Mechanical Draft Apparatus; Fans and Blowers for drying; Humidifiers; Air Washing Systems; Furnace Fans.

Ilg Self-cooled Motor Propeller Fans

Used for general exhaust ventilating in industrial plants, restaurants, schools, halls, churches, residences, banks, stores,

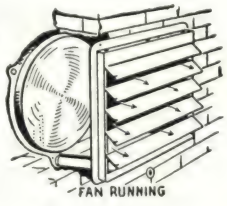


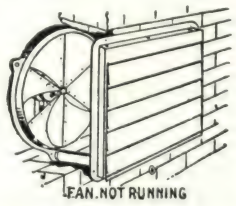
Sectional View

public buildings, theaters, etc. The self-cooled motor feature makes the fan especially effective in handling gases and extreme heat as high as 400° F. Furnished with full enclosed direct connected motor for any current or voltage. Sizes, 12 to 72 in.; capacities, 950 to 40,000 cu. ft. per min.

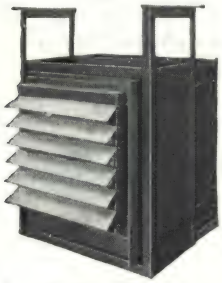
Automatic Shutters

Automatic shutters are used on the outside of propeller fans to protect fan when not running.





When fan is running, shutter is held open by the force of the air current. When fan is shut off, shutter closes automatically by gravity. Shutters built of special, hard rolled, aluminum leaves pressed on Whitney alloy, copper coated rods, supported in cast iron frame. Sizes, 12 to 72 in. square.



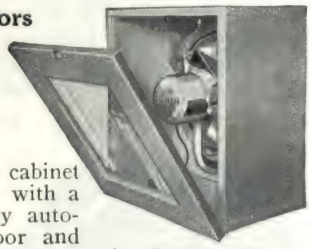
Ceiling Type
Also made in floor style

Ilg Unit Heaters

Circulate heat at floor where it belongs. Consist of cabinet with heating coil, through which cold air is pulled and forced out at front by an Ilg self-cooled motor fan. Deflector forces heat waves towards floor. Most economical system for large open spaces.

New Ilgair Kitchen Ventilators

The new built-in type of the Ilgair electric ventilator provides for permanent wall installation and can be installed at a surprisingly low cost. It comes complete—cabinet, fan, louver and all necessary hardware. The cabinet itself is finished in white lacquer with a glass-paneled door. It is entirely automatic in operation—open the door and the fan starts; close the door and the fan stops. Sizes, 12 and 16 in.

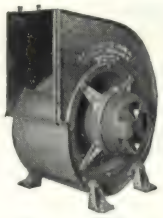


Inside View Showing Door Open

Universal Multiblade Blowers

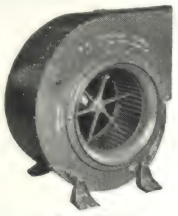
Motor is machined circular and held in cast iron ring bolted to housing, avoiding necessity of pedestal. Bowl is bolted to cast iron side of blower.

Wheel is mounted directly on motor shaft and, as motor is pushed against bowl, hub of wheel is close to motor bearing, giving small overhang. No bearings exposed in suction or inlet; all reached on motor side.



Motor Side

Ilg Multiblade Wheel



Inlet Side

Blades of Ilg multiblade wheels are electrically welded to steel retaining rings. Hubs, cast steel. The features are lightness, great strength, central suspension and drive. Blower and motor are guaranteed as a unit; no split responsibility between blower and motor manufacturers. Furnished with any angle of discharge. Also furnished for belt drive. Sizes from 25 to 90 in.

Type "P"

Volume Blowers

Type "P"—10, 15 and 20 in.—for exhausting air, dust, acid fumes, etc. at high pressures. Type "V" for exhausting air at low velocities and quiet operation.

Type "V"

Literature

Ask for any or all of these new pictorial bulletins:

Ilg Blower Catalog
Ilg Condensed Catalog—48 pages
Ilg Data and Price Sheets
Ilg Blower Bulletin
Ilgair Furnace Fan
Ilgair Kitchen Ventilator Data
Ilg Power Roof Ventilator Bulletin
Ilg Unit Heater Bulletin
Ilg Portable Floor Fan Circular

THE PEERLESS ELECTRIC CO.

WARREN, OHIO

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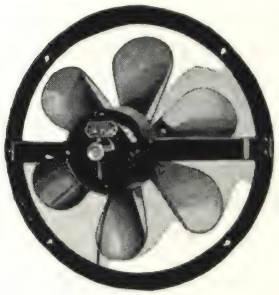
MOTOR DRIVEN VENTILATING and EXHAUST FANS; WALL and WINDOW VENTILATORS; OSCILLATING DESK and BRACKET FANS; FURNACE FANS.

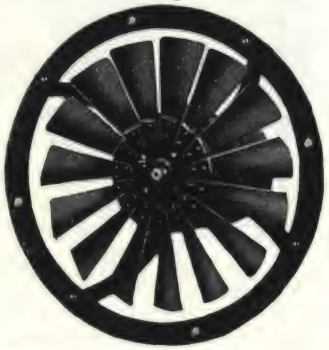
Also Alternating and Direct-current Motors.



Motor Driven Exhaust Fans

6-Blade Type—Sizes 12 to 16 in. Recommended for smaller stores, restaurants, offices and kitchens. Mounted on welded steel frames. Polished brass blades. 12 and 16-in. sizes can be furnished with 3-speed control and switch. Manufactured in both horizontal and vertical mountings. Alternating or direct current.

Multiblade Type—Sizes 12 to 30 in. The 12 and 14-in. models provide a medium size fan for small restaurants, dining rooms and large home kitchens. The 18, 24 and 30-in. models meet any difficult ventilating job in hotels, clubs, industrial plants, auditoriums or other locations where a large volume of air is to be moved. The 12-in. size, one-speed motor; larger sizes, two-speed motor. Manufactured in both horizontal and vertical mountings. Vertical mountings have ball-bearing motors. Alternating or direct current.



Peerless Exhaust Fan Louvers

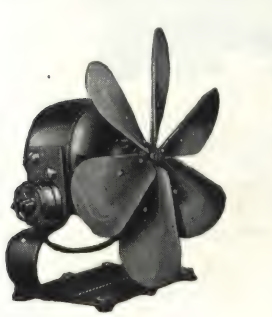
A size for every Peerless Fan. Steel frames painted. Louvers of aluminum. Shutters open when fan starts; close when fan stops. High quality mechanism insures smooth operation at all times.

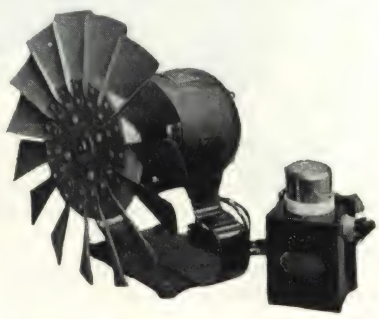
Peerless Furnace Fans

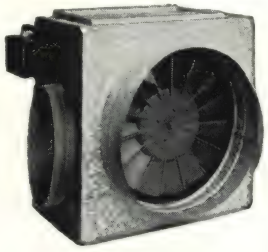
Six-blade and multiblade types. Peerless Furnace Fans provide forced heat ventilation in warm air furnaces, driving heat to distant rooms and reducing radiation losses from furnace and pipes. Silent in operation. *Does not interfere with radio reception.* All alternating-current fans are *two-speed;* direct-current fans are *one-speed.*

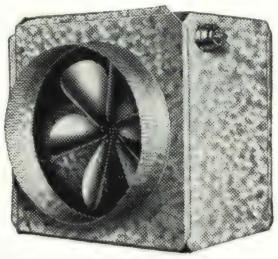
Peerless Junior Furnace Fan—Made in 6-blade and multiblade styles. Designed for furnaces with only one cold air return. This type is installed in the cold air boot through a slide in the side of the boot. Two-speed control. Made in 12 and 16-in. sizes. The 16-in. size recommended where cold air boot is large enough.

Peerless Senior Furnace Fan—Made in 6-blade and multiblade styles. Designed for installation outside of cold air returns. Both fans are enclosed in galvanized iron housings and work upon the syphon principle; air is set in motion in all cold air pipes through suction, thus setting up pressure in bonnet of furnace.









Peerless Furnace Fans meet the requirements of forced ventilation for homes of from 12,000 to 70,000 cu. ft. and furnace fire boxes of from 18 to 33 in.

Wall Type Ventilator

A complete factory assembled unit for kitchen, bedroom or bathroom. Powerful Peerless built fan enclosed in heavy galvanized steel housing, painted. All exposed parts of polished aluminum. Attractive aluminum grille conceals motor from view. Control cord starts motor and at same time opens outside shutter by means of lever arm. Leverage device subject to tension thus preventing vibration and insuring positive seal against weather. Two-speed fan with improved blade design. Single cord controls both speeds. Motor proved on thousands of installations. Induction type; *does not interfere with radio reception.* Length of housing from front to back, 9⅛ in. Wall opening required, 14¼ in. square.

Peerless Desk and Ceiling Fans

Desk Fans—Made in oscillating styles. In 10-in. size with one-speed control and in 12 and 16-in. sizes with three-speed control.

Ceiling Fans—Available in single or three-speed types, with varying size blades, with and without light fixtures attached.

Peerless Window Ventilators

These are quickly and easily installed in either the upper or lower part of a window for the removal of smoke, steam, cooking odors, etc. The fan is capable of moving 600 cu. ft. of air per minute. Window pulls are provided for convenience in opening or closing window. Made in adjustable sizes to fit windows varying from 22 to 28 in.; 28 to 34 in.; 34 to 40 in.; 40 to 46 in. in width. Motor is reversible so that fan will blow air either *into* or *out* of room. *Motor does not interfere with radio reception.*

ESTABLISHED 1923

PRYNE & CO., INC.

Manufacturers of Domestic Electric Ventilators and Building Specialties

791-793 East 15th Street, LOS ANGELES, CAL.

BRANCH SALES OFFICE, 557 Market Street, SAN FRANCISCO, CAL.

Guaranteed "Pryanco" Products

"PRYNE" ELECTRIC CEILING VENTILATORS.
"PACIFIC BREEZE" SIDEWALL VENTILATORS.

"Pryanco"

Built-in Residence Mail Boxes—counterweighted, springless, cast outside plate, cast inside grill door.

Apartment Mail Boxes—Government approved; solid brass, even to locks and hinges; electrically welded.

"Lockapak" Package Receivers—self-locking.

Iron Receptacles—for safety and convenience both while ironing and when iron is not in use.

"Prynite" Illuminated House Numbers—operate off doorbell transformer at nominal cost; always lighted.

"Dorgril" Door Communicators—combine knocker, number and metal door communicator. Improve the door; provide safety.

"PRYNE" ELECTRIC CEILING VENTILATOR

Builds in *over the stove.*

Eliminates old-fashioned hood.

Removes greasy steam where it first tries to escape.

Keeps kitchen cool and clean.

Automatic louvers close to prevent back-draft.

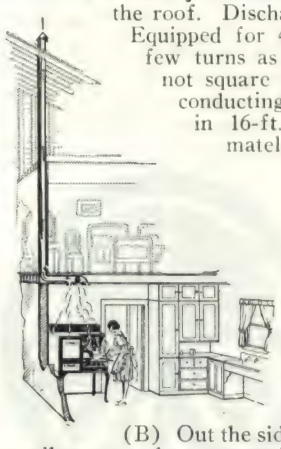
Special Westinghouse motor runs for long periods without oiling.

In One-story Houses—Use No. 1 Type, which discharges air straight up. Equipped with adapter for 8-in. round stack. Should not be used on first floor of two-story houses.

Type No. 1
10¼ x 10¼ in.,
12 in. high

Where Ceiling Ventilation Excels—When the stove is on an inside wall, a ceiling ventilator is from 30% to 40% more efficient than an outside-wall ventilator, because it takes advantage of natural draft tendencies.

In Two-story Houses—Use Type No. 2—(A) Through the roof. Discharges air to one side, between joists. Equipped for 4x10-in. duct, which should have as few turns as possible. (Turns should be round, not square corners.) No static resistance when conducting heat; with cold air figure 15% loss in 16-ft. rise. (Free air volume approximately 500 ft.)

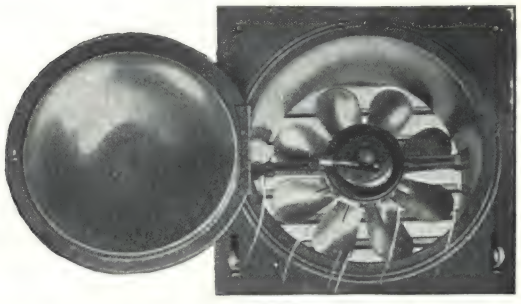


Type No. 2
10¼ x 10¼ in.,
7½ in. high

(B) Out the side. Same ventilator may be connected to 4x10 in. duct leading directly to outside wall. Outside cap, with wind deflector and automatic louvers, furnished without extra charge.

Guarantee—Standard Westinghouse motor guarantee, PRYNE & CO., INC., guarantee covering complete ventilator.

"PACIFIC BREEZE" SIDE-WALL REVERSIBLE VENTILATOR



Either reversible or non-reversible.

Outside louvers automatically close when motor is stopped.

Switch built into ventilator.

Solid inside door or cast aluminum grill optional.

Extensions for cabinet installation.

Decorative outer grills available.

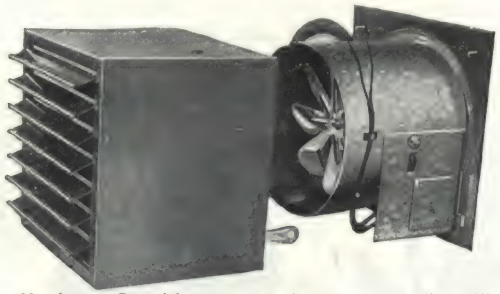
Moves 500 ft. per minute.

Has same motor and guarantee as "Pryne" Ceiling Ventilator.

Automatic louvers protect motor and working parts from dampness and insects, keeping motor indoors.

One-piece 8-blade solid aluminum fan.

Maximum capacity with exceptionally quiet operation.



Installation—Outside square housing or "shell" (which contains louvers) is set into the wall "in the rough." All machinery, including switch and electrical connections, installed with inside section "at the finish." Very simple to install. *Always keep housing flush with inside finish wall or casing, regardless of wall depth.*

Roughing-in size—12¼ in. wide, 12 in. high, 9½ in. deep for reversible model; 6 in. deep for non-reversible model.

UNITED STATES BLOWER AND HEATER CORP.

Manufacturers of Air Conditioning Equipment

2182 Kennedy Street, N. E., MINNEAPOLIS, MINN.

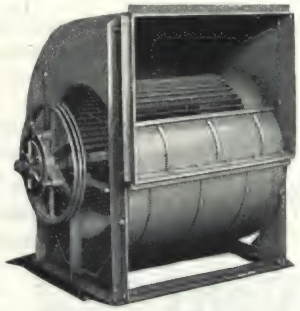
REPRESENTATIVES IN PRINCIPAL CITIES

Products

DOUBLE INLET BLOWERS.
SINGLE INLET BLOWERS.
VARIABLE SPEED PULLEY.
REMOTE HYDRAULIC SPEED CONTROL.
AIR WASHERS.
UNIT HEATERS.
UNIT AIR CONDITIONERS—DOMESTIC and COMMERCIAL.

Proven, Accepted Designs with New Exclusive Features

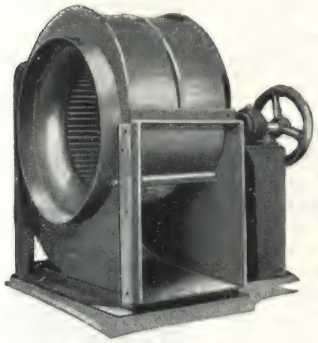
United States Blowers meet the demand for quiet operation. They are arc-welded for increased strength and rigidity. Each impeller wheel is properly balanced and is of multiblade design with forwardly curved blades, producing quiet, uniform air flow. Extra heavy drive shafts are used. Ball or roller bearings prevent end-thrust, vibration and chatter, regardless of speed. Hydraulic remote control, if desired. Non-slip Multi-V-belt drive with short shaft centers assures silent operation and economizes on floor space.



Double Inlet Blower

United States Blowers are made in all sizes, wheel diameter being constructed in increments of 3 and 6 in. with capacities of from 100 to 90,000 cu. ft. per minute. Multi-V-belt standard equipment.

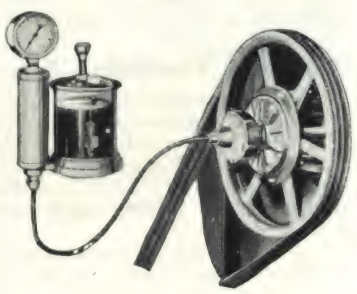
Small sizes may be direct connected or belt driven, as desired.



Single Inlet Blower

Hydraulic Remote Control and Variable Speed Pulley

This exclusive development gives an infinite number of blower speeds with a low-cost, constant speed motor. The blower speed is regulated by operating the plunger of the hydraulic control. A few strokes of the plunger on the cylinder increases the speed of the blower, a flip of the small release lever slows it down. When the desired speed is reached, that same speed may be maintained without further attention.

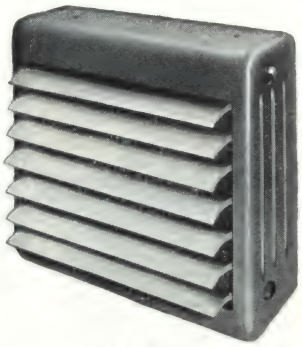


The hydraulic remote control may be placed anywhere in the building, wherever most convenient.

Unit Heater

Absolutely leakproof. Withstands steam pressure as high as 150 lb. The union between fins, tubing and headers is accomplished without brazing or soldering, by means of our exclusive "mechanical bond." Seam separation or metal fatigue does not occur.

A high-velocity heater which effectually prevents cold areas at the floors.



Unit Heater

Air Washers

Draws the air through misty, penetrating curtains of water, cools, humidifies and cleanses, removing dust, soot and foreign matter.

Eliminator Plates—Moisture eliminator plates are of one-piece construction broken into six deflections at a 45° angle.

These moisture eliminator plates catch all entrained water, flushing same to the settling tank below.

Eliminator plates are also equipped with moisture arresting hooks on first and last bends.

Spray Nozzles—Spray nozzles are especially constructed in such a manner that the water entering the nozzle is forced to take a circular motion producing a fine misty spray covering a wide area.

Nozzles are of simple construction, having only two parts.

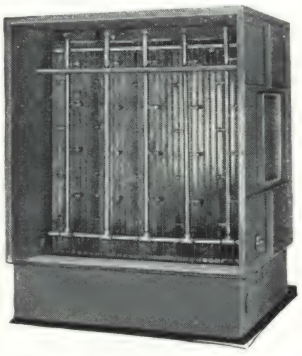
Each nozzle contains two inner orifices to guard against clogging.

Settling Tank—Settling tank is constructed of 10 gauge copper bearing steel with arc-welded seams wherever laps or joints occur.

Pump suction chamber is protected by heavy cover plate, eliminating foreign matter from entering recirculating water pump.

Tank is equipped with float valve for providing constant water level; also quick-fill and drain and overflow flange with riser.

Recirculating Water Pumps—All air washers are equipped with double suction, closed impeller, bronze fitted recirculating water pumps mounted on cast iron bed plate with direct connected motor and flexible coupling.



Air Washer

Catalogues

Catalogues, rating tables, complete information, prices and terms on UNITED STATES BLOWER AND HEATER CORP. products will be sent promptly upon request.

B. F. STURTEVANT COMPANY

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CHICAGO, ILL., 410 No. Michigan Avenue SAN FRANCISCO, CAL., 681 Market Street

PLANTS LOCATED AT
HYDE PARK, MASS. STURTEVANT, WIS. BERKELEY, CAL. FRAMINGHAM, MASS. CAMDEN, N. J. GALT, ONT.

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Sturtevant Products

The complete line of Sturtevant Equipment includes practically every type of AIR SUPPLYING and EXHAUSTING APPARATUS, UNIT HEATERS for industrial plants and other places, PORTABLE and STATIONARY VACUUM CLEANERS, and many other related items too numerous to mention.

Shown on these pages are merely those products of widest interest to architects.

Engineering Service

Experienced Sturtevant Engineers are located at each of the offices above.

These men are at your service.

They will gladly co-operate and advise on any heating or ventilating problem with which you may be confronted.

Sturtevant Silentvane Fans

The Sturtevant Silentvane is a high speed ventilating fan especially designed for installations where exceptionally rugged construction and the utmost in efficiency and operating economy are required. It is the highest priced Sturtevant Ventilating Fan made.

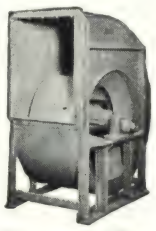
Silentvane Wheel

Ninety of these fans, capable of handling over 11,500,000 cu. ft. of air per minute, are installed in the famous Holland Vehicular Tunnels linking New York and New Jersey. Hundreds of others are installed in fine buildings everywhere.

They are made in a wide variety of sizes—with top speeds ranging from 2400 to 9000 r.p.m.

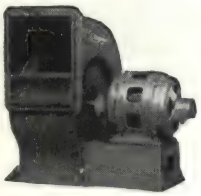
A few of the outstanding Silentvane features as follows:

(1) Static efficiency—over 70%.
(2) Quiet operation.
(3) Self-limiting horsepower characteristic—eliminates danger of overload and the usual excess in motor size. Permits use of motors about half the size ordinarily needed for the same working conditions.
(4) When the Silentvane is direct-connected, high-speed motors are used. As high-speed motors are lower in cost than low-speed motors a worthwhile saving is effected.



Silentvane Fan

Sturtevant Multivane Fans

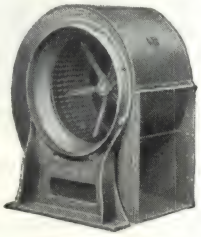


Multivane Fan

The Sturtevant Multivane is a so-called low-speed fan designed for ventilating duty. From the standpoint of efficiency, performance and dependability it meets all the requirements of slow-speed fan service. It is highly efficient and is of typical rugged Sturtevant construction. Multivane fans are made in a wide variety of types and sizes.

Sturtevant Convertible Multivane Fans

The Sturtevant Convertible Multivane is the same in performance and dimension as the standard Design 3 Multivane but is built with convertible and reversible housing in both motor and pulley types.



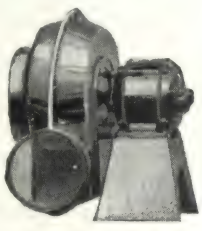
Convertible Multivane Fan

The roundabout scroll sheet is die formed with beaded edges locking over the side sheets. It is not welded to the sides and may be removed easily by simply taking out two or three bolts at each end.

Pulley and wheel are both overhung in the single width, single inlet type, the wheel shaft being carried on two ball bearings at either end of a solid sleeve between pulley and wheel. On the electric type, the motor is carried in a cradle and fan is overhung on motor shaft.

Sturtevant Ventilating Sets

These fans are ideally adapted for the ventilation of small or medium size rooms, in general up to 7500 ft. cubic contents. They are widely used for ventilating kitchens, toilets, chemical laboratory hoods, motion picture and telephone booths, bank vaults and similar places.

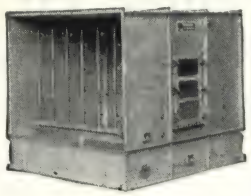


Ventilating Set

A ventilating set consists of a direct-connected motor-driven fan of the Multivane type, and is particularly adapted to handling air through duct work. It may be operated either as an exhauster or blower. Six sizes—which meet practically all requirements—are carried in stock.

Continued on next page

Sturtevant Air Washers



Air Washer

Sturtevant Air Washers are built in three standard types, each being recommended for the service to which it is best adapted.

Type H is designed for all general work in washing, purifying and humidifying.

Type C is for severe humidifying and cooling service and is similar to Type H but with an additional group of nozzles and longer spray chambers.

Type S is suitable for all requirements encountered in average ventilating systems, and is recommended where low first cost is the primary consideration.

Sturtevant Propeller Fans

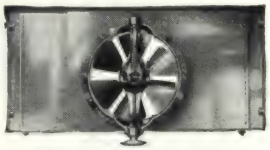
Propeller Fan

Sturtevant Propeller Fans are usually installed to exhaust directly to out-of-doors. They are widely used in restaurants, bakeries, garages, laundries, industrial plants and many other places. As all propeller fans are unsuitable for working against high resistances, these Sturtevant Fans should not be used on ducts of great length; 20 ft. is about the maximum.

Sturtevant Propeller Fans are made for both alternating and direct current, and in a wide variety of sizes.

Sturtevant Wind-O-Vane Fans

The Wind-O-Vane is a propellor type fan especially designed for residences, small offices and other places where a small, easily installed ventilating fan is required.



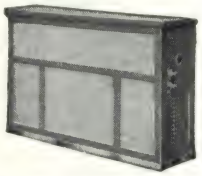
Wind-O-Vane Fan

This fan is made of polished aluminum throughout and is therefore handsome in appearance, light in weight and rustproof. Can be used for exhausting hot air, steam or fumes, or as a cooling fan for blowing fresh air into the room. A turn of a knob reverses the blades.

Installation time—about 20 minutes. Adjustable mounting board fits any window. Motor supplied for any current. Blades: diameter—13 in.

Sturtevant Unit Heater-Ventilators

The Sturtevant Unit Heater-Ventilator is a complete heating, ventilating and air filtering outfit, housed within an attractive metal cabinet. Essentially it comprises two direct-connected centrifugal fans driven by a common motor; an air filter, and an Aerofin heating element, for connection to the regular steam supply. Each unit functions independently of other units which may be installed in the same room or building. This equipment is widely used in schools, institutions, offices, showrooms, stores, etc.



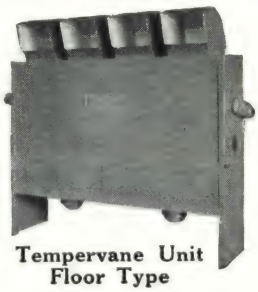
Unit Heater-Ventilator Type 3

The cabinet is usually mounted on the floor, against the wall. Fresh air is drawn in from the outside through a wall inlet, filtered clean, raised to any desired temperature and then introduced into the room at moderate velocity. Dampers provide a means of introducing the air into the room without heating and of recirculating the heated air in a room. Any desired temperature can be accurately maintained by either hand or automatic control.

Units are exceptionally quiet in operation which makes them especially adapted to schools, churches and all other places where quiet is essential.

Standard sizes deliver 600, 900, 1200 and 1500 cu. ft. per minute. Temperature rise is from 0° to 108° F.

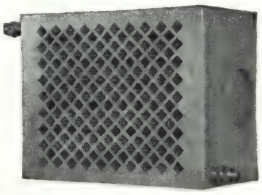
Sturtevant Unit Heaters



Tempervane Unit Floor Type

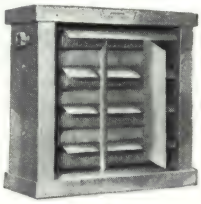
Sturtevant Unit Heaters are made in both overhead and floor types.

Overhead Type: Known as the Speed Heater; built in two types, in several sizes and capacities. Cabinet type is used in offices, schools, gymnasiums, swimming pools, etc. and wherever exceptionally quiet operation is desirable. Delivers 500 to 750 cu. ft. per minute. Industrial type is used in plants, shops, garages, etc. Delivers 920 to 5400 cu. ft. per minute. Speed Heaters have 2-speed motors—high speed for extra fast heating, low speed for maintaining set temperature. Each heater is wired for individual control, but several heaters can be wired for remote control from one switch (complete wiring diagrams with each heater). All models have high pressure Aerofin, for steam pressures up to 350 lb. No alterations or special provisions are needed to operate on a desired pressure. Vertical louvres (a new exclusive feature on industrial type of Speed Heater) diffuse air flow over wider area. Motors for both alternating and direct current and for standard voltages.



Cabinet Type Speed Heater

Floor Type: Known as the Tempervane; made in a range of sizes and capacities. When equipped with fresh air inlets, they may be used for ventilating as well as for heating. Equipped with Aerofin heating element. Motors for both alternating and direct current and for standard voltages.



Industrial Type Speed Heater

Sturtevant Publications

Heating and Ventilating Equipment

271—Multivane Fans
283—Autoforce Ventilators
290—Silentvane Fans
295—Air Washers
349—Coal Burning Blowers
332—Ventilating Sets
337—Monogram Fans
363—Unit Heaters, Industrial
340—Propellor Fans
361—Unit Ventilators
327—Disc Fans Des. 2
370—Convertible Multivane Fans

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Turbo-Undergrate Blower Specifications

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291—Pneumatic Collecting and Conveying Systems
356—Steel Plate Planing Mill Exhausters
303—Planing Mill Fans
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1270—Motors

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Household Vacuum Cleaners
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371—Attachments

L. J. WING MFG. CO.

Manufacturers of Exhausters, Fans, Heaters, Blowers and Steam Turbines

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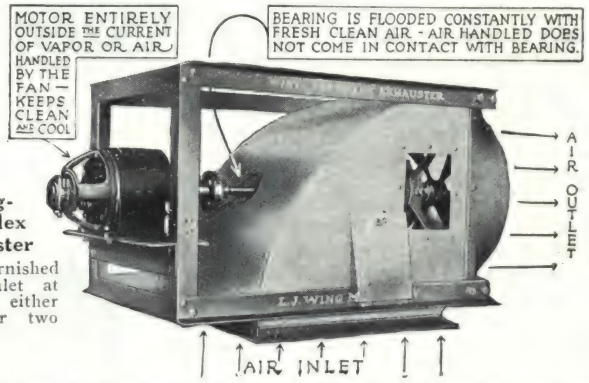
NEWARK, N. J.

Products

WING-SCRUPLEX PROPELLER FANS and EXHAUSTERS; WING FEATHERWEIGHT UNIT HEATERS; WING FOG ELIMINATORS; WING MOTOR DRIVEN BLOWERS; WING TURBINE and CENTRIFUGAL TURBINE BLOWERS, and WING STEAM TURBINES.

Wing-Scruplex Exhausters

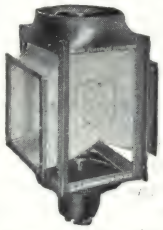
The Wing-Scruplex Exhauster consists of the highly efficient "screw-propeller" fan, with a casing conveniently designed with the motor on the outside, easy of access, clean and cool. These features make it ideal for duct work where resistance is low, where heretofore it has been necessary to use



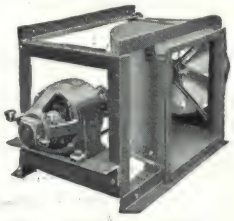
Wing-Scruplex Exhauster
Furnished with inlet at top, or either side, or two inlets

encased fans of the multivane type. Its elbow form fits readily into any run of duct. Its rectangular frame greatly simplifies installation as can be seen. For handling acid laden air, fan and exposed parts can be supplied in Monel Metal.

Weatherproof Bottom Inlet

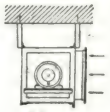


Vertical Double Inlet

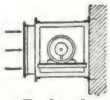


Right Side Inlet

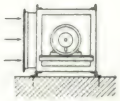
Bolted Directly to Ceiling



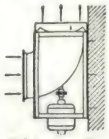
Hung from Ceiling



Bolted Directly to Side Wall



Bolted to Floor or Foundation



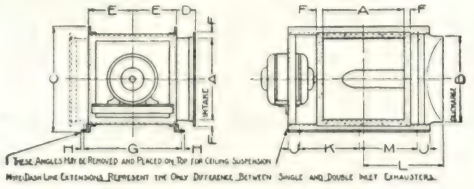
Vertical Bolted to Side Wall

SIZES AND CAPACITIES OF WING-SCRUPLEX EXHAUSTERS

Size	Inlet square, in.	Outlet round, in.	Speed, r.p.m.	Free air C. f.m.	Free air Hp.	.15 in. C. f.m.	.15 in. Hp.	.25 in. C. f.m.	.25 in. Hp.	.40 in. C. f.m.	.40 in. Hp.	.50 in. C. f.m.	.50 in. Hp.
1-A	10	10½	1750	800	.052	630	.054	330	.060				
2-A	13½	14⅛	1150	1440	.060	950	.069	395	.090				
2-B	13½	14⅛	1750	2050	.195	1895	.208	1695	.216	1155	.248	750	285
3-S	16¾	17⅜	850	2130	.090	1250	.110						
3-A	16¾	17⅜	1150	2700	.180	2150	.195	1550	.221				
3-C	16¾	17⅜	1750	4000	.600	3720	.635	3510	.655	3150	.700	2810	.720
4-S	21	21¾	850	2850	.100	2200	.100	1610	.125				
4-A	21	21¾	1150	3575	.170	3150	.200	2775	.220	1950	.245	1550	.280
4-C	21	21¾	1750	5400	.540	5160	.600	4990	.650	4670	.710	4140	.750
5-A	25	25	1150	5200	.330	4720	.380	4250	.440	3300	.530	2310	.600
5-B	25	25	1750	8000	1.330	7740	1.360	7540	1.400	7175	1.480	6900	1.540
6-A	30	30	600	5500	.210	3725	.250	2375	.330				
6-B	30	30	850	7400	.550	6280	.600	5450	.740	4000	.830	3400	.960
6-C	30	30	1150	10230	1.500	9520	1.550	8950	1.570	8000	1.620	7340	1.760

Where particularly quiet operation is desired, as in offices, residences, hospital wards, churches, laboratories, etc., we use lowest speeds in all sizes. For toilet rooms, laboratories, motion picture booths, stockrooms, etc., use any speed in sizes 1 and 2; low and medium speeds in all other sizes. In industrial plants, hotel and restaurant kitchens, engine rooms, workshops, etc., use any speed.

Complete table for pressure up to 1-in. static sent on request.

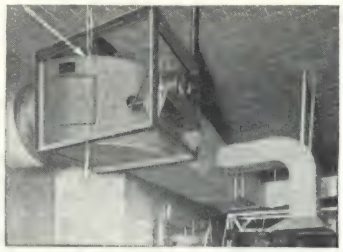


Dimension Diagram of Wing Exhauster

Diagram shows side inlet exhausters. Top and bottom dimensions are the same. The side elevation shown, becoming a plan view of top inlet type

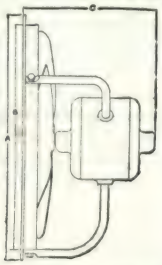
Size	Intake A&A	Dch. B	Dimensions of Single or Double Side Inlet Exhausters C	D	E	F	G	H	J	K	L	M
1-A	10"	10½"	14¼"	2⅝"	5½"	1"	13"	⅜"	11"	7½"	12¼"	10½"
2-A	13½"	14⅛"	17⅞"	2⅝"	7⅛"	1"	16⅜"	⅜"	11"	9½"	15"	12½"
2-B	13½"	14⅛"	17⅞"	2⅝"	7⅛"	1"	16⅜"	⅜"	11"	9½"	15"	12½"
3-A&S	16¾"	17⅜"	22¼"	2⅝"	8⅝"	1"	20¼"	1"	11"	11¼"	18"	14½"
3-C	16¾"	17⅜"	22¼"	2⅝"	8⅝"	1"	20¼"	1"	11"	12¾"	18"	15½"
4-A&S	21"	21¾"	26¼"	2⅝"	11"	1"	24¼"	1"	11"	13"	19½"	16½"
4-C	21"	21¾"	26¼"	2⅝"	11"	1"	24¼"	1"	11"	15"	19½"	18"
5-A	25"	25"	30"	3"	15"	1¼"	28"	1"	11"	17¾"	28"	20½"
5-B	25"	25"	30"	3"	15"	1¼"	28"	1"	11"	17¾"	28"	20½"
6-A	30"	30"	10"	3½"	17¾"	1¼"	37¾"	1¼"	11"	21¾"	31"	24½"
6-B	30"	30"	10"	3½"	17¾"	1¼"	37¾"	1¼"	11"	21¾"	31"	24½"
6-C	30"	30"	10"	3½"	17¾"	1¼"	37¾"	1¼"	11"	21¾"	31"	24½"

A Typical Wing-Scruplex Exhauster Installation
Showing the ease, simplicity and cleanliness involved in an installation of this equipment



Wing-Scruplex Fans

The true screw design moves all the air in straight and parallel lines. Absence of eddy currents contribute to low current consumption. Generously proportioned, totally enclosed motors require no artificial ventilation, and accessibility insures long life with minimum of attention. Also furnished for pulley or turbine drive. Can be supplied with Monel Metal parts.



DIMENSIONS OF WING-SCRUPLEX FANS (IN INCHES)

Size. in.	A	B	C
10	12½	10	10⅝
13	16	13	12
17	20	17	13¾
22	24½	22	13¾
25	29⅜	25	15
30	34½	30	18⅝
36	41½	36	20½
42	46½	42	28
48	53	48	29
54	59	54	33
60	66	60	39

SIZES AND CAPACITIES OF WING-SCRUPLEX FANS

Size, in.		Speed, r.p.m.	Free air capacity, c.f.m.	Motor, hp.	Size, in.		Speed, r.p.m.	Free air capacity, c.f.m.	Motor, hp.
10	H-18	1750	950	1/20	30	L - 9	850	6000	¼
10	H-20	*2000	1100	1/10	30	L -95	950	6300	3/10
13	L-18	1750	1400	1/10	30	H-60	600	7000	⅓
13	H-12	1150	1550	⅙	30	H-70	700	7600	4/10
13	H-15	*1500	2080	⅙	36	L-60	600	8000	⅓
13	H-18	1750	2400	¼	36	L-70	700	8800	4/10
17	L-15	*1500	2700	⅙	36	H-60	600	11000	6/10
17	L-12	1150	2100	⅛	42	L-60	600	12700	6/10
17	H-12	1150	3150	¼	42	H-45	450	14700	¾
17	H-18	1750	4800	¾	42	H-50	500	14700	¾
22	H- 9	850	3450	⅙	48	L-45	450	17500	¾
22	H-12	1150	4150	¼	48	L-50	500	17500	¾
22	H-18	1750	6300	¾	48	H-45	450	19500	1
25	H- 9	850	4500	¼	54	L-45	450	21000	1
25	H-10	1000	5200	3/10	54	H-45	450	24000	1¼
25	H-12	1150	6000	½	60	L-45	450	26000	1¼
25	H-18	1750	9100	1½	60	H-40	400	33000	2

Table of capacities at various static pressures on request.

Note: The 13, 17, 22 and 25-in sizes in speeds above 1150 r.p.m. are designed for industrial plants and locations where a little noise is not objectionable. All other speeds given are "quiet speeds."

*D-c. only—all others a-c. and d-c.

Continued on next page

Wing Featherweight Unit Heaters

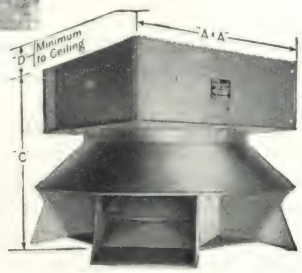
In large buildings like factories and garages, ordinary heating methods fail to give complete satisfaction because of vast amount of overhead space which must first be heated before any effect is felt at working level.

Wing Featherweight Unit Heaters deliver heat to working area first. From overhead out-of-the-way locations they deliver large quantities of comfortably warmed air downward, uniformly distributed by means of scientifically designed adjustable discharges.

There is no radiant heat to cause discomfort as when heating apparatus is placed on floor or on walls—as with pipe coils or radiators.

Wing Featherweight Unit Heaters are very light and compact and can be installed immediately over area to be heated. A great part of their superior effectiveness lies in their completely overhead position.

Wing Featherweight Unit Heater

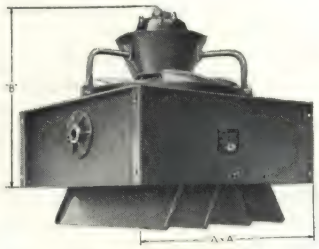


Type L C Unit

Motor and fan placed below unit, permitting location close to ceiling. Standard 4-way discharge used

Standard Designs of Discharge Used with H C Units

Note adjustable diffusers for fixing angle of discharge



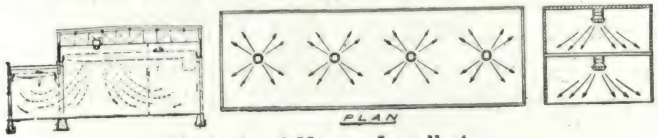
Type H C Unit with Design 1 Vane Discharge

Other discharges shown on left

CONDENSED TABLE OF ENGINEERING DATA

Unit size	AxA, in.	B, in.	C, in.	D, in.	Air, c.f.m.	Motor, hp.	Temperature, degrees Room	Temperature, degrees Leav.	B.t.u. per hr. available	Approx. ship. wt., lb.
13-4-12	19 3/4	26 1/2	24 7/8	6	1150	1/6	65	113	54,600	185
17-3-12	22 3/4	28	24 7/8	6	1950	1/4	65	113	92,500	213
22-3-12	27 3/4	29	25 3/8	6	3200	1/4	65	115	157,000	270
22-4-12	27 3/4	29	25 3/8	6	2800	1/4	65	125	162,600	280
22-5-12	27 3/4	29	25 3/8	6	2600	1/4	65	135	173,200	288
25-4-12	32 3/4	30 1/2	28 1/2	7	4800	1/2	65	125	279,000	320
25-5-12	32 3/4	30 1/2	28 1/2	7	4500	1/2	65	135	300,000	332
30-4-85	39 1/8	30	32	8	6900	1	65	125	401,000	360
30-5-85	39 1/8	30	32	8	6500	1	65	135	433,000	365
36-4-85	46 1/8	42	41 5/8	8	9600	2	65	125	558,000	504
36-5-85	46 1/8	42	41 5/8	8	9000	2	65	135	599,400	528

Space does not permit complete table for other room temperatures but this data will be gladly furnished on application.



Methods of Heater Installation

First diagram shows a Type H C Unit installed above a traveling crane, the heater arranged so that the lower left portion of the building is also heated. Second diagram shows a plan view illustrating the general distribution and diffusion of heated air from Wing Heaters. The third pictures a typical multistory building heated with Type L C Wing Units. The best and most economical installation of Wing Featherweight Unit Heaters is when they are placed close to roof or ceiling

Two types of heaters available, one for particularly low ceilings and one for buildings with higher roofs or ceilings. In the latter, a number of different discharges permit proper selection to assure perfect distribution, regardless of shape or height of space to be heated.

A great source of waste, the accumulation of overheated air in upper spaces, is overcome by Wing Featherweight Unit Heaters, especially in single story buildings having large roof exposures. This heat accumulation, which must exist with any heating system which allows hot air to rise to upper spaces first, is impossible with Wing Featherweight Unit Heaters because, regardless of height of building, they are located close to roof or ceiling and constantly withdraw the warmed air from overhead and deliver it reheated to the working area.

Type L C Wing Featherweight Heater in Furniture Factory

The ease with which any or all units in a Wing-heated building may be turned off, either by manual or thermostatic switches, when desired temperature is reached does away with another cause of waste. And the rapidity with which a Wing-heated building can be made comfortable after night or other shutdowns secures further economy. Warmth is felt immediately when heaters are turned on in a cold building. The heating-up period is eliminated.

The Wing system is readily adaptable to special conditions, and it is easily changed to suit alterations and extensions. It requires little attention, an inspection at beginning or end of heating season is sufficient.

Wing-Scruplex Fog Eliminators

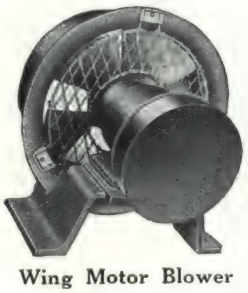
This equipment supplies conditioned air to completely defog and maintain a clear atmosphere in dye houses, bleacheries; pasteurizing, bottling, preserving and chemical plants; paper mills, etc.

Buckwheat Coal Burning Systems

Wing Motor Driven Forced Draft Blowers, similar in design to Wing Turbine Blowers, are small, compact units for providing forced draft for low pressure boilers.

These blowers are extensively used in schools, apartment houses, residences, loft buildings, hotels, etc. They effect astonishing savings by burning low-cost buckwheat sizes of coal. In addition, they generate steam rapidly, therefore assuring efficient heat in the early morning hours. In soft coal localities Wing Blowers permit the combustion of low-priced, low volatile coals, thereby eliminating the smoke nuisance.

With cast iron boilers, the blowers are usually mounted by feet or base to the floor, near the boiler, connecting into the ash pit by means of a short duct. The smaller sizes of blowers are often secured directly to the boiler base. For domestic heaters a small, specially designed Wing Blower supplies sufficient forced draft to burn buckwheat coal in furnaces having up to 5 sq. ft. of grate area. In the case of brickset boilers, Wing Blowers are cemented directly into the ash pit wall.

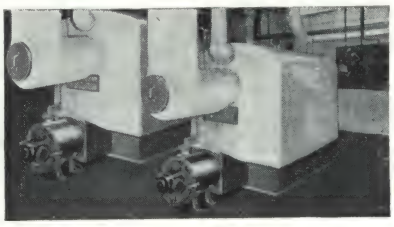


Wing Motor Blower

Wing Motor Blowers are made with specially designed, fully enclosed motors, to keep dust and grit from the bearings, windings and commutator. The blowers are furnished in either single phase, polyphase, or direct current, all three types with speed regulation in order to vary the intensity of the draft; in the polyphase type, with squirrel cage motors and built-in dampers for air control. Since for most capacities Wing Blowers operate at 1750 r.p.m. they are quiet in operation.

The illustration shows a Wing installation in an apartment house.

A short sheet metal duct connects the blower discharge with the ashpit.



A Typical Wing Installation

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

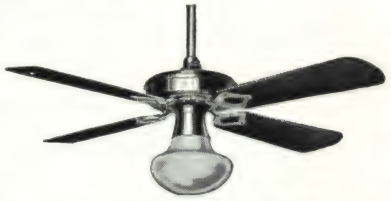
WESTINGHOUSE FANS

Westinghouse makes a complete line of fans noted for beauty, power and silence.

Ceiling Fans

With Westinghouse ceiling fans installed, stores and shops are always fresh and cool. These fans keep in circulation the constantly changing, refreshing air at a cost for current that is surprisingly low.

They are made in the paddle fan type with 36, 52 and 56-in. blades and can be furnished with a simple adapter for attaching underneath any type of lighting unit desired.



36 in. or 52-in. a-c. Ceiling Fan, with Globe Holder and Socket, without Switches
Both fan and light are controlled by wall switches

For attaching lighting units to the 52-in. ceiling fan, a globe holder and socket can be provided. Fans can be furnished from factory on special order, equipped with lighting attachment, or it can be ordered separately.

The Rotaire Fan

Each year brings new proof of the popularity and superiority of the Rotaire, a commercial fan that combines the efficiency and low operating cost of the regular 16-in. fan with the recognized advantages of ceiling suspension. In the commercial and industrial fields, the Rotaire with its economy in price and efficiency in performance, has met with widespread approval. In the Rotaire the 16-in. oscillating fan is adapted for ceiling mounting. It may be installed wherever the common type of ceiling fan is practicable. It is especially adapted to restaurants, theaters, stores and offices or any other place where many people gather.

Rotaire Fan

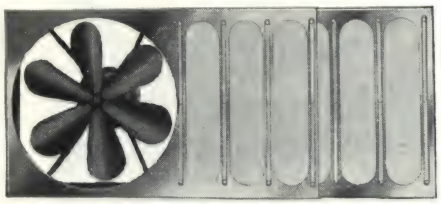
Suspended from the ceiling the fan is held rigidly at an angle of 45° from the perpendicular. One Rotaire will efficiently cool a circle 20 ft. in diameter. Fan should be mounted 8 ft. from floor to secure best results.

Exhaust Fans

Made in 12 and 16-in. sizes for horizontal or vertical mounting. They are single-speed fans, but a speed regulator can be supplied if desired. They have Micarta blades.

Kitchen Exhaust Fan—Will operate as an exhaust or intake fan. It will force smoke and objectionable odors from the room or will draw the invigorating outside air into the room; it prevents greasy kitchen fumes from marring furniture, walls and draperies. Smoke and fumes are banished before they have an opportunity to do any damage.

Frame has translucent panels which improve the appearance of the unit and allow a maximum amount of light to enter. This feature is particularly valuable in rooms where there is only one window.



Kitchen Exhaust Fan

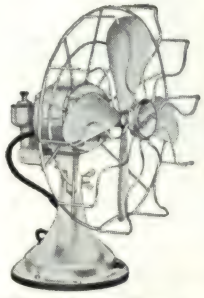
The kitchen exhaust fan is more than a hot weather fan. All the year around it will help to maintain a comfortable temperature and healthful atmosphere in the kitchen or in any other room in which it may be installed. There are many homes in which a fan of this kind is wanted.

Many commercial applications for it will be found in small restaurants, restaurant kitchens and in the smaller theaters. In schools this fan is useful in laboratories and domestic science rooms.

The unit is provided with 15-ft. cord and plug. Fan is furnished in 110 volts, 60 cycles, only.

The Home Fan

The splendid 10-in. Home Fan is, we believe, the best value in fans on the market and should not be confused with low priced fans of similar size from which many refinements of design and construction have been eliminated to bring down the price.



The Home Fan in Old Ivory

Although known as the Home Fan, this fan is popular in a great many commercial applications. In the restaurant or bakery, in the beauty shop, barber shop, doctor's office or hospital, the Home Fan in ivory is very appropriate. In the smaller offices and stores the Home Fan in black does a big cooling job efficiently. Hotels will find that this fan suits their needs admirably and that it will play a big part in making their rooms attractive in hot weather.

Desk and Bracket Fans

Made in 8, 10, 12 and 16-in. sizes; the two smaller fans being generally used in homes and small offices.

The 12 and 16-in. sizes cover a very broad field of commercial uses. They may be tilted forward 15° or 20° and tilted backward 90° for wall mounting.

The 10-in. fans have two speeds; 12 and 16-in. fans have three speeds controlled by a switch in the base and an arc of oscillation of 90°, readily changed to 45°, or to operate without oscillating.

The 10, 12 and 16-in. fans have Micarta blades which, with a 6-pole, slow-speed motor, contribute greatly toward silent operation and long life.

The standard finish is a rich, dull black. A special finish can be readily secured when desired.

MUELLER-STURTEVANT AIR-CONDITIONING SYSTEMS

DISTRIBUTED AND ENGINEERED BY
L. J. MUELLER FURNACE CO.
337 So. Second Street, MILWAUKEE. WIS.

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BALTIMORE, MD., 909 Cathedral Street
SALT LAKE CITY, UTAH, 601 McIntyre Building
LOS ANGELES, CAL., 5450 West Boulevard

Product

HEATING, VENTILATING and AIR CONDITIONING SYSTEMS.

For Mueller Gas-Fired Steam and Hot Water Boilers, Registers, Grilles and Ventilators, and Gas-Fired Warm Air Furnaces, see Manufacturers' Index.

Climator Systems

Climator Air Conditioning Systems are the product of the combined engineering and production facilities of two of the oldest and most reliable manufacturers in the heating and ventilating fields. The L. J. MUELLER FURNACE Co. have manufactured, since 1857, a complete line of heating plants for all fuels, and B. F. Sturtevant Co., Hyde Park, Boston, Mass., are the pioneers in the development and manufacture of blowers and ventilating equipment.

Comfort, health and cleanliness demand of modern engineering every facility for specified indoor climate the year round. Climator systems meet these requirements completely and are adapted to any type of residence.

Functions—

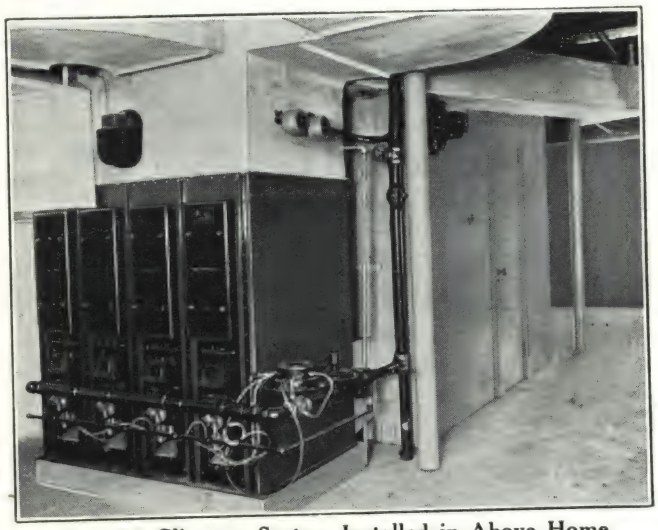
(1) Positively circulating air within a building.
(2) Supplying ventilation.
(3) Washing or filtering all circulated air.
(4) Heating, when required, maintaining the exact temperature desired.
(5) Humidifying: maintaining, automatically if desired, the exact relative humidity most conducive to health and comfort during the winter months.
(6) Cooling and dehumidifying, if desired, when high outdoor temperature and absolute humidity are oppressive.

All, or any combination of these facilities, are available without personal attention by occupants, at a cost comparable to many luxuries widely enjoyed, yet of far less intrinsic value. Where climatic conditions do not require all of these functions, cost of Climator equipment is proportionate.

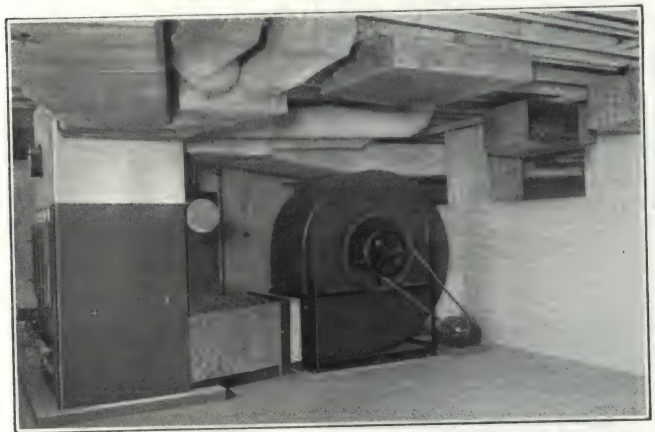
Service—

A complete Climator proposal for any residence will be supplied upon receipt of plans, specifications and details as to air conditioning functions required. Descriptive literature upon request.

Typical Home with Climator Installation



No. 104 Climator System Installed in Above Home
Showing Gas-Era Furnace, with plenum room at back



Typical Climator Installation Before Plenum Room Was Built
Shows Mueller Gas-Era Furnace, Sturtevant Blower, Warm Air Ducts, and Returns

A Room in Above Home
Showing warm air register near ceiling

CARRIER-LYLE CORPORATION

AFFILIATED WITH CARRIER ENGINEERING CORPORATION

Air Conditioning System for Homes in Winter

850 Frelinghuysen Avenue
NEWARK, N. J.

DISTRICT SALES OFFICES

NEW YORK, N. Y., 50 East 42nd Street
EAST ORANGE, N. J., 626 Central Avenue
PITTSBURGH, PA., 1904 Clark Building
PHILADELPHIA, PA., 1600 Walnut Street
BUFFALO, N. Y., 1146 Prudential Building
BALTIMORE, MD., 1210 No. Charles Street
BOSTON, MASS., 1012 Statler Building

THE CARRIER WEATHERMAKER

The Carrier Weathermaker is a compact, self-contained gas fired unit; clean, efficient, economical to operate and quiet. It *warms* the air, *controls the temperature, maintains automatically the proper humidity* for health and comfort, *cleans the air* of floating dust particles, ridding it of germs. Distributes this cleaned, warmed, humidified air under pressure throughout the home.

Regulates Automatically Both Temperature and Humidity

The Weathermaker system for homes is the result of five years' research by Willis H. Carrier, President of the Carrier Engineering Corporation, and engineers associated with him to adapt to residential use in winter the principles of manufactured weather which were first developed and applied to industry and later to stores, theatres, offices and public buildings.

For more than two years these systems have been in use in homes throughout the country so that manufactured weather for the home in winter may be considered an actual proven fact.

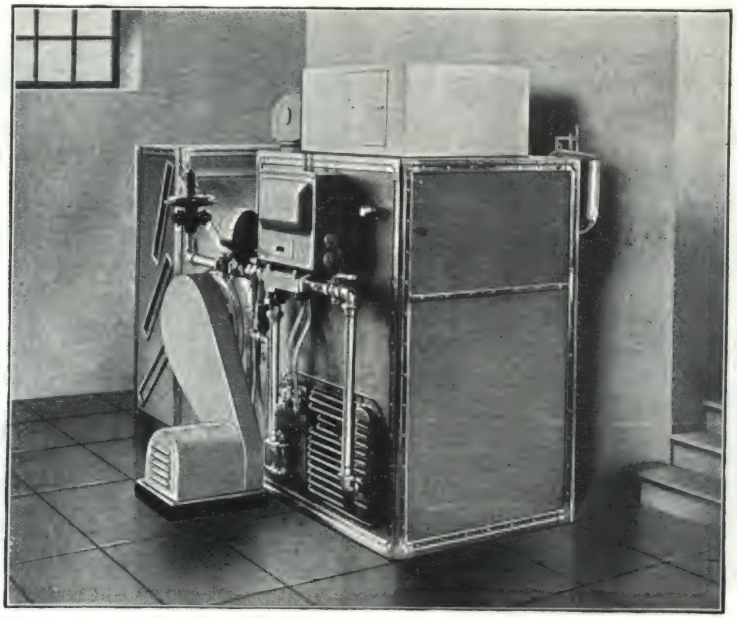
The most important feature of the system is its ability to regulate automatically *both* temperature and humidity and at the same time provide for manual control at the will of the home owner.

An attractively finished and accurately adjusted wall instrument, sensitive to air temperature and humidity, centrally located in the home accomplishes this. If at any time the owner desires to increase or decrease the temperature or the humidity he can do so by simply moving an indicator on this instrument.

The forced distribution of air in the Weathermaker System makes for a compact arrangement of ducts. This, in addition to the saving caused by the elimination of fuel storage facilities, allows the architect to convert the basement into a usable part of the house.

And of even more value is the space that can be saved upstairs. Inconspicuous grilled openings for the conditioned air are provided flush with walls which may be painted to harmonize with the decorative scheme of the room. The artistic effect of fine paneling and woodwork is not marred by unsightly heating fixtures.

Every Weathermaker System is laid out and installed under direct supervision of company engineers co-operating with the architect—studied as an individual case and engineered according to the particular operating problem involved.



Exterior View of Carrier Weathermaker

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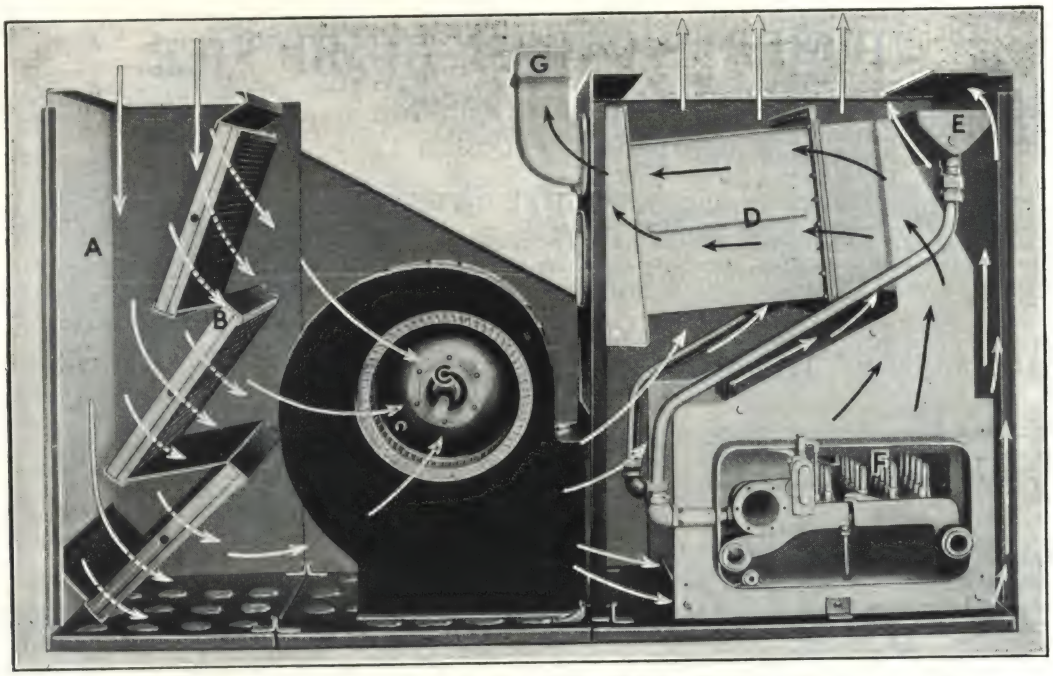


Sectional View Showing Details of Carrier Weathermaker Construction

A. Opening connected to duct through which air is drawn from house.

B. Filters through which air passes, removing dust, dirt and impurities.

C. Blower operated by electric motor, which draws air in and then passes it over and around the outside of heating sections (D).

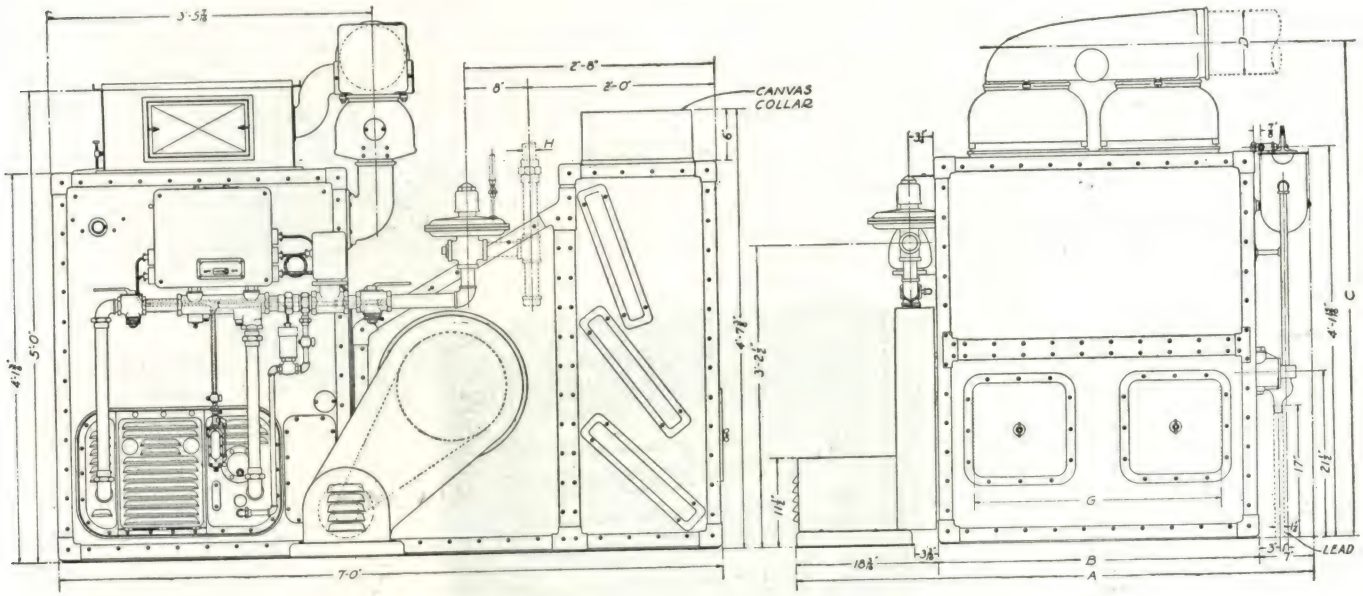
D. Heating sections warmed by gas, which transmit heat to the air.

E. Vaporizer containing water which supplies moisture at the point where the clean warmed air leaves the Weathermaker unit. The temperature of this water is maintained by a separate gas burner connected to a hygrostat upstairs by which the amount of humidity is regulated automatically.

F. Gas burners which supply heat to sections around which the air travels. The combustion chamber and gas passages through the heating sections are totally separate from the air travel.

G. Exhaust for waste gases which is connected to the chimney.

After the air is cleaned, warmed and humidified it enters a system of ducts taken off from the top of the unit above the heat interchanger and is distributed to the rooms through small pipes.



DIMENSIONS

No. Weather-maker	Over-all length, ft	Over-all width A, ft.—in.	Height to center of flue connection C, ft.—in.	Flue diameter D, in.	Return air opening, in.	Air discharge opening, in.
301	7	4—1	5—3 5/8	6	14x16	24x12
302	7	4—6 1/2	5—3 5/8	8	14x24	24x18
303	7	5—6 1/8	5—4 5/8	8	14x32	24x24
304	7	5—11 5/8	5—4 5/8	10	14x40	24x30
305	7	6—6 3/4	5—4 5/8	10	14x48	24x36

RATINGS

Output B t.u. per hr.	Motor hp.	Gas supply, in.	*Gas consumption, cu. ft. per hr.	Shipping weight, lbs.
100,000	1/4	1 1/4	220	2300
150,000	1/3	1 1/4	330	2500
200,000	1/3	1 1/2	440	3100
250,000	1/3	1 1/2	550	3300
300,000	1/2	2	660	3700

*Based on 550 B.t.u. gas with 3 1/2 lbs. water pressure at the regulator.

DOHERTY-BREHM HUMIDIFIER

MANUFACTURED BY
DOHERTY-BREHM CO.

EXECUTIVE OFFICES
333 No. Michigan Avenue, CHICAGO, ILL.

SOLD BY CRANE CO.

THE DOHERTY-BREHM HUMIDIFIER

Uses

This modern humidifier is used in homes, offices, stores, shops, hospitals and schools heated with hot water, steam, vapor, or any form of radiator heat.

Description

The Doherty-Brehm Humidifier consists of a specially designed humidifying radiator with hollow, horizontal radiator sections made of cast iron.

These hollow sections of the humidifier act as heating units. The heating mediums—hot water, steam or vapor—flow through the hollow part of each radiator section.

The top of each section is designed as a trough to hold water. A city water line runs through a pressure-reducing valve to the top of the humidifier. This pressure-reducing valve supplies from 2 to 3 gallons of city water per hour into the trough on the top horizontal radiator section.

The trough in this section fills up ¼ in. in depth over its entire area and then overflows through a down-spout onto the next horizontal radiator section below. The trough in this section then fills up ¼ in. in depth over its entire area and in turn overflows onto the next section below.

This process continues until the tops or troughs of all the radiator sections are entirely covered with water. The small amount of surplus water not evaporated flows into the base of the humidifier, which acts as a catch basin, and from there to the sewer.

Efficient Operation

The Doherty-Brehm Humidifier embodies the two fundamental factors in the efficient evaporation of water:

First, a large area of shallow water is supplied with heat.

Second, heated air currents are deflected across these surfaces of shallow water by the patented design of the radiator sections.

Because of these factors, the Doherty-Brehm Humidifier will evaporate from 20 to 50 gallons of water a day, depending on the size of the unit and the type of heating system on which it is used.

One unit will adequately humidify the ordinary home or office.

Simple Installation

The humidifier acts as a heating unit as well as a humidifier and can be installed to displace an ordinary cast-iron radiator in the heating system or as an extra heating and humidifying unit. It is connected to the heating system in the same manner as the ordinary radiator with the addition of a water line and sewer connection.

Attractively Enclosed

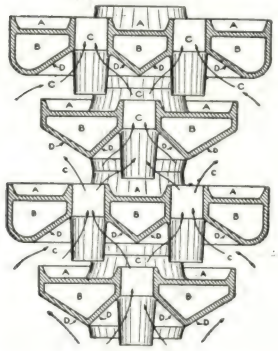
After the humidifier is installed it is enclosed in an attractive console cabinet of wood or metal finished in keeping with the other furnishings of the quarters in which it is placed. Or, it can be recessed into the wall and enclosed with an attractive grille, using a curved metal shield behind the humidifier to direct the moist air out into the room.

Silent, Automatic, Economical

Every detail of the Doherty-Brehm Humidifier is made to last—to give years of satisfactory service. It has no fans, belts or motors; no pans to fill, no noise, no steam, no odor. It is entirely automatic in operation, providing the right amount of humidity for all variations in the outside temperature by a very simple but effective method. Evaporation caused by the humidifier is in direct proportion to the amount of heat in the radiator sections. When the weather is cold, the outside air is dry—the colder the weather, the drier the air and the greater the amount of artificially produced moisture that is needed indoors. Correspondingly, the colder the weather, the hotter the radiator sections in the humidifier are maintained to heat the building and the greater the evaporation from them. In mild weather, when outdoor air is more humid, less moisture is required indoors as well as less heat, so the lowered temperature of radiator sections reduces evaporation by humidifier. Thus, the thermostat which controls heating of building also controls action of humidifier and provides correct humidity at all times.

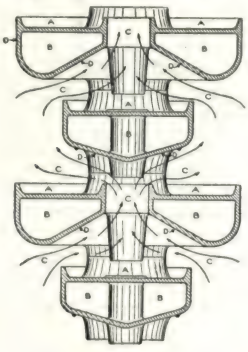
Models

The entire Doherty-Brehm Humidifier line is pictured on the following pages. These sizes and styles fill practically every requirement for an efficient, durable, economical humidifier for homes, offices, shops, stores, hospitals, schools, etc.



CROSS SECTION MODEL A

Diagram of the Humidifier for Hot Water Systems



CROSS SECTION MODEL A-2

Diagram Showing the Arrangement of Sections and Air Circulation of the Humidifier for Steam and Vapor Systems

Continued on next page

"A" MODELS FOR HOT WATER SYSTEMS

Capacity

"A-Twelve" Doherty-Brehm Humidifier, built with twelve sections and base, has a capacity of 20,000 cu. ft.

SPECIFICATIONS OF MODEL "A-TWELVE"

Number of sections	12 and base
Humidifying capacity	20,000 cu. ft.
Heating surface	49.20 sq. ft.
Evaporating surface	1836 sq. in.
Dimensions (over-all) Length	38½ in.
Dimensions (over-all) Width	9 in.
Dimensions (over-all) Height	40½ in.
Shipping weight (packed)	423 lb.

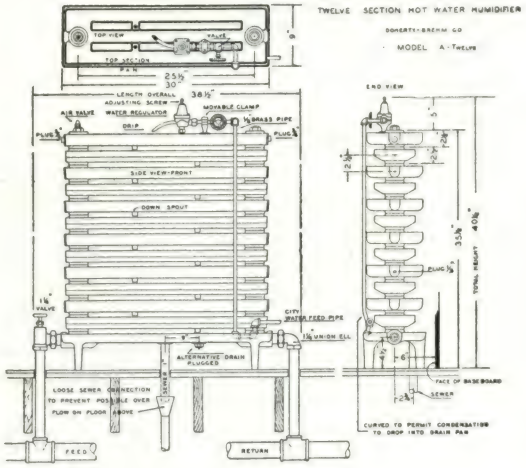
PRICES F.O.B. FACTORY—INSTALLATION EXTRA

With brass pressure-reducing valve and fittings less cabinet	$195
Complete with metal cabinet	225
Complete with wood cabinet	340

Uses

Model "A-Twelve" must be used with hot-water heat only. Models "A-1" and "A-2," pictured below and on the next page, are designed to be used primarily with steam or vapor heat, but can also be used with hot-water heat. See note (*) under Model "A-1."

The reason for this limitation of Model "A-Twelve" is that the hollow interior of the tubes in the radiator sections of this model are smaller than those in the steam and vapor models and when used with steam or vapor cause too rapid condensation of the heating medium and so do not prove efficient

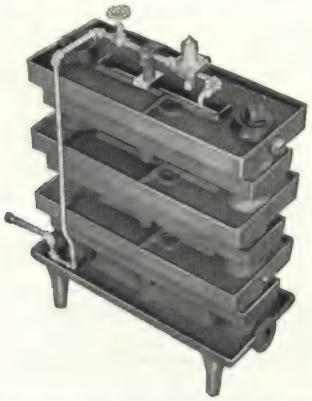


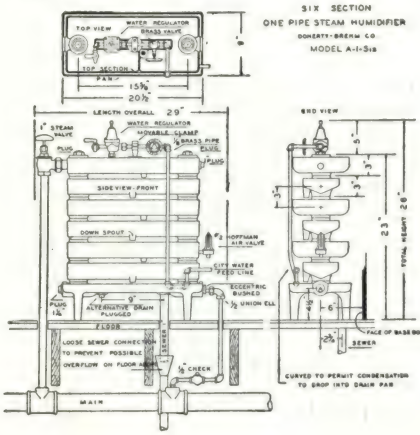
"A-1" MODELS FOR STEAM OR VAPOR

Models and Capacities

"A-1-Six" Doherty-Brehm Humidifier, built with six sections and base, has a capacity of 20,000 cu. ft.

Model "A-1-Eight," built with eight sections and base, has a capacity of 27,000 cu. ft.*





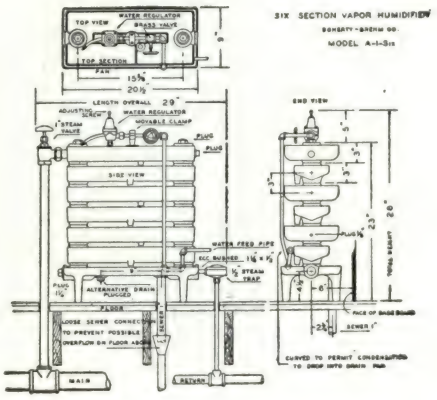
SPECIFICATIONS OF "A-1" MODELS

Model	"A-1-Six"	"A-1-Eight"
Number of sections	6 and base	8 and base
Humidifying capacity	20,000 cu. ft	27,000 cu. ft
Heating surface	15 sq ft	20 sq. ft
Evaporating surface	615 sq in	820 sq in
Dimensions (over-all) Length	29 in	29 in.
Dimensions (over-all) Width	9 in	9 in.
Dimensions (over-all) Height	28 in.	32 in.
Shipping weight (packed)	175 lb.	215 lb

PRICES F.O.B. FACTORY—INSTALLATION EXTRA

With brass pressure-reducing valve and fittings less cabinet	$125	$140
Complete with metal cabinet	150	165
Complete with wood cabinet	245	280

*While the "A-1" models are designed primarily to humidify large homes heated with steam or vapor, they are also practical and efficient for small homes or offices of approximately 10,000 cu. ft. capacity (six rooms or less) when used on hot water heating systems.



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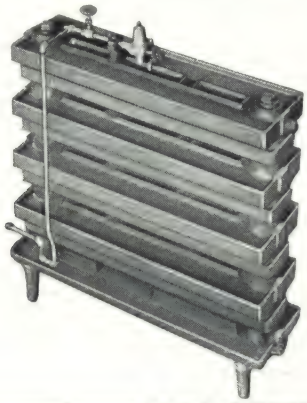
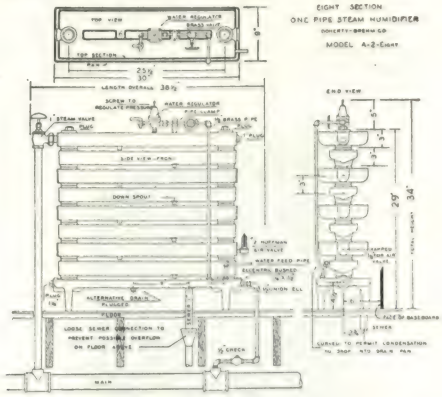
"A-2" MODELS FOR STEAM OR VAPOR

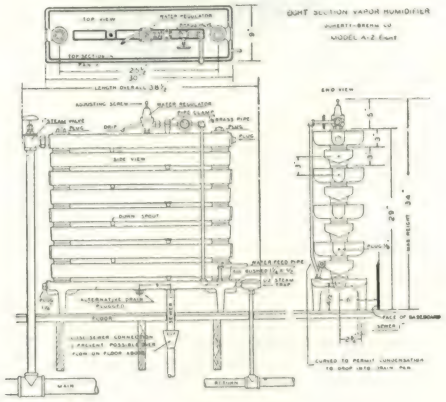
Models and Capacities

"A-2-Eight" Doherty-Brehm Humidifier, built in eight sections and base, has a capacity of 40,000 cubic feet.

Model "A-2-Ten," built in ten sections and base, has a capacity of 50,000 cubic feet.







SPECIFICATIONS OF "A-2" MODELS

Model	"A-2-Eight"	"A-2-Ten"
Number of sections	8 and base	10 and base
Humidifying capacity	40,000 cu. ft.	50,000 cu. ft.
Heating surface	28 sq ft.	35 sq. ft.
Evaporating surface	1224 sq. in.	1530 sq. in.
Dimensions (over-all) Length	38½ in.	38½ in.
Dimensions (over-all) Width	9 in.	9 in.
Dimensions (over-all) Height	34 in.	40 in.
Shipping weight (packed)	275 lb.	336 lb.

PRICES F.O.B. FACTORY—INSTALLATION EXTRA

With brass pressure-reducing valve and fittings less cabinet	$180	$195
Complete with metal cabinet	210	225
Complete with wood cabinet	325	340

COMPLETE SPECIFICATIONS OF DOHERTY-BREHM HUMIDIFIERS

			"A-Twelve"	"A-1-Six"	"A-1-Eight"	"A-2-Eight"	"A-2-Ten"
1. Model							
2 Type of heating system			Hot water	Steam or vapor*	Steam or vapor*	Steam or vapor	Steam or vapor
3. Number of sections			12 and base	6 and base	8 and base	8 and base	10 and base
4 Prices, f.o.b factory, installation extra	With brass fittings and pressure reducing valve *less cabinet*		$195.00	$125.00	$140.00	$180.00	$195.00
	Complete with metal cabinet		225.00	150.00	165.00	210.00	225.00
	Complete with period wood cabinet		340.00	245.00	260.00	325.00	340.00
5. Capacity	Cubical contents which unit will properly humidify		20,000 cu. ft.	20,000 cu. ft.	27,000 cu. ft.	40,000 cu. ft.	50,000 cu. ft.
6 Heating surface***		Section	2 tube, 3.6 sq. ft.	1 tube, 2 sq. ft.	1 tube, 2 sq. ft.	1 tube, 2.6 sq. ft.	1 tube, 2.6 sq. ft.
		Section	3 tube, 4.6 sq. ft.	2 tube, 3 sq. ft.	2 tube, 3 sq. ft.	2 tube, 4.4 sq. ft.	2 tube, 4.4 sq. ft.
		Pair	8.2 sq. ft.	5 sq. ft.	5 sq. ft.	7.0 sq. ft.	7.0 sq. ft.
		Unit	49.2 sq. ft.	15 sq. ft.	20 sq. ft.	28.0 sq. ft.	35.0 sq. ft.
7. Evaporating surface		Section	2 tube, 127 sq. in.	1 tube, 89 sq. in.	1 tube, 89 sq. in.	1 tube, 127 sq. in.	1 tube, 127 sq. in.
		Section	3 tube, 179 sq. in.	2 tube, 116 sq. in	2 tube, 116 sq. in.	2 tube, 179 sq. in.	2 tube, 179 sq. in.
		Pair	306 sq. in.	205 sq. in	205 sq. in.	306 sq. in.	306 sq. in.
		Unit	1836 sq. in.	615 sq. in.	820 sq. in.	1224 sq. in.	1530 sq. in.
8. Dimensions (over-all)	Section	Length	30 in.	20½ in.	20½ in.	30 in.	30 in.
		Width	8 in.	8 in.	8 in.	8 in.	8 in.
		Height	2½ in.	3 in.	3 in.	3 in.	3 in.
	Unit	Length	38½ in.	29 in.	29 in.	38½ in.	38½ in.
		Width	9 in.	9 in.	9 in.	9 in.	9 in.
		Height	40½ in.	28 in.	32 in.	34 in.	40 in.
	Metal cabinet	Length	41 in.	31½ in.	31½ in.	41 in.	41 in.
		Width	11¾ in.	11¾ in.	11¾ in.	11¾ in.	11¾ in.
		Height	42 in.	33 in.	33 in.	36 in.	42 in.
	Period wood cabinet	Length	43 in.	35 in.	35 in.	43 in.	43 in.
		Width	13 in.	12½ in.	12½ in.	13 in.	13 in.
		Height	41 in.	33 in.	33 in.	41 in.	41 in.
9. Approximate shipping weights	Sections	Section	3 tube, 35 lb.	2 tube, 23 lb.	2 tube, 23 lb.	2 tube, 38 lb.	2 tune, 38 lb.
		Section	2 tube, 25 lb.	1 tube, 17 lb.	1 tube, 17 lb	1 tube, 23 lb.	1 tube, 23 lb.
		Total	60 lb	40 lb.	40 lb.	61 lb.	61 lb.
	Unit	Uncrated	395 lb.	160 lb.	200 lb.	255 lb.	316 lb.
		Crated	423 lb.	175 lb.	215 lb.	275 lb.	336 lb.
	Metal cabinet	Uncrated	90 lb.	55 lb.	55 lb.	90 lb.	90 lb.
		Crated	145 lb.	116 lb.	116 lb.	145 lb.	145 lb.
	Period wood cabinet	Uncrated	55 lb.	35 lb.	35 lb.	55 lb.	55 lb.
		Crated	115 lb.	75 lb.	75 lb.	115 lb.	115 lb.

*Can also be used satisfactorily on hot water heating system in houses or offices of approximately 10,000 cubic feet or less (five or six rooms).

***As a heating element this unit is 30% more efficient than the ordinary radiator of equal heating surface and should be so considered in computing it as a part of the heating system.

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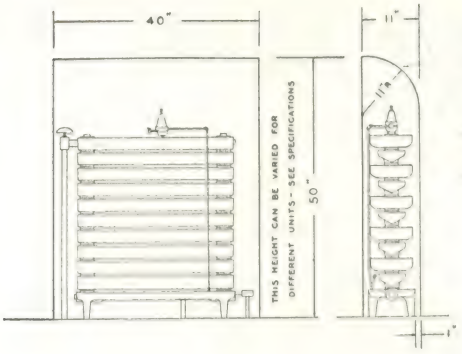
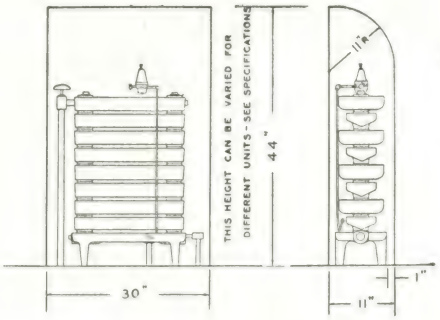
RECESSING PLANS



RECESS PLAN FOR MODEL A-2 TEN SECTIONS OR LESS

MODEL A TWELVE SECTIONS OR LESS



RECESS PLAN FOR MODEL A-1 EIGHT SECTIONS OR LESS

CABINETS FOR DOHERTY-BREHM HUMIDIFIERS

Period Wood Console for Models "A-Twelve," "A-2-Eight" and "A-2-Ten"

Cabinet No. 105-M—This is an exquisite piece of furniture manufactured by the Wm. A. French Co. and can be furnished either in genuine mahogany (No. 105-M) or in genuine walnut (No. 105-W).

Dimensions Over All—Length, 43 inches; width, 13 inches; height, 41 inches.

Weight, Approximate—Uncrated, 55 pounds; crated, 115 pounds.

Period Wood Cabinet for Models "A-1-Six" and "A-1-Eight"

Cabinet No. 106-M—This is another example of fine period consoles designed and manufactured for us by the Wm. A. French Co. Furnished in genuine mahogany (No. 106-M) and genuine walnut (No. 106-W).

Dimensions Over All—Length, 35 inches; width, 12½ inches; height, 33 inches.

Weight, Approximate—Uncrated, 35 pounds; crated, 75 pounds.

Metal Cabinet for Models "A-Twelve" and "A-2-Ten"

Cabinet—No. 102-W.

Dimensions Over All—Length, 41 inches; width, 11¾ inches; height, 42 inches.

Weight, Approximate — Uncrated, 90 pounds; crated, 145 pounds.

Metal Cabinet for Model "A-2-Eight"

Cabinet—No. 103-W.

Dimensions Over All—Length, 41 inches; width, 11¾ inches; height, 36 inches.

Weight, Approximate — Uncrated, 87 pounds; crated, 140 pounds.

Metal Cabinet for Models "A-1-Six" and "A-1-Eight"

Cabinet—No. 104-W.

Dimensions Over All — Length, 31½ inches; width, 11¾ inches; height, 33 inches.

Weight, Approximate — Uncrated, 55 pounds; crated 116 pounds.

Continued on next page

THE DOHERTY-BREHM WASHED AIR AND HUMIDIFYING SYSTEM

MANUFACTURED AND SOLD BY

DOHERTY-BREHM CO.

The Doherty-Brehm Washed Air and Humidifying System is a combination air washer and humidifier for large homes, office suites, schools, hospitals, stores and shops. Through its installation fresh, clean, healthfully moistened air may be provided at moderate cost. In the field of air conditioning, this system has proved a distinct advancement.

Original ideas, conceived by George D. Doherty, an engineer of prominence, have been utilized to make it the most practicable and efficient air washing and humidifying system that can be procured. Tests by eminent engineers and the experience of hundreds of prominent home owners have proved its high efficiency over a period of many years.

Description

The Doherty-Brehm Washed Air and Humidifying System consists of a cabinet, located at some convenient point, generally in the basement of the building, into which the dry, dust-laden air of the home or office is drawn by means of a powerful, rotary blower.

Within the cabinet are a battery of sprays connected to the city water line which form a curtain of water through which the air is forced to pass, cleaning it of all dust, dirt and bacteria. At the same time these sprays play directly upon a heating unit which is connected to the heating system of the building, securing efficient evaporation of large quantities of water. The washed and moistened air is then drawn through a special filter curtain which removes all surplus moisture and is returned to the living quarters through one or more metal ducts.

The rotary blower assures positive circulation of the air and complete distribution of the moisture throughout the home or office.

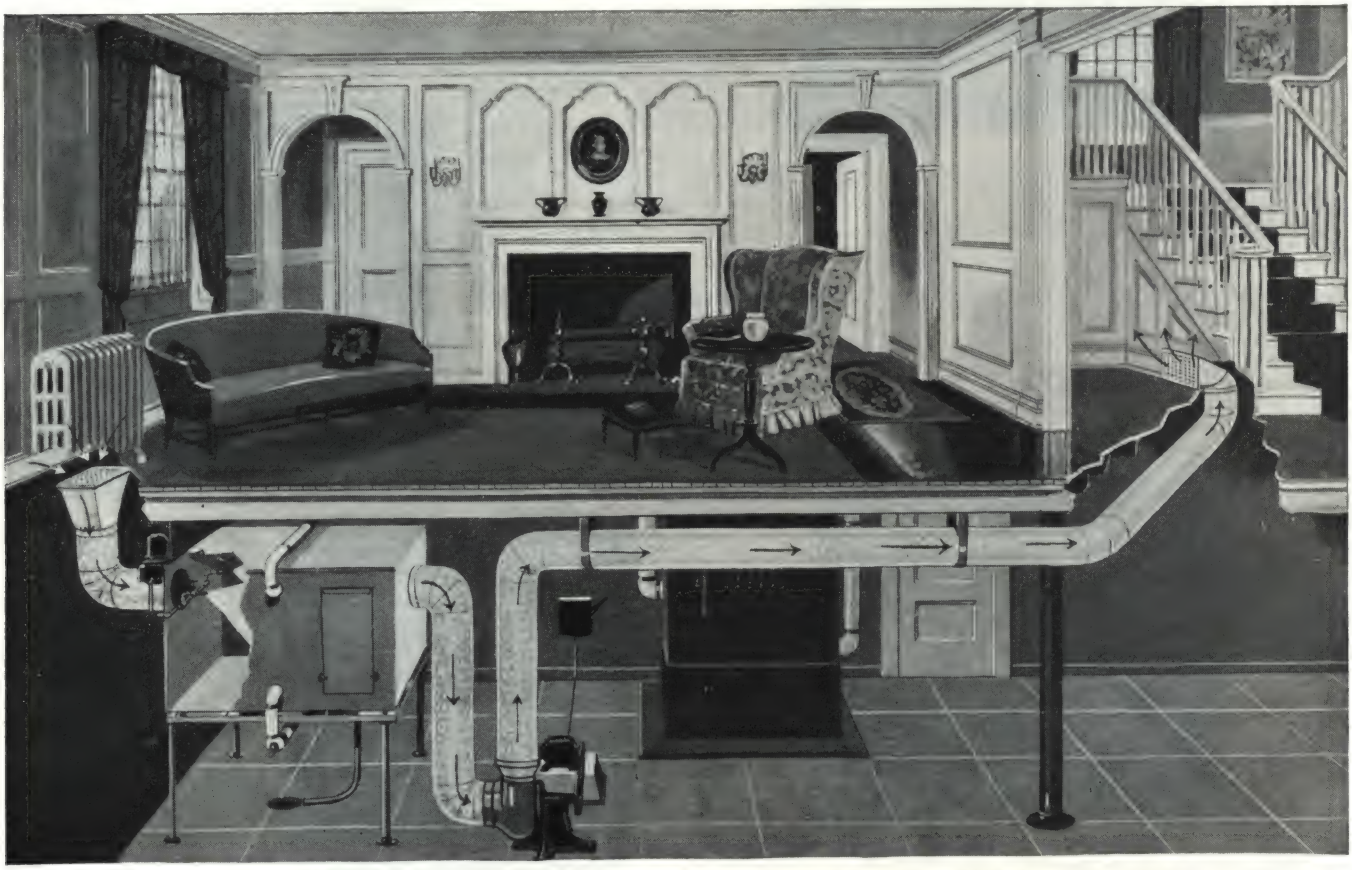
Careful attention to the acoustical problems of the installation has eliminated all possible noises from the system and provided an absolutely silent unit.

Construction

All parts of the Doherty-Brehm Washed Air and Humidifying System are made of the finest materials available. The cabinet is of 26 gage galvanized sheet iron with brass fittings.

The drip pan is of heavy sheet copper set on a 1½-in. plank base framed in angle iron. The standards are of 1½-in. iron pipe adjustable in height to the location of the cabinet. The spray assembly is of brass throughout with special spray nozzles, water strainer and control valves. Intake ducts are of 10-inch galvanized round pipe with 12-inch pipe fitted with 1-inch felt silencers at the floor opening. Outlet ducts are of 9-inch galvanized round pipe with 11-inch pipe fitted with 1-inch felt silencers at the outlet opening.

Write for complete information and installation data



Typical Installation of the Doherty-Brehm Air and Humidifying System

Continued on next page

Detailed Operation

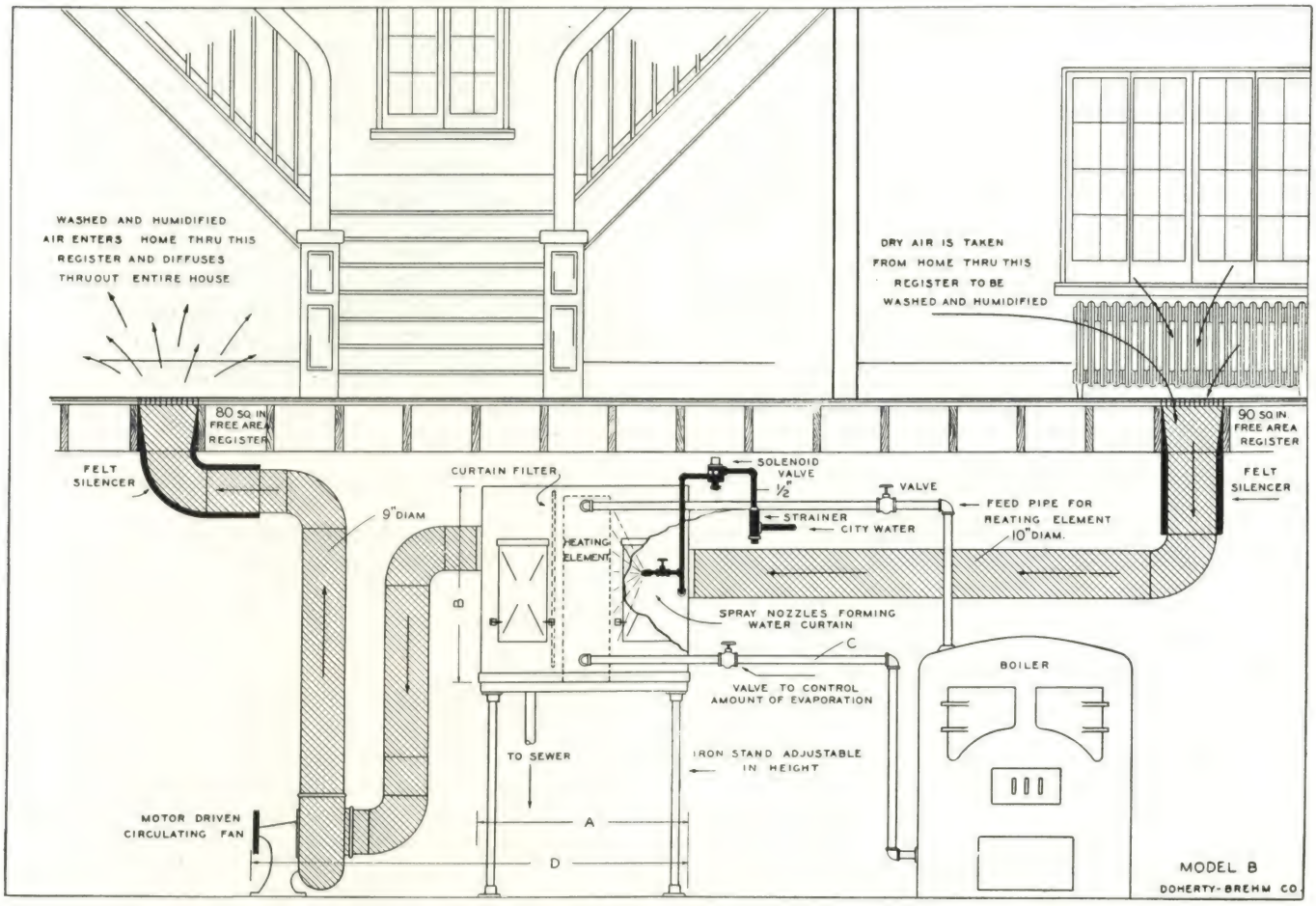
Referring to the detail drawing below, the house air is taken from floor register shown at right. The humidified and washed air is blown into house through the floor register at left. From here the moisture diffuses all through the house.

The register at right may be located anywhere. The moist air register at left should be as centrally located as possible; it may be placed under a hall radiator to good advantage.

Standard Equipment

For hot water heating systems, standard equipment of the Doherty-Brehm Washed Air and Humidifying System includes 1¼-inch connections for radiator in humidifying cabinet.

For steam and vapor heating systems, equipment includes 1-inch connections for feed to radiator; ¾-inch steam trap on return; ⅜-inch galvanized pipe for city water; and 1¼-inch galvanized pipe for sewer. (Each spray passes 3 gals. of water per hour at 45 lbs. pressure.)



Detail of Typical Basement Installation of Doherty-Brehm Washed Air and Humidifying System

SPECIFICATION OF DOHERTY-BREHM WASHED AIR AND HUMIDIFYING SYSTEM

Model B	Humidifying capacity	Volume of air circulated in house per hour	Percentage of dust, odors, smoke, and bacteria removed	Motor	Blower
All equipment located in basement	Any residence exceeding 30,000 cu. ft. in cubical contents	30,000 to 60,000 cubic feet	93%	Repulsion induction type quietly operating	Quietly operating centrifugal type

DIMENSIONS OF DOHERTY-BREHM WASHED AIR AND HUMIDIFYING SYSTEM

Sheet metal ducts	Air washer and humidifying cabinet			Over-all dimensions for fan and motor	Floor registers
	Length	Height	Width		
10 in. diameter	46 in.	40 in.	30 in.	3x3 ft.	12x14 in. or equivalent—may be concealed under radiators or behind furniture

Special sizes to suit requirements.

THE AQUALATOR

MANUFACTURED BY
The Wilcolator Company
(AQUALATOR DIVISION)

MAIN OFFICE AND FACTORY
17 Nevada Street, NEWARK, N. J.

A Humidifier Unit for Homes, Offices and Industrial Use

Advantages

Protect a new building from arid dryness in the heating season and its first-year look will last. The clean, adequately humidified air which the AQUALATOR supplies keeps doors and windows from shrinking and warping, furniture joints from loosening, and materially lessens plaster cracks.

Comfort during cold weather depends not alone upon being warm enough. It depends upon the condition of the air breathed. When the air is properly humidified, one is comfortable at a lower temperature than in dry air.

The AQUALATOR washes, circulates, humidifies and maintains air conditions more nearly resembling those of the "physical comfort zone" of from 40% to 50% relative humidity at room temperatures of 68° to 70°.

Capacity

One AQUALATOR will evaporate, under average conditions, from 12 to 15 gal. of water each 24 hours, which amount will adequately humidify the air in a space of from 10,000 to 12,000 cu. ft. If a larger space is to be humidified, additional AQUALATORS must be installed.

To successfully operate the AQUALATOR, water must be available for at least 35-lb. pressure. One AQUALATOR will use from 5 to 6 gal. of water per hour, depending on the water pressure.

Installation

The AQUALATOR may be easily installed either in new or existing buildings. It is designed to fit between two 2x4 in. studs, 16 in. on center.

The AQUALATOR should be installed in an inside wall in a central location in the building—in the home this is usually in the lower hallway. It should be located in a space at least 4 ft. wide, to avoid condensation on the opposite wall, and where no furniture is to be placed directly under it. A corner location is to be avoided. It should not be installed directly over a radiator.

It is instantly accessible for cleaning or adjustment, if required—the front is a hinged door which opens readily. The working parts are not plastered over—a very important point in any installation where there is water under pressure.

Construction

Copper and brass are used throughout in the construction of the AQUALATOR which is mounted rigidly in an angle iron frame screwed through the lath and plaster to the studs.

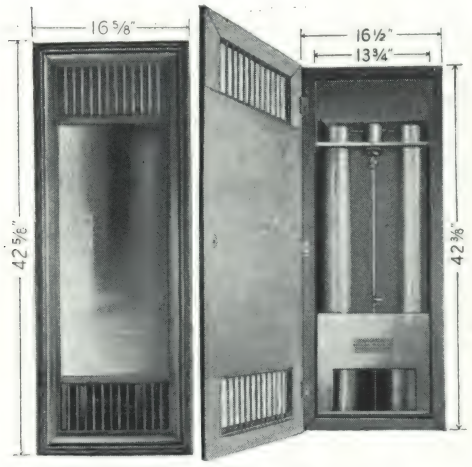
The AQUALATOR is controlled by means of a valve easily reached by opening the mirror frame door. A fine mesh filter or strainer is provided to remove any particles before they reach the nozzles.

Operation

In the AQUALATOR, as shown below, water is sprayed downward through two copper tubes, causing air to be drawn into each tube by the suction thus created, the sprays acting like pistons. This air is washed, becomes saturated with water vapor and is returned to the room. A series of baffles remove surplus free moisture.

Very complete atomization of the water is accomplished by means of the special construction of the nozzles. This makes the moisture the more readily absorbed by the air and also limits the consumption of water to a minimum.

Automatic control can be furnished if desired.



The Model A Aqualator
The AQUALATOR is so designed as to fit unobtrusively into practically any decorative scheme. The frame is attractively finished in antique gold metal leaf, the mirror is a high quality plate. A Colonial frame can be furnished if desired

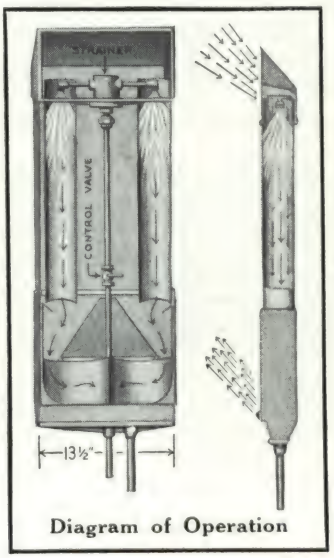
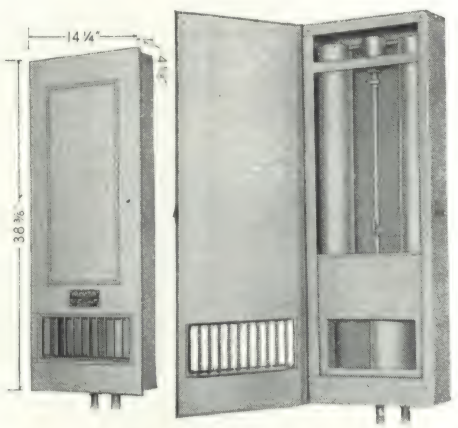


Diagram of Operation



The Model B Aqualator
The industrial AQUALATOR embodies the same principle of operation as the residence type. It is for office and industrial use. The unit is contained in a heavy steel cabinet with a steel door, which is finished in a durable ivory duco

Continued on next page

Wall Model Installed

The mirror frame carrying the two grilles is reversible, that is, may be installed with the hinges on either the right or left side

Cost of an Aqualator Installation

Up to now most *effective* humidifying systems involved the expenditure of thousands of dollars in industrial installations, and several hundreds of dollars in homes and offices.

With the advent of the AQUALATOR it becomes unnecessary to spend more than a fraction of the sum formerly required.

The AQUALATOR will take care of the humidifying needed indoors during the heating season—washing, moistening and circulating the air. It does *not* reduce excess humidity on days in the summertime when humidity is high.

The operating cost of an AQUALATOR is negligible—only a few cents a day.

Services to Architects, Contractors and Plumbers

The Aqualator Division of THE WILCOLATOR COMPANY is glad to co-operate with architects, builders and plumbers in selecting the best locations for installing AQUALATORS, and indicating proper apparatus and piping for connection to the water system.

In writing for information, kindly send us sketch or blue prints of the home, office or industrial plant, kind of processes being carried on (if any), and give cubic volume of air to be humidified.

Aqualator Performance Is Guaranteed

When installed in accordance with our instructions, we guarantee the successful operation of the AQUALATOR, and will protect the buyer against its failure to do what we claim for it.

Tempering the Water

Because of air's capacity to absorb about twice as much moisture at 70° F. as at 50° F., and because in the wintertime the tap water is usually 50° F. or below, it is advisable to temper the water supplied to the AQUALATOR, for the two water sprays will cool the air drawn in to about their temperature. There is a drop in temperature at the sprays due to the latent heat of vaporization, so that water at 100° F. is recommended. Do not use hot water from the domestic hot water supply.

Console Model Aqualator

This model operates on the same principle as the wall models. A motor driven fan is provided which speeds up the air circulation very materially.

This model will take care of about the same space as the wall model, without using the fan. By using the fan its capacity is doubled

Specifications

Note: The following should be incorporated in the plumbing specifications:

Humidifier—This contractor shall furnish and install, where indicated on the drawings, an "AQUALATOR" (Humidifier) as manufactured by THE WILCOLATOR COMPANY, 17 Nevada Street, Newark, N. J., in strict accordance with the detailed drawings (or manufacturer's instructions). Furnish and install a small indirect water heater similar to a No. 0 Taco, a Bell & Gossett No. 30 Special, or an Excelso, Jr. Insert a valve in the heating line to the water heater to control the hot water supply. In the cold water supply to the heater, insert a globe valve.

The water supply line between the heater and the humidifier unit should be ½-in. brass.

Provide a ¾-in. drain pipe from the humidifier unit which shall discharge into the nearest plumbing fixture with an open connection to prevent backing up of sewer gas. For easy removal of the humidifier, the supply and drain connections shall be made with unions. These unions shall be accessible at all times.

Literature

Literature and detailed installation instructions on the various AQUALATOR models are available on request.

ZEPHYR WASHED AIR COMPANY

Humidifying-Air Purifying Systems for Homes, Apartments, Offices and Industrial Plants

1124 Harmon Place, MINNEAPOLIS, MINN.
DEALERS IN PRINCIPAL CITIES

Zephyr Washed Air System

The new and improved Zephyr is quiet, safe and has increased capacity. A simple and inexpensive humidifying-air purifying system operated by city water pressure. Downward sprays of water create suction, drawing air through circulator where it is washed, humidified and purified. On wall models only operating cost is for water used. Cabinet models use small motor and fan to increase air circulation.

Automatic control furnished if desired but inherent regulation is generally sufficient.

ZEPHYR Washed Air System
TRADE-MARK

What Zephyr Does

(1) Provides a generous air circulation through rooms served (see capacity ratings below).

(2) Washes air in sprays of pure water, removing dust, lint, odors of cooking, smoke, and other impurities.

(3) Evaporates sufficient water to maintain an average relative humidity of 40% in rated cubage, using warm water, providing infiltration is not excessive.

(4) Avoids or eliminates air dryness which predisposes occupants of the premises to colds and other respiratory troubles.

(5) Permits comfort at 68° to 70°, with fuel economy.

(6) Prolongs life of fine furniture and prevents shrinkage of wood trim and paneling.

Improved Features

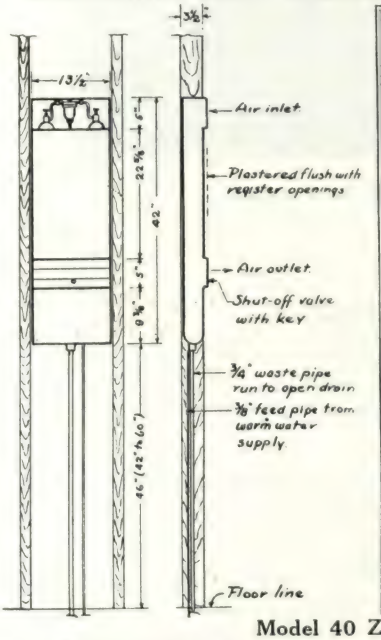
Quiet—Pressure regulating valve maintains a quiet spray. Nozzle silencers further reduce sound to a minimum.

Safe—Automatic trip safety valve is positive insurance against overflow.

High Capacity—New interior design increases capacity of new wall models 50% over former models.

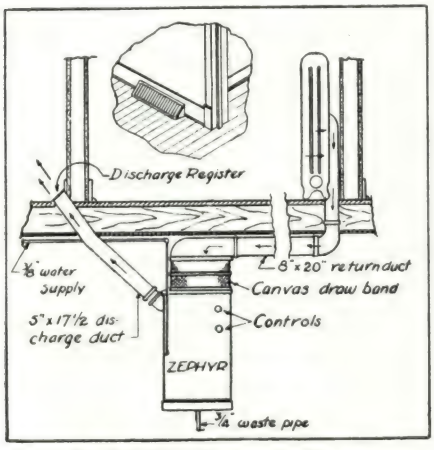
Water Consumption

Water cost for wall models will run 2¢ per 24 hours of operation with water at 10¢ per thousand gal.—about 200 gal. a day. Warm water should be supplied for winter use with small indirect heater attached to boiler.



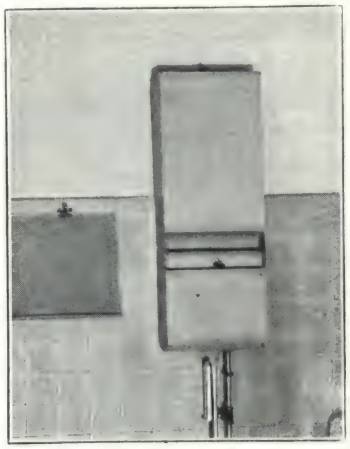
Model 40 Zephyr

Built-in type for new or old homes, hospitals, apartments, or new office buildings. Only two bronze registers visible. Installed in an inside frame or tile wall during construction, or thereafter by removing small section of plaster. Made of heavy copper and brass for permanence. Provided with water strainer, pressure regulator, manual shut-off with key and automatic trip safety valve. Will maintain an average relative humidity of 40% in 18,000 cu. ft. of space, evaporating 15 to 20 gal. of water per day



Model 27—Basement Type

Steel cabinet supported from basement ceiling, with ducts to and from inlet and outlet registers. Similar to standard console but of greater capacity. Will condition 30-40,000 cu. ft. of space. Designed for homes, stores or shops



Model 60—Office and Industrial Type

Similar to Model 40 but installed exposed on wall or column. Multiple units serve any cubage. One unit will condition about 18,000 cu. ft. Installation above is in hospital operating room

Zephyr Console—for Home or Office

Cabinet of genuine walnut (Model 30), or of steel finished in walnut (Model 25). Circulator of copper enclosing all operating mechanism. Copper feed and waste pipes to basement. Motor driven fan. Will condition a home or office of 20,000 to 25,000 cu. ft., evaporating 15 to 25 gal. in 24 hours.

Steel console is also supplied with outlet at back (Model 26), so that unit may be concealed in closet or pantry, only the register being visible in adjoining room

AMERICAN AIR FILTER COMPANY, INC.

226 Central Avenue, LOUISVILLE, KY.

ENGINEERING AND SALES REPRESENTATIVES

ALBANY, N. Y.
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BALTIMORE, MD.
BARRE, VT.
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COLUMBUS, GA.
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SAGINAW, W. S., MICH.
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TOLEDO, OHIO
TULSA, OKLA.
WASHINGTON, D. C.

CANADIAN ASSOCIATES, MIDWEST CANADA, LTD., MONTREAL, QUEBEC

Products

The American Air Filter Company, Inc., manufactures a complete line of Air Filtering Equipment, including Automatic Self-cleaning, Standard Unit and Dry Process Air Filters, all used for the removal of dust, dirt, bacteria and other foreign matters from the air.

This equipment is used for general ventilation, drying operations, process dust control; for air compressor and diesel engine; mill motor, turbo generator and other electrical applications; and for air or gas under pressure to remove entrained oil, moisture and dirt.

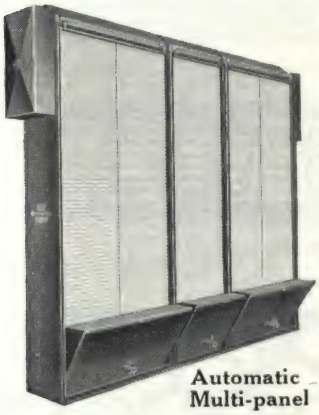
Air Cleaning Principle

All American Air Filters (viscous type) operate on the adhesive impingement principle. The air to be cleaned is drawn through the filter media by means of fans or blowers.

The centrifugal force actuated upon the air streams in passing through the filter throws the dust particles against the surface of the filter media where they are caught and held by a viscous coating.

Guaranteed cleaning efficiency on any American Air Filter—97% to 98%, at a resistance of .25 to .385 in. water gauge.

Automatic Self-cleaning Air Filters



Automatic Multi-panel

The American line of automatic air filters is among the most complete that have ever been offered. All of the filters described below have been in use for a number of years in connection with both general ventilation and industrial applications. Positive self-cleaning features on each assure maximum cleaning effectiveness and eliminate practically all maintenance.

All types are furnished for either continuous or intermittent service and are available in sizes and set-ups suitable to any desired capacity or space conditions.

Multi-panel Type

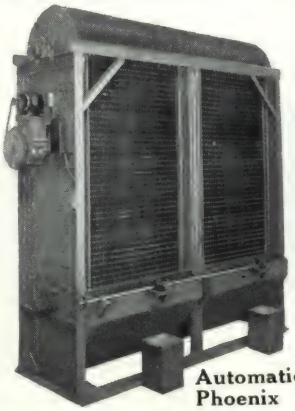
The filter media consist of a multiplicity of closely overlapping bakelite fiber coated screen panels, which form a continuous movable curtain having a high efficiency in dust removal.

When the curtain enters the charging liquid bath at the base of the filter, the panels are automatically separated and individually cleaned, thus insuring positive self-cleaning.

Automatic Horizontal

Horizontal

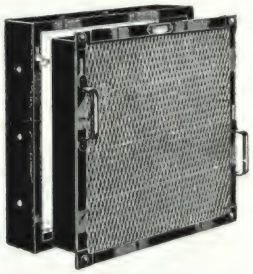
The filter media consists of horizontally placed unit cells of expanded metal, arranged in rows one above the other. Self-cleaning is accomplished automatically, at predetermined intervals, by a flushing device which moves over each row of cells, cleaning and recoating them with a fresh supply of charging liquid.



Automatic Phoenix

Phoenix

With filter media of innumerable small die-formed metal plates secured in position by cross rods and incorporated in a rotating filter screen. The screen, mounted on sprockets, is automatically cleaned and recharged by intermittently moving through a bath of charging liquid located at the base of the filter.

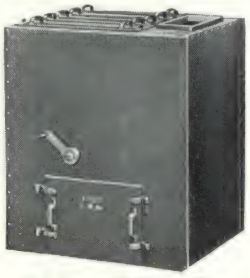


Unit Filter

Rated capacity—800 c.f.m.
Size of units (outside frames)—20x20x4 in.
Effective opening—18x18 in. (2¼ sq. ft.)
Dust holding capacity—2 lb. per cell
Weight—unit 30 lb.—cell 20 lb.

Standard Unit Filters

The American Unit Filter is made up of a standard sheet steel frame and interchangeable cell, with filter media of expanded metal or crimped wire, scientifically graded to produce maximum cleaning efficiency. Filters are arranged in wall type set-ups to deliver the required capacity and to meet space conditions. Automatic latches placed conveniently near handles of the cell permit instant and easy removal of the latter for cleaning and recharging. Cleaning requires but a few minutes time and is usually accomplished by means of a steam or hot water tank.



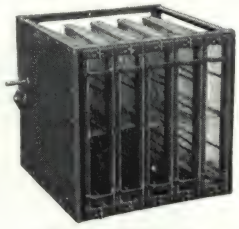
"Airmat" Dust Box

Airmat

The basic element in this type is the "Airmat" sheet, a dry filter media composed of sheets of gauzy cellulose tissue. These sheets are renewable and when thoroughly filled with dirt are discarded for new ones, the useful life of each mat depending upon the hours of service, dust conditions, etc.

Pocket Type—In this form the mats, held in place by screens, are mounted in a boxlike frame of metal "pockets." These unit frames can be set up to meet any space conditions and capacity requirements. The Pocket Type is used for both general ventilation and industrial air cleaning.

Dust Arrester—In this form the Airmat pockets are arranged in standard dust "boxes" or dust arrester "systems" designed for individual needs. The Airmat Dust Arrester is ideal for the recovery of valuable dust, for abating the dust nuisance in factory and factory districts, and for saving fuel and eliminating drafts due to the recirculation of air in winter.



"Airmat" Pocket Type

Technical Facilities

Our research laboratory and engineering staff are always at your service. Let our engineers study your dust problem, make tests in our laboratory and recommend the proper type of equipment.

THE AUER REGISTER CO.

Registers, Faces, Grilles, Ventilators and Radiator Enclosures

TELEPHONE
HENDERSON 7650

3608 Payne Avenue, CLEVELAND, OHIO

CABLE
"AUER—CLEVELAND"

Auer Wrought Metal Grilles

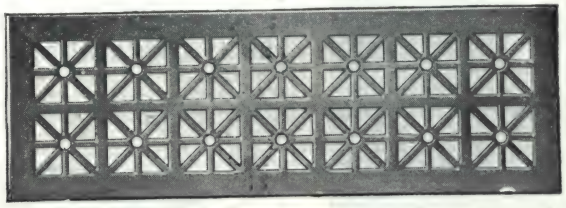
Advantages—Wrought metal grilles can be made in odd sizes and shapes without the expense and delay of pattern making. Wrought grilles are light in weight and easily fastened to walls and ceilings. They can neither be broken in transit nor after installation. The lodging surface for dust is reduced to a minimum, hence sanitary.

Grilles can be screwed or hinged to woodwork or metal frames.

All grilles can be provided with cement-set frame—an angle frame spot-welded to margin of grille to extend into wall opening. The frame is formed to provide pocket for holding hardening cement by which means grille is held in place, making a sealed connection.

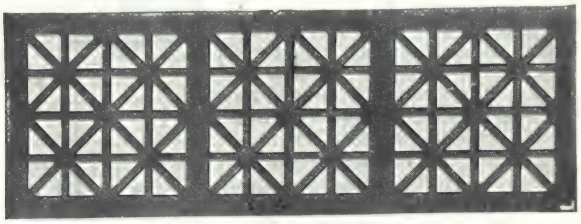
All grilles can be made into registers by the addition of operating or stationary louvers; or, can be equipped with aluminum automatic back pressure dampers.

Sizes and Finishes—Auer wrought metal grilles are made of cold rolled steel, or solid bronze, brass, copper, aluminum or monel metal. U. S. 10 gauge or B&S 10 gauge, approximately ⅛ in. thick; heavier gauges where required; in sizes up to 60x96 in. Larger sizes in sections appropriately joined. All standard finishes.



No. 7A Grecian Design, 50% Opening

Units, square	Division bars	Multiples, square
3 inch	⅜ inch	3⅜ inch
3 inch	½ inch	3½ inch
3 inch	¾ inch	3¾ inch

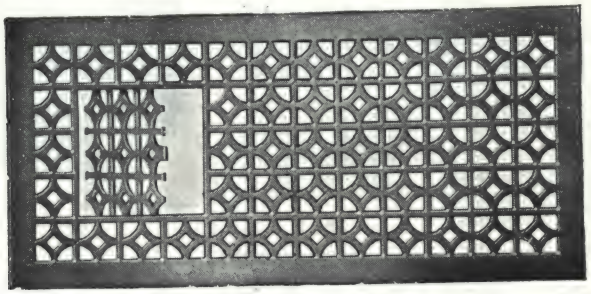


No. 12A Union Jack Design, 45% Opening

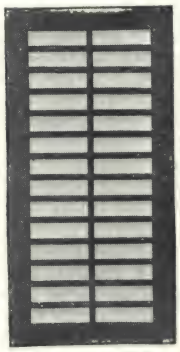
No.	Openings, square	Bars	Multiples, square	Air opening
12A	2½ in.	¼ in.	2¾ in.	50%
12A	2½ in.	½ in.	3 in.	45%
14A	3 in.	⅜ in.	3⅜ in.	55%
14A	3 in.	½ in.	3½ in.	50%
20A	4⅛ in.	⅜ in.	4½ in.	65%

Plain Lattice Design

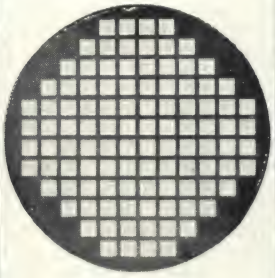
No.	Openings, square	Bars	Multiples, square	Air Openings
8A	½ inch	¼ inch	¾ inch	50%
5A	¾ inch	¼ inch	1 inch	64%
3A	⅞ inch	¼ inch	1⅛ inch	70%
9A	1 inch	¼ inch	1¼ inch	75%
10A	1¾ inch	¼ inch	2 inch	85%



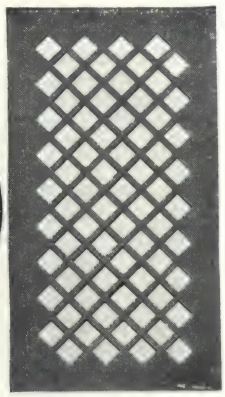
No. 4A Moorish Design, 51% Opening
Openings 1¾ in. Bars ¼ in. Multiples 2 in. square. Invisible doors for access to radiator valves can be incorporated in all designs



Oblong Design
No. 17A



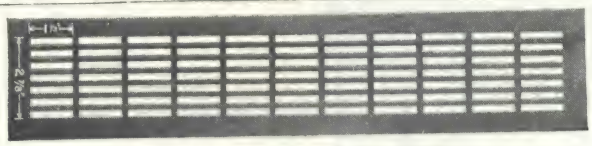
Round Grille
Made in any size



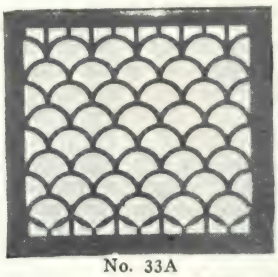
Diagonal Design, No. 6A
Openings ¾ in. Bars ¼ in.

Oblong Design

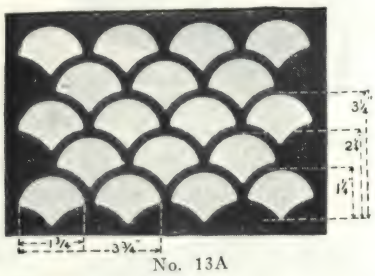
No.	Openings	Bars	Air openings
15A	1½ x ¾ in.	¼ in.	67%
17A	2¾ x ¾ in.	¼ in.	72%
31A	1½ x 3/16 in.	3/16 in.	50%



No. 31A Window Stool Grille
Perforations 1½ x 3/16 in. Bars 3/16 in. Made any size in multiples above indicated

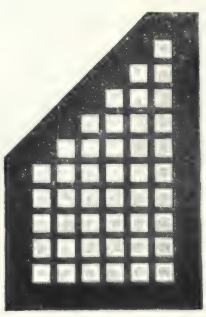


No. 33A

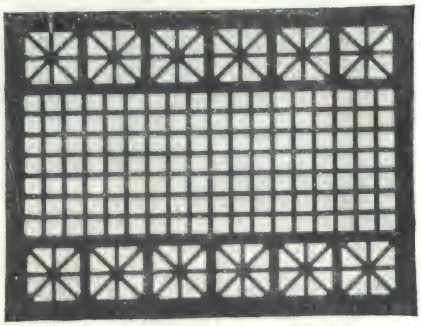


No. 13A

Shell Design Openings as Shown

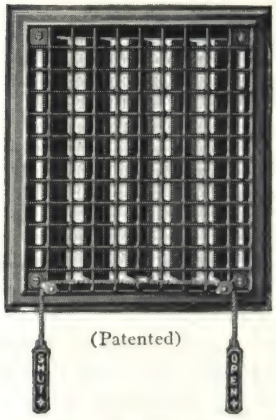


Design No. 5-S



Design No. 5-12B

Continued on next page



(Patented)

Fig. OP Embossed Design Steel Register

Equipped with pulleys.

This register can also be furnished having a Design No. 5A face, and is then indicated as Fig. KP. State whether wall or ceiling pulleys are wanted

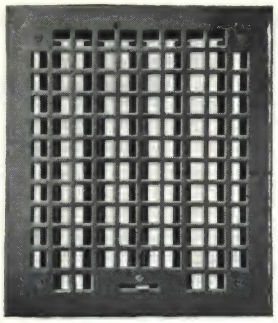
(Patented)

Fig. KR Pole Operating Register

For wall and ceiling use. Face is made of 12 gauge steel Design No. 5A, having attached thereto a multiple louver register body, with a ring-operating lever so that a window pole can be used to open and close the louvers

"A" indicates height of opening in wall.

"B" indicates length of louver, or width of the opening in wall



Set-Screw Lock Register Fig. KL

(Patented.) All-steel construction. The louvers are locked in various positions with a setscrew. When not locked the louvers can be operated in the regular way

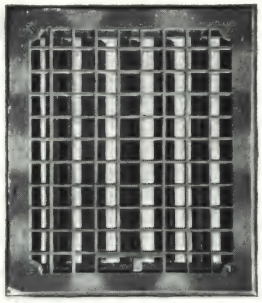
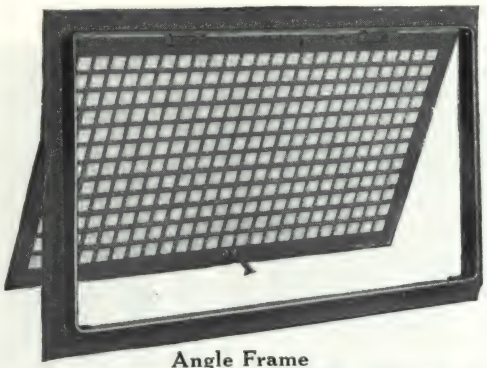


Fig. M Semi-cast Register

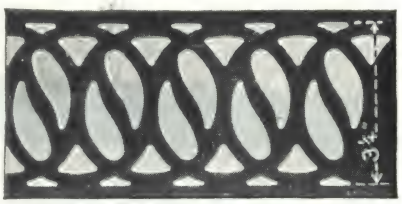
Cast metal face, steel body and louvers.

Margin of face is bevel edge. (Patented.) Sizes 6x8 in. and larger. We also make floor borders or frames to match



Angle Frame

Any grille can be furnished with angle frame to which it may be hinged or screwed. Standard sizes of angle frame material: $\frac{7}{8} \times \frac{7}{8} \times \frac{1}{8}$ and $1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{8}$ in.

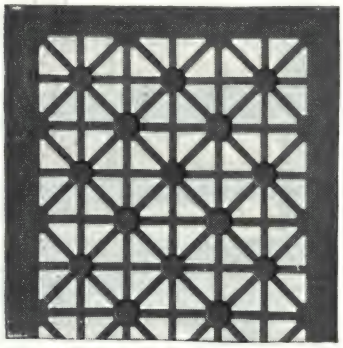


No. 25A

Made only in width shown; any length

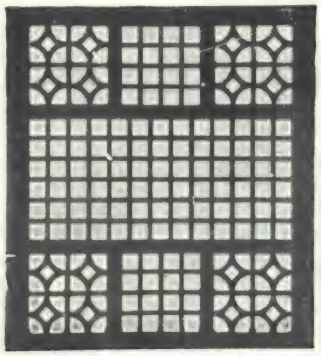
Auer's All-steel Clothes Chute Door

Easy to install, better appearance and finish. Being metal, can not sag or warp; non-breakable; rigid; tight closing. Convex border hides rough plaster, etc. Spring catch. Also self-closing spring. Deep flanged frame with holes punched for attaching to metal box or furring strip. Made for opening 7x10 in.; also 9x12 in. Finishes: white, prime and nickelplated

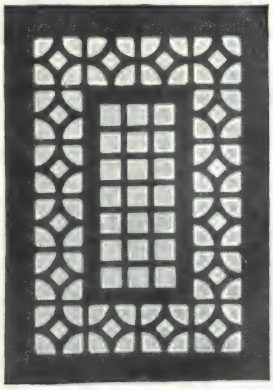


Design No. 27A

Made in same units as Nos. 12A, 14A and 20A



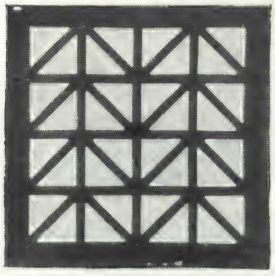
Design No. 5-4C



Design No. 5-4B

No. 24A

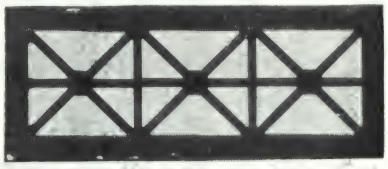
Made only in width shown; any length



Design No. 29A

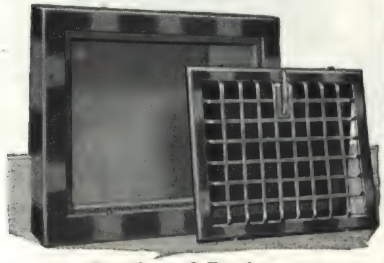
Multiples same as No. 23A

All Grilles can be made into Registers with Movable (Adjustable) or with Fixed (Stationary) Louvers.



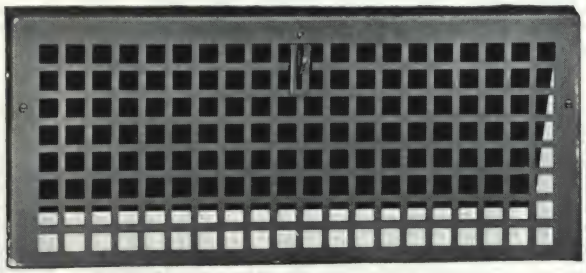
Design No. 22A

Units 4⅛" in. square. Bars ⅜ in. Multiples 4½ in. square



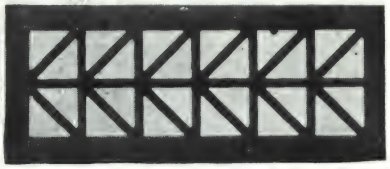
Baseboard Register

Colonial model—grille removed



Forced Air Heating Register

Made of heavy gauge steel in any of our ornamental designs shown on preceding page. No. 5A design, however, is most practical. Made in any required size and finish. Furnished with and without louvers



Design No. 23A

Units 1⅞ in. Bars ⅜ in. Multiples 2¼x4½ in.

AMERICAN FOUNDRY & FURNACE COMPANY

Air Controlling Specialties

BLOOMINGTON, ILL.

Products

WIRE GRILLES and GUARDS; ALUMINUM BACK PRESSURE LOUVRE DAMPERS; DIFFUSERS; MIXING, SPLITTER and BY-PASS DAMPERS.

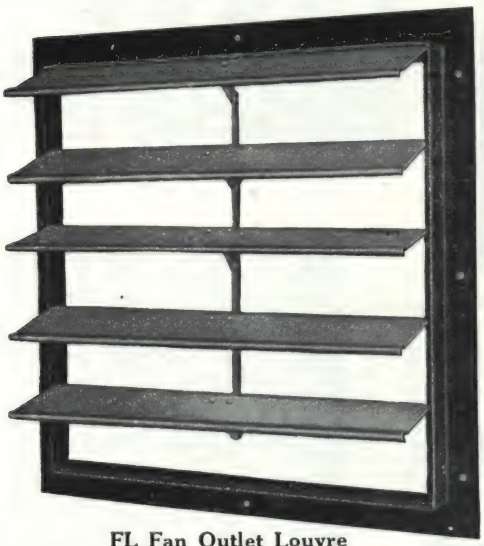
Also Warm Air Heating and Ventilating Apparatus for churches, schools, garages, etc.; American Gas Furnaces; Residence Furnaces; June-Aire Systems of Heating, Ventilating and Air Conditioning for Homes; Access Doors; Manhole Doors; Belt Guards; Blow-off Basins; Ventilators; Foot Warmers; Ornamental Grilles and Cast Radiator Brackets.

Finishes and Sizes

Finish—The standard finish on all grilles, dampers and diffusers is *black duco,* krinkle or prime coat. Any other duco color or krinkle finish can be furnished at slight additional cost.

Sizes—All grilles, diffusers and dampers can be made in any sizes. When ordering, give the exact size of opening. An allowance of ¼ in. (smaller) will be made for irregularities, unless ordered otherwise.

Use this form in ordering: *Opening ..... inches wide, by ..... inches high.*

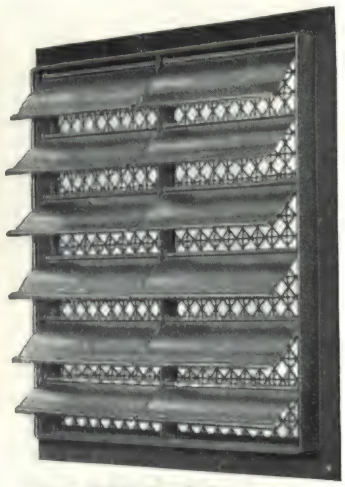


FL Fan Outlet Louvre

For use where fan discharges to atmosphere. Aluminum blades working in unison, open from fan pressure and close automatically when fan is not in operation. Stormproof. Frames are of angle iron, drilled for fastening to wall or duct

K-88 Diffuser

Used over heat openings in fan blast steam or warm air heating systems. Adjustable vertical blades deflect air to any portion of the room. Felt strips prevent dirt streaks on wall. Smooth finish border, no joints show. Made of auto body steel, duco or krinkle finish, in any sizes. Back leg is 4 inches

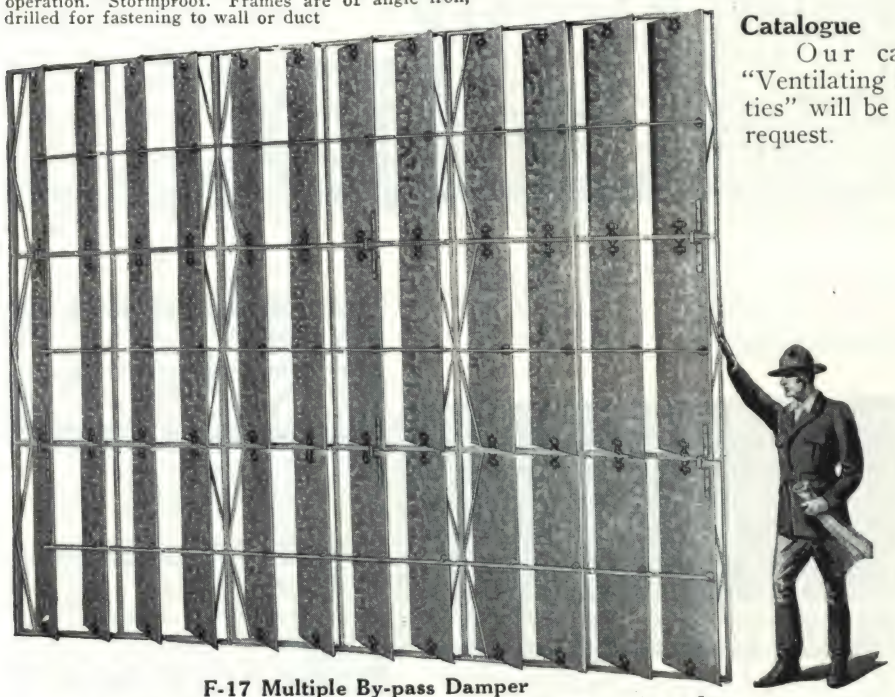


M-2 BPD Back Pressure Metal Screen

Expanded metal screen with back pressure dampers at rear, for base of flues, etc. Dampers made from light, but hard, strong aluminum. Smooth operation and freedom from binding is secured by use of fiber spacers. Silent operation obtained by lining all dampers with felt. These dampers do not clatter. Damper frames are ½x¼-in. bar iron. Standard steel angle borders are 2 in. wide. Other width borders can be furnished at slight additional charge

Catalogue

Our catalogue "Ventilating Specialties" will be sent on request.



F-17 Multiple By-pass Damper

For admission of fresh air. Can be made in any width or height to fit any opening. Adaptable to hand or automatic control. For schools, churches, hotels, theaters, powerhouses, etc. Standard finish, black enamel. Leaves are of galvanized iron or any material on special order. Frame is heavy and substantial

F-13 American Fresh Air Louvre

American fresh air louvre in combination with 12 gauge copper-bearing wire screen with 1-in. diamond mesh. Made in any size, with any number of dampers, with or without screen over face. Any gauge wire screen can be furnished on special order. Standard 1¼-in. diamond mesh. Frame to fit in wall 16 gauge steel, 6 in. deep. Outside frame 2-in. steel angle, drilled for fastening to wall or duct. Dampers fit in frames of ½x¼-in. bar iron. Felt strips on back sides of border eliminate dirt streaks on wall. No joint marks visible on border

THE DIAMOND MANUFACTURING COMPANY

Architectural Grilles of Perforated Metal and Perforated Metal Screens

GENERAL OFFICE AND PLANT
WYOMING, PA.

BRANCH OFFICES

BROOKLYN, N. Y., 26 Court Street
PITTSBURGH, PA., 405 Penn Avenue
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DETROIT, MICH., 4-230 General Motors Building
ATLANTA, GA., 161 Spring Street N. W.
CINCINNATI, OHIO, 622 Broadway
NEW ORLEANS, LA., 2204 Jefferson Avenue
INDIANAPOLIS, IND., 136 No. Delaware Street

Products

DIAMOND ARCHITECTURAL GRILLES, in a wide and diversified line of modern designs for every architectural purpose; DIAMOND METAL CANING for all commercial purposes.

THE DIAMOND MANUFACTURING COMPANY also specializes in Perforated Metal Sizing Screens, and Perforated Metals for machinery guards, elevator buckets, conveyor trough, flights and light structural work.

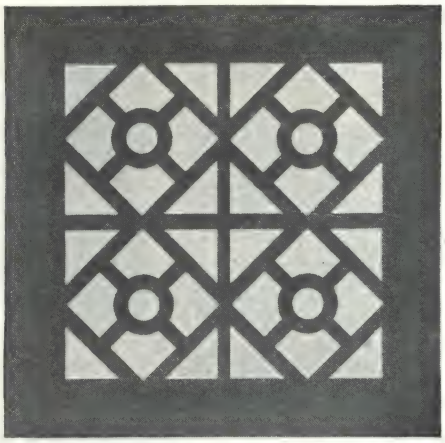
General Information

The illustrations shown depict only a few of the many available designs, but present an excellent idea of typical Diamond patterns. Diamond grilles are furnished in all metals, and may be had in any desired finish. All grilles are manufactured to specifications only, and not in standard sizes, and are furnished in one piece up to 54 by 144 in.; larger grilles being butted together almost invisibly.

Combinations of any desired designs in the Diamond line may be effected to meet individual requirements.

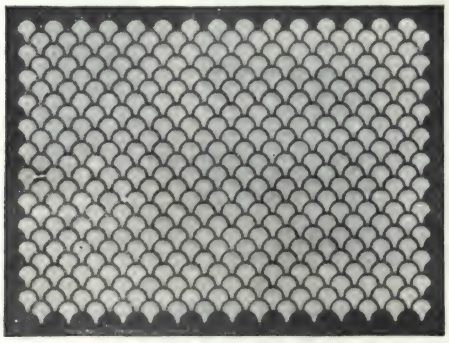
Catalogue and Bulletins

Our latest catalogue shows complete style range, and open area tables which simplify figuring to specifications. Separate bulletins on practically all designs, are also available and will be sent upon request.



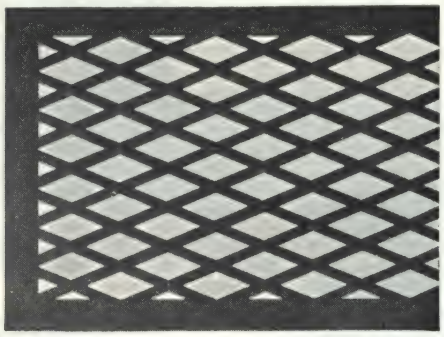
Jack Special Design

This novel design is available in two sizes, 2½ and 3¾ in.; with daylight openings of 50% and 60%



Tear Drop Design

This design is particularly attractive for church installations and has a daylight opening of 65%

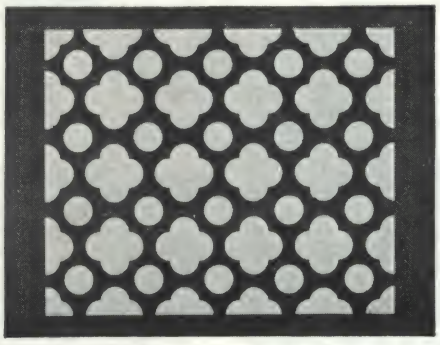


Diamond Design

Modern in conception and very practical for many purposes. Furnished in one size only, with open area of 55%

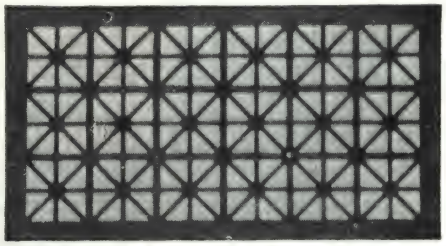
Ionic Design

This design is of unusual decorative value for installations of every type; has ¼-in. fretwork, 65% daylight opening



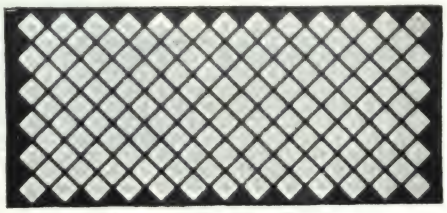
Clover Leaf Design

An entirely new creation of unusual distinction and beauty of design, has daylight opening of 52%; furnished in one size only



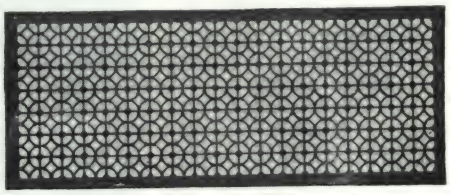
Union Jack Design

Made in four sizes, 1¾, 2½, 3, and 5⅞-in. square openings. The daylight openings range from 28% to 57%



Diagonal Lattice Design

Made in four sizes, ½, ¾, ⅞ and 1 in., giving open areas of 53%, 57%, 60% and 64%, respectively



Doric Design

Made in one size only, the opening being 2 in. square, giving a daylight opening of 50%. Made in all sizes and finishes to meet any specification

THE BEST REGISTER COMPANY

Registers, Ventilators, Grilles and Screens

1500 Oklahoma Avenue, MILWAUKEE, WIS.

REPRESENTATIVES

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CHEYENNE, WYO., E. R. Lewis, 430 Boyd Building
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PHILADELPHIA, PA., R. C. Kratz, 830 Perry Building
WILMINGTON, DEL., Morgan Building Equipment Co., 1900 Market Street

Products

Registers, Ventilators, Grilles and Screens, of stock or special designs and finishes, in Bronze, Brass, Copper, White Porcelain Enamel, White or Black Japan, etc., made in Cast Iron, Semisteel, Brass or Bronze Metal, and Steel.

Mushroom Ventilators.

Specialists in Semisteel Registers.

Also manufacturers of Gratings, Wall Frames, Sheet Steel Boxes, Floor Borders, Perforated Steel Grilles, Wire Screens, etc.

Facilities

The factory is equipped throughout with the most improved modern machinery. The capacity is unlimited; and the efficiency of the entire equipment, together with new methods of construction, insure a high quality of workmanship and finish.

"Best" Semisteel Register

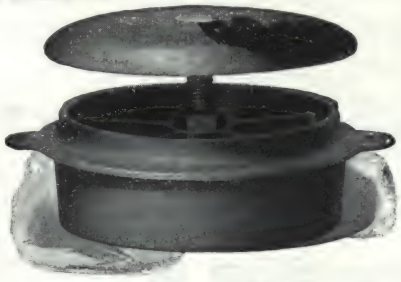
The faces are made of cast iron; the boxes, valves, operator, etc., of sheet steel. Each register is coated with heavy rustproof metal coating, and carefully inspected.

Special Designs

Special design goods are made to order only. In all cases, pattern work is necessary to produce. Any design can be produced from architect's drawings or sketches, and can be made to conform to any conditions and be supplied in any finish.

"Best" Mushroom Ventilator

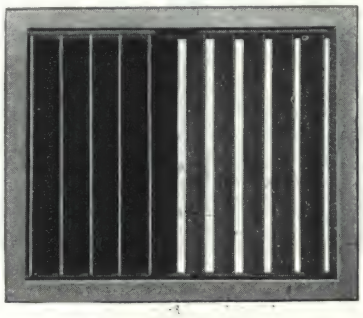
Made in 5 sizes to fit ducts or flues of the following diameters (dimensions being the size of the flue opening of duct): 4, 5, 6, 8 and 10 in.



"Best" Mushroom Ventilator

Adjustable Diffuser

Eliminates friction. Diffuses air in any horizontal direction.



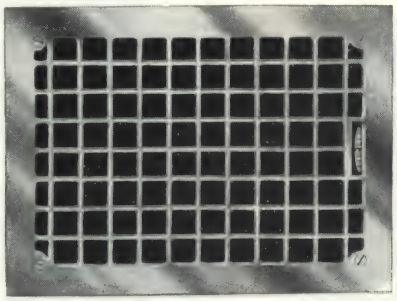
Adjustable Diffuser

References

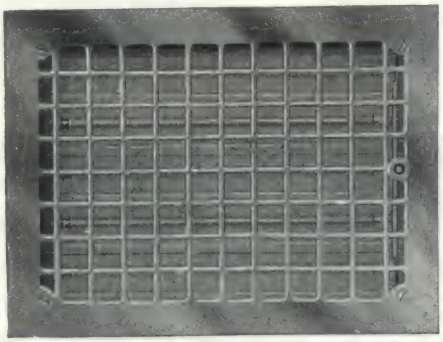
Goods are sold solely on merit. Used and accepted by leading architects and engineers, and installed in many hotels, hospitals, post offices, and other public buildings.

Catalogues and Prices

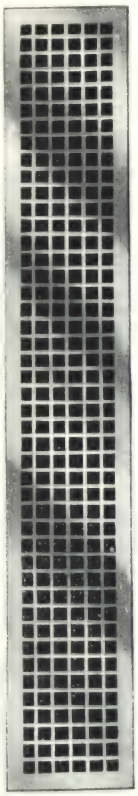
Illustrated catalogues, showing a large variety of register designs and prices, sizes and finishes, as well as further information concerning "Best" deflecting wall and baseboard registers and other products, will be sent on request.



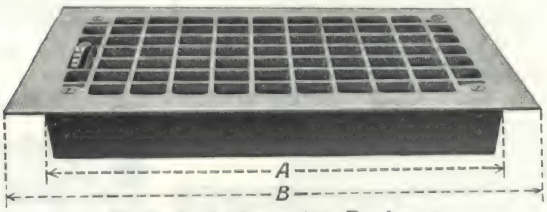
Plain Lattice Design
Made in any style



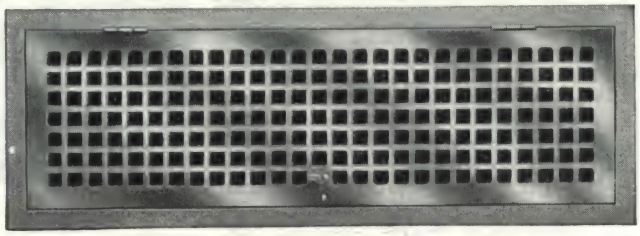
Key-operated Register
Phosphor bronze operator parts. Can not wear or rust out



Plain Lattice Ventilating Face
This design made to order only in any length and width desired



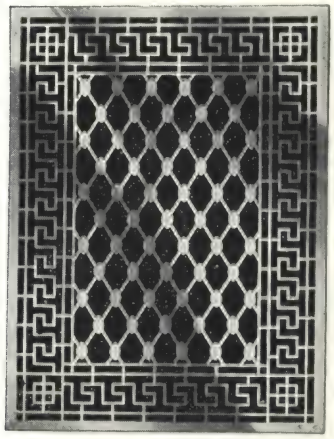
Method of Measuring Registers
A—Flue or opening size
B—Extreme measurement



Grille Hinged in Angle Iron Frame

Continued on next page

No. 503-B



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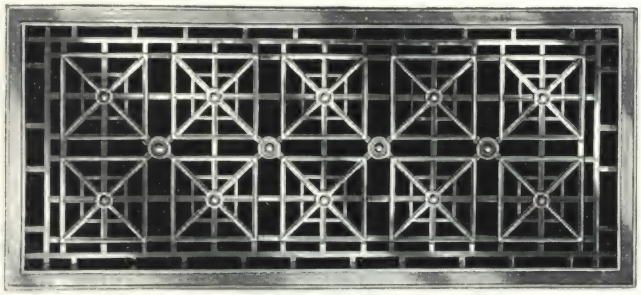

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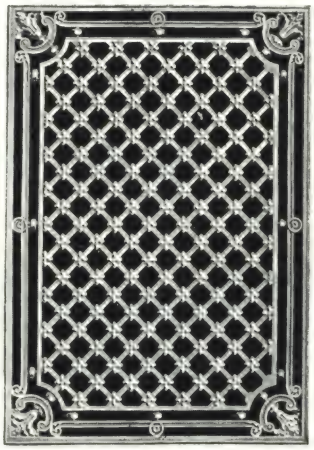

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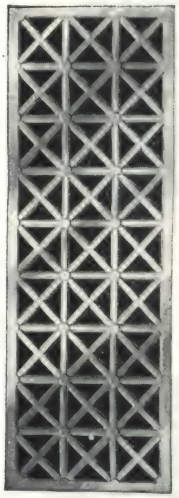

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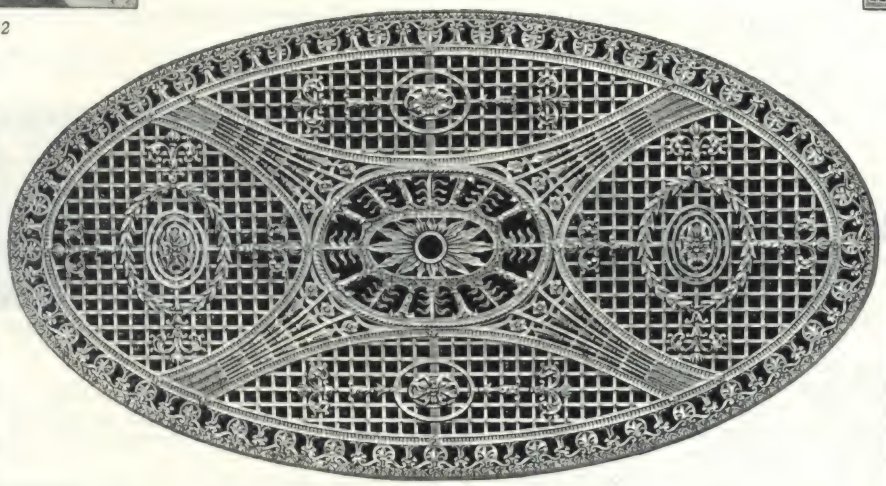

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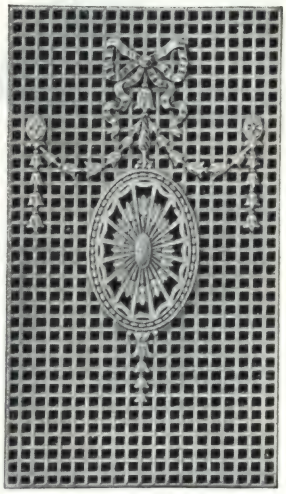

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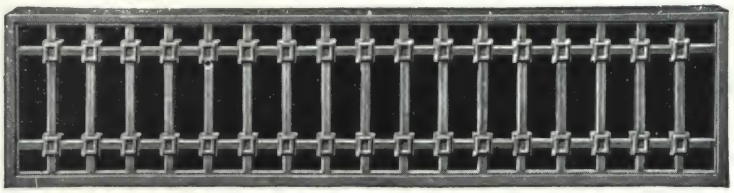

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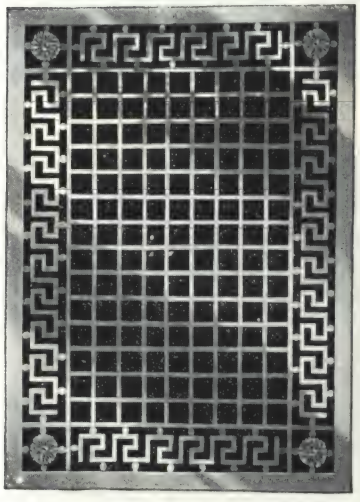

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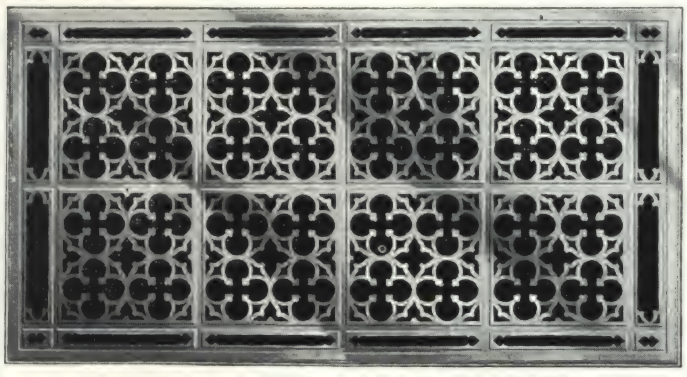

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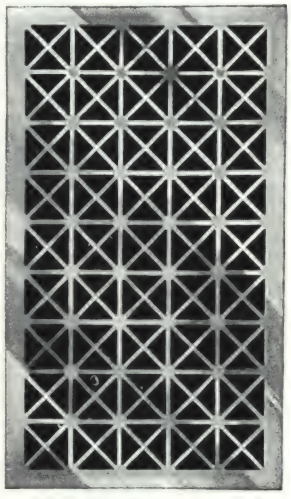


No. 110

Some of Many Special Designs Produced

This company will make any register. Nothing too small, too large or too complicated

HART & COOLEY MANUFACTURING CO.

Manufacturers of Warm Air Registers, Ventilating Grilles and Registers, Radiator Enclosures

61 West Kinzie Street, CHICAGO, ILL.

FACTORIES: HOLLAND, MICH., NEW BRITAIN, CONN., NASHUA, N. H.

BRANCH OFFICES

NEW YORK, N. Y., 101 Park Avenue
HOLLAND, MICH.
BOSTON, MASS., 75 Portland Street
PHILADELPHIA, PA., 1600 Arch Street
NEW BRITAIN, CONN.

Products

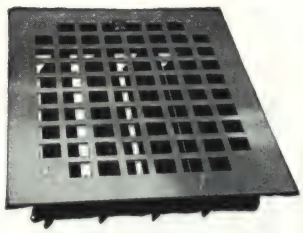
STEEL, SEMI-STEEL and ALL-CAST REGISTERS; STEEL and CAST REGISTER FACES and REINFORCED COLD AIR FACE PLATES; CEILING and SIDEWALL VENTILATORS; LOCK REGISTERS.

H&C

For our pages on Ventilating Grilles, stamped and cast, all designs, and for Radiator Enclosures and Shields, see Manufacturers' Index.

"H. & C." Steel Registers—"The Air Capacity Line"

For actual free air opening in square inches of every "H & C" Register see complete catalogue



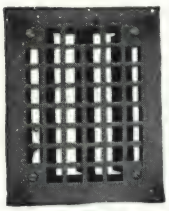
Register No. 800

Class No. 800 Ventilating Register—

Made for sidewall and ceiling use only.

Face from Nos. 12 to 16 gauge steel, brass or bronze, ¾-in. holes, ¼-in. bars; 50% free air opening.

Has same body as our Class 200 line of registers.



Lock Register No. 7800

Class No. 7800 Ventilating Register—Key Operated—

An asylum type lock register, valves of which may be locked in any desired position by one turn of key. When locking device is disengaged, valves may be operated in usual manner without key. Identical with Class No. 800 illustrated above, except for locking device.

"H & C" Baseboard Registers with Quickly Detachable Faces—

No. 110 Series—The beauty of this new type baseboard register is enhanced by the attractive design of the face and the embossed paneling around the margins of the frame. Unusual free air capacity has been secured through the unique and pleasing design of the face. Advantages: smaller, less conspicuous but more efficient registers; decreased costs.

No. 110 Series
Patent applied for

For horizontal sidewall type (above baseboard) to match No. 110 series, specify No. 310. For baseboard cold air intakes to match No. 110 series specify No. 651. See "H & C" Catalog.

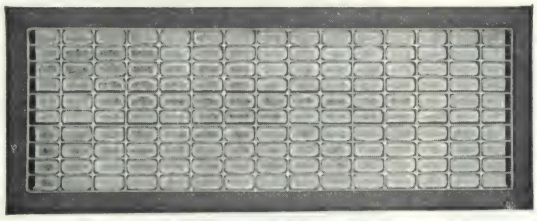
No. 150 Series

No. 150 Series—The face is perforated in oblong hole design retaining the conventional lattice fretwork but affording very large free area. Face is removable by quarter turn of locking buttons—no screwdriver required.

For either horizontal or vertical sidewall register for use with No. 150 series specify No. 345. For baseboard intakes for use with No. 150 series specify No. 655 or 605.

"H & C" Cold Air Face, Class No. 255—

The "H & C" Class 255 Steel Cold Air Face is made in oblong hole design to facilitate the free flow of return air to the furnace. Adequate strength is assured by heavy braces permanently spot-welded to the face.



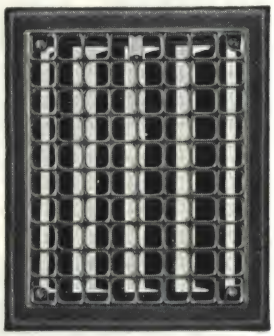
Class 255 Cold Air Face
Patented

Wide margins overlap opening—no countersinking or fastening in place necessary. Stock finishes—oak, black japan, oxidized copper. Low list prices compare favorably with cost of less substantial, less efficient, wood grilles.

"H & C" Floor Register, Class No. 200—

Featured by the beautifully rounded pinched-back fretwork of the face. This *patented process* results in maximum openings for the free flow of air, greatly increased strength and striking beauty of design.

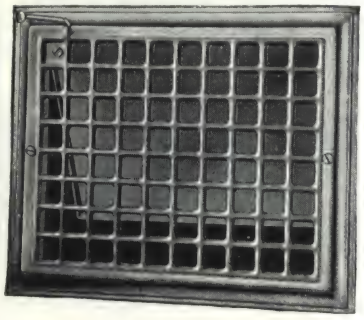
Rugged in construction, rigidly reinforced, unbreakable. Louvres swinging on solid trunnions assure permanent ease of operation.



Floor Register Class No. 200
Patented

"H & C" Sidewall Registers (Above Baseboard)—

Reversible Register, Class No. 345—Square hole perforation to match No. 200 series floor register. The No. 345 is shown here in horizontal position, but may be readily reversed for vertical setting simply by removing two screws. Deep convexing of margin permits easy installation.



No. 345. Set Horizontally

THE HARRINGTON & KING PERFORATING CO.

Grilles and Ventilators of Perforated Metal

MAIN OFFICE AND FACTORY

5647 Fillmore Street
CHICAGO, ILL.

TELEPHONE
MANSFIELD 1800

BRANCH OFFICE: NEW YORK, N. Y., 110 Liberty Street—Telephone, Barclay 0203

Products

ARCHITECTURAL GRILLES OF PERFORATED WROUGHT METALS.

Grilles of Steel, Bronze, Brass, Monel Metal, Stainless Steel, Aluminum and other metals.

We are also prepared to furnish specifications requiring Registers and Cast Grilles of standard and special designs.

Our Facilities

Fifty years ago we began the production of perforated metals and for many years we have specialized in the manufacture of punched grilles.

Aiming always for the finest in quality, we have developed special machinery and trained workmen to produce grilles which meet the most exacting requirements of particular architects and owners.

Specifying Harrington & King grilles is an assurance of quality.

Designs

A few of our designs are shown on our three pages in this catalogue.

We are also prepared to make up new designs which architects and designers may require to carry out special motifs in decoration.

The Why of Punched Grilles

Because they are beautiful, because they are unbreakable, economical, and in good taste, and because Harrington & King grilles are a quality product manufactured in a factory which knows how.

Specifications

When writing specifications for our grilles please give the following information:

Dimensions—opening or over all.

Design.

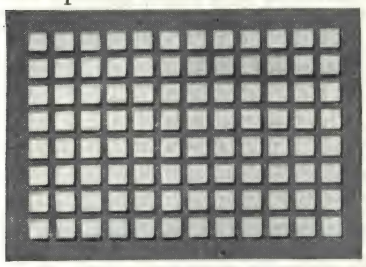
Metal—kind and gauge (No. 12 USS gauge is usual but we can furnish lighter or heavier).

Finish—Enamel (white, black or tinted), electroplated (to match any sample), prime coat or natural shop finish. Bronze grilles finished natural either bright or dull or to match sample.

Screwholes, frames, handholes—indicate any special details required.

Handbook of Grilles

We have a complete and attractive catalogue which shows actual size pictures of each design and gives tables of opening sizes for all dimensions. Also valuable information for the architect and engineer. Send for this handbook "Grilles of Perforated Metal."



Plain Lattice Design

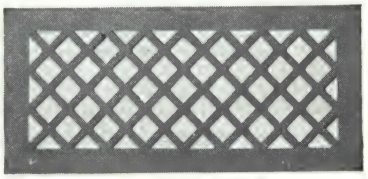
PLAIN LATTICE DESIGN

Size of hole, in.	Width of bridge, in.	Per cent open
½	3/16	53
½	¼	45
¾	¼	57
⅞	¼	60
1	¼	71
1¾	5/16	72

DIAGONAL LATTICE DESIGN

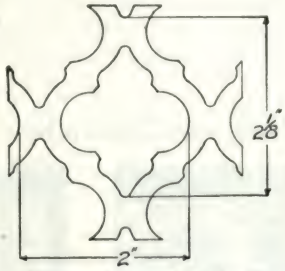
Size of hole, in.	Width of bridge, in.	Per cent open
½	3/16	53
⅞	¼	60

Half holes around the edge only when specified.

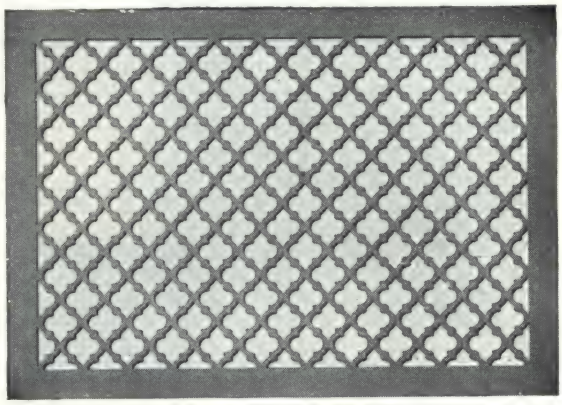


Diagonal Lattice Design

Grille Hinged in a Frame
We make all types of frames



Dimensions of Style C



Style C 72% Open
A handsome new design with great open area

Continued on next page

GRILFRAME—A NEW PRODUCT

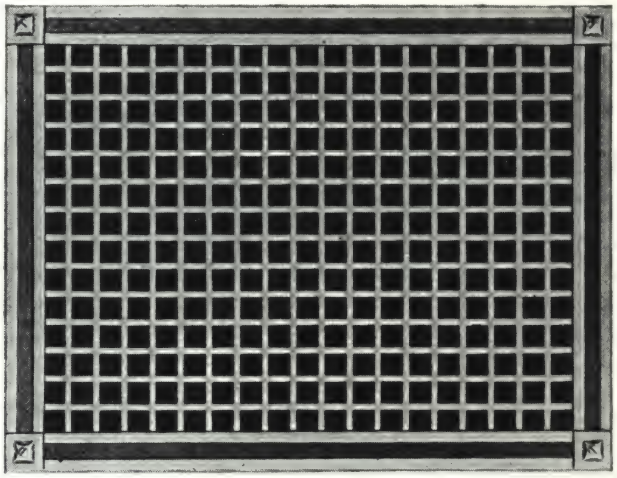
Grilframe

TRADE-MARK

Grilframe

Grilframe is the name of a new grille construction fully covered by patent applications. By means of this construction handsome grilles of any dimensions can be made from stock parts, assembled, finished, and shipped within 48 hours after receipt of order.

The grilles are cut from stock sheets and the edges finished and reinforced by a frame which is simple yet effective in design. The cold rolled steel frame strips interlock with die cast corner pieces and the grille panel is securely held in place by special clamping lugs.



Uses

When something new, something different in Grilles is desired, use "Grilframe." The frame in relief, because of its raised or embossed effect, accentuates the beauty of the grille itself, giving to the finished job an unusual and pleasing appearance. Then, too, "Grilframe" is the answer when grilles are needed in a hurry, as this construction makes possible assembly, finish and shipment within 48 hours.

Sizes and Designs

While "Grilframe" can be constructed with any grille design we have concentrated on a few more popular designs on which 48-hour service can be given. The ½, ¾ and ⅞-in. Plain Lattice designs, also our "Perfex," Style A-1, Cane and Metalace are always in stock. The other designs shown on the preceding and following pages can be shipped within one week.

Grilles of any dimensions, handsome and sturdy in appearance can now be shipped on a few hours' notice.

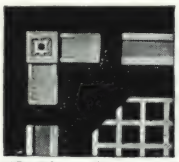
Distribution

Distributers are being appointed in all cities, and they are putting in a stock of "Grilframe" parts and perforated grille sheets. Thus local requirements can be taken care of without the delays of transportation. We will be glad to send you the name of your nearest agent. In territory which is still open we will assemble and ship from our New York or Chicago offices.

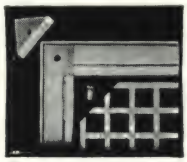
Catalogue and Samples

An attractive 24-page catalogue of "Grilframe" showing many grille designs assembled with this new construction will be sent upon request. We also have a limited supply of bronze plated actual size corner samples, one of which we will send gratis for the asking.

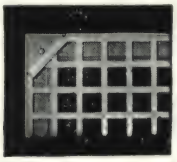
Showing Grilframe Construction



"Grilframe" parts ready for assembly. (Front view)

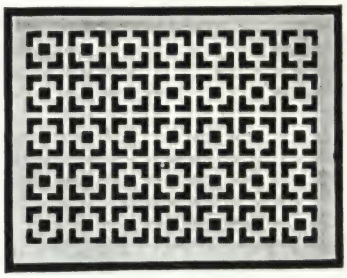


Corners inserted, grille clipped. (Back view)

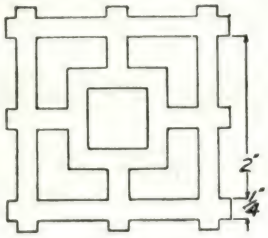


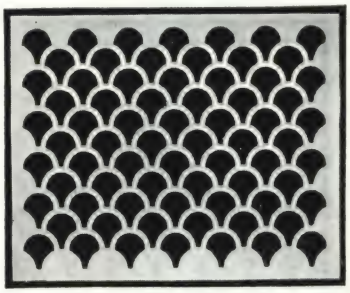
Grille secured to frame with lug. (Back view)

Continued on next page

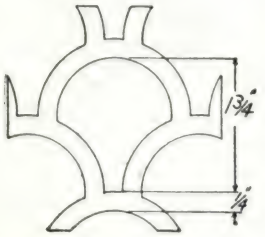


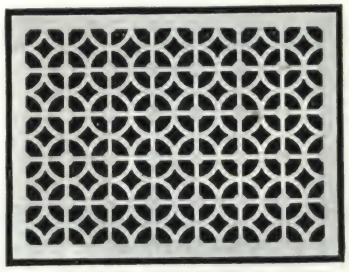
Style A
Square Link
52% open



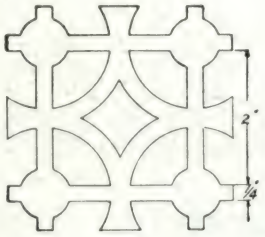


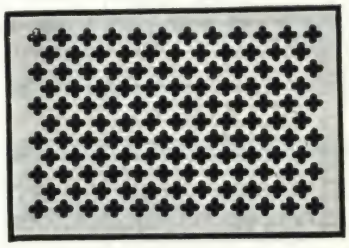
Style J
Fish Scale
65% open



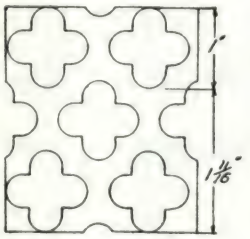


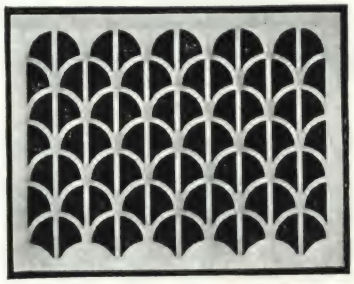
Style M
Moorish
50% open



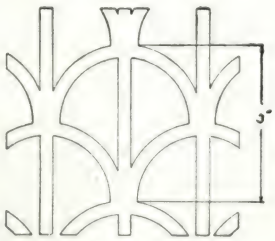


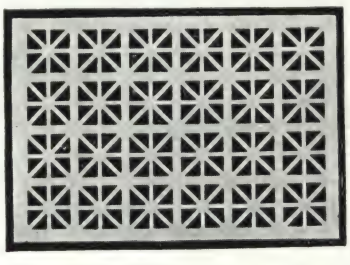
Style F
Clover Leaf
45% open





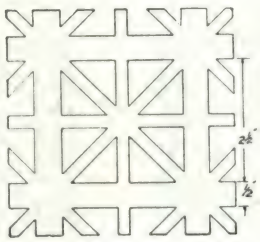
Style Q
Divided Fish Scale
55% open

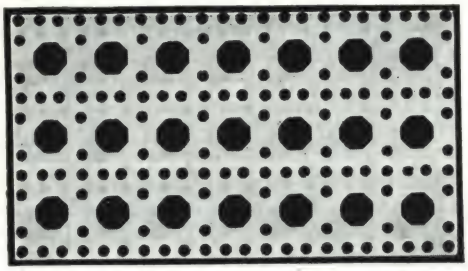




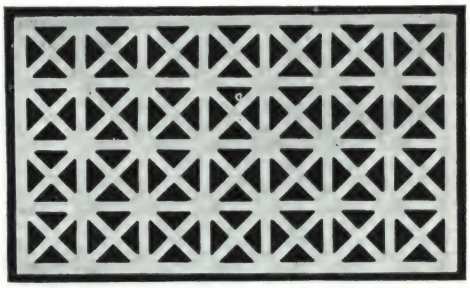
Style L
Union Jack
40% open

The detail shows this Style L design with a unit size of 2½ in. We also have two other sizes of this design. Style L2, unit size 1¾, and Style L3, unit size 3 in.

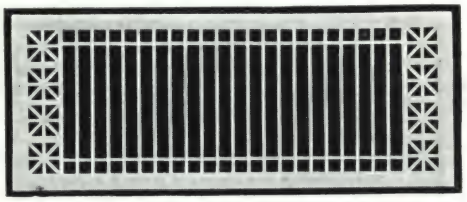




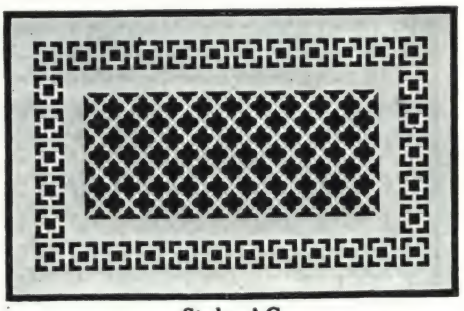
Style P (Metal Cane) ⅝ Actual Size
A true representation of the woven cane design. Used extensively for radiator enclosures



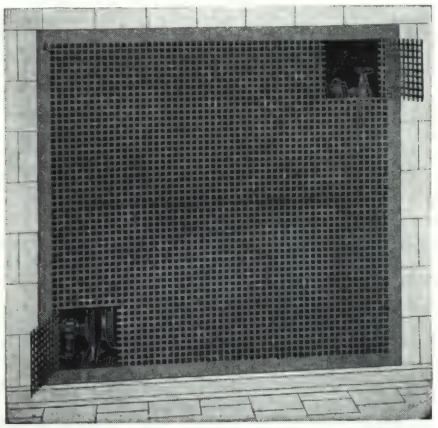
"Perfex" Design, ⅝ Actual Size
A beautiful, new, lacelike design which is extremely popular for radiator enclosures



Style LT
71% open



Style AC
65% open



Showing Handhole Openings Which Are Invisible When Closed

HENDRICK MANUFACTURING COMPANY

Hendrick Perforated Metal Grilles

21 Dundaff Street, CARBONDALE, PA.

BRANCH OFFICES
NEW YORK, N. Y. PITTSBURGH, PA. HAZLETON, PA.

Product

HENDRICK PERFORATED METAL GRILLES.

For data on Mitco Interlocked Steel Grating, Mitco Armorgrids and Mitco Shur-Site Treads, see Manufacturers' Index.

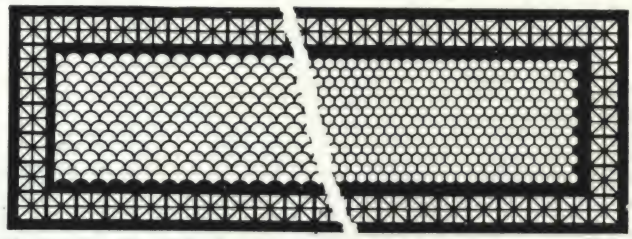
Hendrick Perforated Metal Grilles

Hendrick Perforated Metal Grilles can be furnished in a wide variety of attractive designs, some one of which is usually found to harmonize with the general architectural design. Where special designs are required, Hendrick is always glad to co-operate in the development of patterns to meet the requirements.

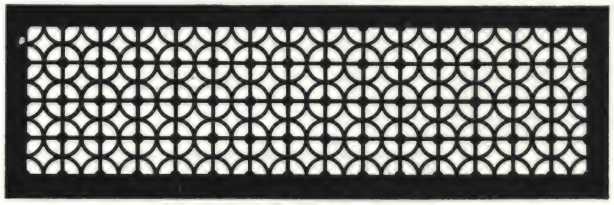
Hendrick Perforated Metal Grilles can be furnished in steel, brass, bronze, copper, zinc, aluminum, monel metal, stainless metal, and any other commercially produced metal; unpainted or with prime coat, with lacquer or duco finish of any specified color, or any standard electroplate finish. Hendrick always maintains large stocks of standard metals in order to expedite production and make unusually prompt shipments. Architects will find the Hendrick Grille Catalogue a valuable aid in specifying or ordering. Write for a copy.

Ordering Information

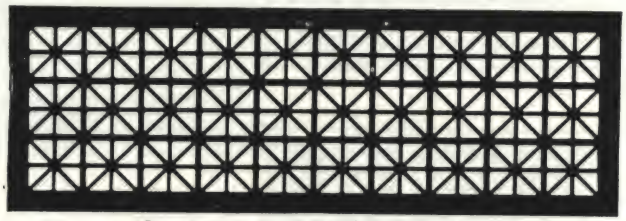
When inquiring for Hendrick Perforated Metal Grilles, or in ordering, please give the following information: Quantity; Kind of Material; Thickness or Gauge of Material; Overall Dimensions; Width of Margin or Blank Border; Design of Perforation Desired; Doors or Hand Holes if any; Location, Size and Style of Attachment Holes; Finish. Data contained in the Hendrick Catalogue will be of valuable aid in ordering or specifying designs.



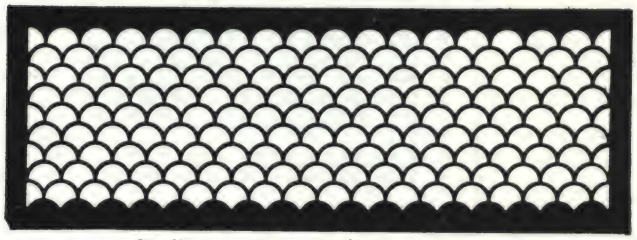
Variations Possible by Combinations of Hendrick Designs



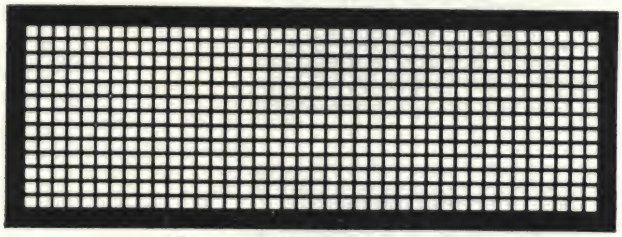
Egyptian—55% Open Area



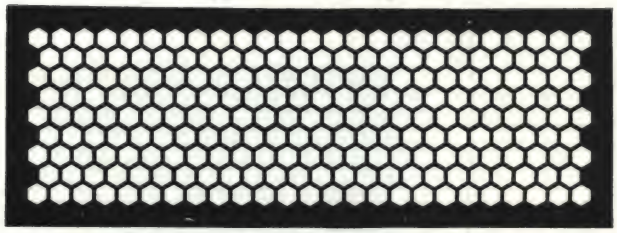
Grecian 3 In.—47% Open Area



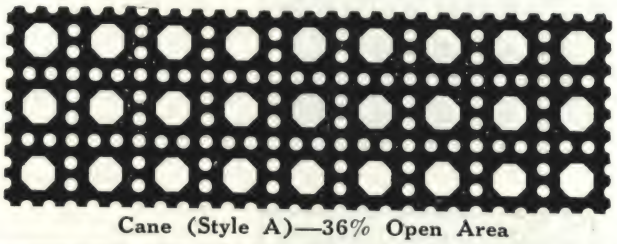
Shell 1¾ In.—72% Open Area



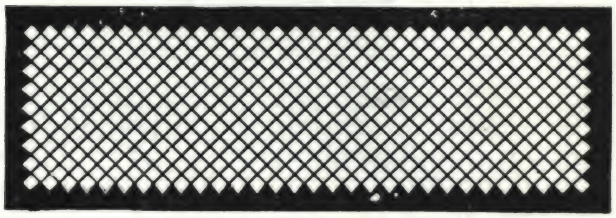
Square—55% Open Area



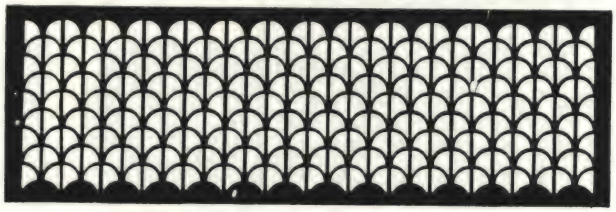
Hexagon 1 In.—64% Open Area



Cane (Style A)—36% Open Area



Diamond ⅝ In.—55% Open Area



Half Shell—60% Open Area

HITONCAST GRILLES & REGISTERS

H&C HIGHTON

Manufactured by

WM. HIGHTON & SONS

DIVISION OF HART & COOLEY MFG. CO.

MAIN OFFICE, NASHUA, N. H.

FACTORIES

NEW BRITAIN, CONN. NASHUA, N. H. HOLLAND, MICH.

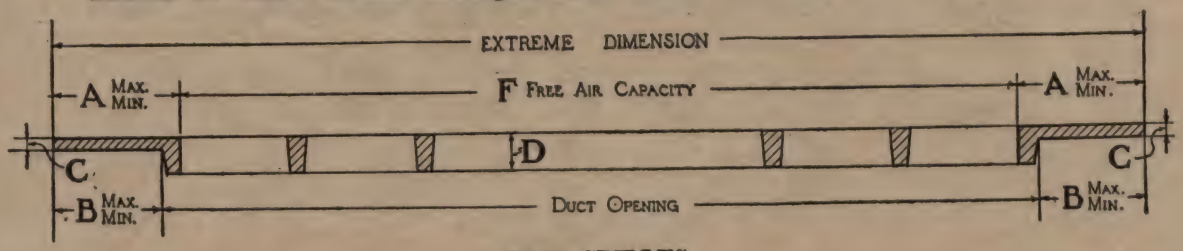
BRANCH OFFICES

NEW YORK, N. Y., 101 Park Avenue
CHICAGO, ILL., 61 West Kinzie Street
PHILADELPHIA, PA., 1600 Arch Street
BOSTON, MASS., 75 Portland Street

REPRESENTATIVES

ATLANTA, GA., Julian F. Baxter, Inc., 397 Peachtree Street, N.E.
BALTIMORE, MD., Edwin Cugle, Old Town National Bank Building
BIRMINGHAM, ALA., Arnold Supply Co., 2923 Avenue E, South
CHAMBERSBURG, PA., Chas. E. Aughinbaugh, 174 No. Main Street
CHARLOTTE, N. C., Lydon, Cousart & Weeks, 304 Builders Building
CINCINNATI, OHIO, West Wind Cincinnati Co., 626 Broadway
CLEVELAND, OHIO, Vance A. Hives, 750 Prospect Avenue
COLUMBUS, OHIO, V-W Ventilator Co., 2830 A.I.U. Building
DALLAS, TEX., W. A. Sedwick Corp., 401 Construction Building
DENVER, COLO., John T. Rowntree, Inc., 707 Interstate Trust Building
DETROIT, MICH., Acme Wire & Iron Works, 12340 Cloverdale Avenue
FAYETTEVILLE, ARK., Wm. S. Gregson
FORT WORTH, TEX., Collinsville Mfg. Co., 1003 East Front Street
GREAT BARRINGTON, MASS., Berkshire Equipment Co.
HARRISBURG, PA., Martin W. Fager, 627 Walnut Street
HOUSTON, TEX., Coastal Sales Agency, Inc., 3914 Main Street
INDIANAPOLIS, IND., The Standard Metal Co., 135 So. Pennsylvania Avenue
KINGSTON, PA., Standard Steel & Bronze Co., Kingston Corners Building
KNOXVILLE, TENN., Nelson Iron Works
LOS ANGELES, CALIF., John T. Rowntree, Inc., 1213 So. Olive Street
MIAMI, FLA., Brinson, Sistrunk Co., P.O. Box 974
MINNEAPOLIS, MINN., John F. Hurley Co., 711 National Building
MOBILE, ALA., McGowin-Lyons Hardware & Supply Co., 113-125 No. Water Street
NEW ORLEANS, LA., Orleans Steel Products Company, 1025 Bienville Street
OKLAHOMA CITY, OKLA., Federal Steam Specialties Co., 120 East Main Street
PITTSBURGH, PA., F. J. Carlson, % Pittsburgh H & C Co., 6012 Broad Street
PORTLAND, ORE., John T. Rowntree, Inc., 516 Henry Building
RICHMOND, VA., Vance & Vance, 302 Carneal Building
ROCHESTER, N. Y., Swalbach Building Products Co., 300 Genesee Street
SALT LAKE CITY, UTAH, John T. Rowntree, Inc., 313 Dooly Block
SAN ANTONIO, TEX., Geo. H. Swan Co., 619 Houston Building
SAN FRANCISCO, CALIF., John T. Rowntree, Inc., 33 Spear Street
SCRANTON, PA., Charles E. Sunday, Inc., 522 Mulberry Street
SEATTLE, WASH., John T. Rowntree, Inc., Mutual Life Building
SYRACUSE, N. Y., W. H. Landers Co., 208 East Willow Street
TAMPA, FLA., Carrington Sweeny, 718 Grand Central Avenue
TOLEDO, OHIO, E. R. Gillet, 1214 Madison Avenue
WASHINGTON, D. C., Baxter Sales Co., Fourth and Channing Streets, N.W.
MONTREAL, QUE., Ogilvie-Robinson, 2087 Bleury Street

Index to Cast Grille Designs and Data on Sizes and Capacities



CAST GRILLES

Design	F Free air cap.	Page No.	A, in. Max.	A, in. Min.	B, in. Max.	B, in. Min.	C, in.	D, in.
⅛ in.p.l.	45%	11	1¼	½	1	¼	5/32	3/8
¾ in.p.l.	57%	11	1½	½	1¼	¼	5/32	¾ to 5/8
⅞ in.p.l.	60%	11	1½	½	1¼	¼	5/32	⅜ to 5/8
22	50%	6	1½	½	1¼	¼	5/32	7/16
25	58%	7	1¼	½	1	¼	5/32	7/16
29	58%	6	1½	½	1¼	¼	5/32	7/16
35	54%	5	1¼	½	1	¼	5/32	7/16
36	54%	5	1¼	½	1	¼	5/32	7/16
37	81%	5	1¼	½	1	¼	5/32	½ to 5/8
39	74%	5	1¼	½	1	¼	5/32	½ to 5/8
45	52%	8	1¼	½	1	¼	5/32	7/16
50	57%	8	1½	½	⅞	¼	5/32	7/16
59	60%	7	1½	½	1¼	¼	5/32	7/16
62	75%	7	1¼	½	1	¼	5/32	7/16
70	47%	4	1¾	½	1½	¼	5/32 to 5/16	½
74	63%	4	1¼	½	1	¼	5/32	½
75	76%	7	1¼	½	1	¼	5/32	½
78	54%	4	1½	½	1¼	¼	5/32	½
80	61%	5	1½	½	1¼	¼	5/32	½
91	61%	8	1½	½	1¼	¼	5/32	½
93	53%	7	1¼	½	1	¼	5/32	7/16
98	45%	7	1¼	½	1	¼	5/32	7/16 to 5/8
110	60%	6	1¼	½	1	¼	5/32	⅜ to 5/8
130	60%	7	1¼	½	1	¼	5/32	½
134	40%	4	1¼	½	1	¼	5/32	⅜
140	57%	6	1¼	½	1	¼	5/32	7/16
145	62%	7	1¼	½	1	¼	5/32	7/16
146	54%	4	1	½	¾	¼	5/32	⅜
148	70%	8	1⅜	½	1⅛	¼	5/32	⅜ to 5/8
149	61%	4	1¼	½	1	¼	5/32	7/16
150	77%	8	1	½	¾	¼	5/32	⅜ to 5/8
152	50%	6	1	½	¾	¼	5/32	½
152A	50%	8	1¼	½	1	¼	5/32	7/16
160	63%	6	1¼	½	1	¼	5/32	7/16
195	74%	5	1⅜	½	1⅛	¼	5/32	⅜ to 5/8
201	63%	7	1¼	½	1	¼	5/32	⅜
250	55%	6	1	½	¾	¼	5/32	7/16
263	48%	5	1½	½	1¼	¼	5/32	7/16
303	66%	6	1¼	½	1	¼	5/32	⅜
321	60%	5	1¼	½	1	¼	5/32	½
333	47%	4	1⅜	½	⅞	¼	5/32	⅜
391	30%	4	1½	½	1¼	¼	5/32	7/16
399	47%	6	1½	½	1¼	¼	5/32	7/16
403	54%	4	1¼	½	1	¼	5/32	7/16
407	65%	7	1	½	¾	¼	5/32	⅜
442	74%	4	1¼	½	1	¼	5/32	7/16
450	62%	6	1¼	½	1	¼	5/32	½
460	72%	5	1¾	½	1½	¼	5/32 to 5/16	½
485	60%	5	1¼	½	1	¼	5/32	½
485B	50%	5	1	½	¾	¼	5/32	⅜
500	50%	4	1⅛	½	⅞	¼	5/32	⅜
528	48%	8	1½	½	1¼	¼	5/32	½
607	66%	8	1¼	½	1	¼	5/32	7/16
619	50%	8	1	½	¾	¼	5/32	½
732	64%	5	1	½	¾	¼	5/32	7/16
749	59%	6	1¼	½	1	¼	5/32	7/16
752	42%	7	1½	½	1¼	¼	5/32	⅜
760	58%	7	1¼	½	1	¼	5/32	7/16
810	60%	3	1	½	¾	¼	5/32	7/16
815	58%	3	1	½	¾	¼	5/32	7/16
820	50%	3	1¼	½	1	¼	5/32	7/16
900	40%	3	1	½	¾	¼	5/32	7/16
901	36%	3	1	½	¾	¼	5/32	7/16
902	40%	8	1	½	¾	¼	5/32	7/16
982	44%	6	1½	½	1¼	¼	5/32	½

HITONCAST

The Story of Highton Quality and Service

In this catalogue will be found the most complete line of Ornamental Grilles and Registers in Cast as well as Wrought metals ever obtainable from any one source. We, ourselves, manufacture every item listed in our catalogue. Due to increased facilities we can furnish Grilles in Cast Iron, Brass or Bronze, Aluminum, Monel Metal, or Benedict Nickel. Wrought Grilles can be furnished in Steel, Brass or Bronze, Aluminum, and Monel Metal.

Our chief aim is to completely satisfy the architect and his client. Careful attention is therefore given every order that is entered in our factories to insure our customer of first-class work in every respect as to design, manufacture, and finish. Special care is taken in the selection of designs to combine beauty with the in the United States which has not lost through its increased size the individual atmosphere, characteristic of a small plant. Our endeavor for the past seventy-three years to manufacture a high-grade quality line of grilles and registers is, therefore, doubly insured and the new combine is now known to all the trade as Wm. Highton & Sons—Division of Hart & Cooley Mfg. Co.

When Specifying "Hitoncast" We Suggest

First—State "all grilles and registers to be Highton-H & C."

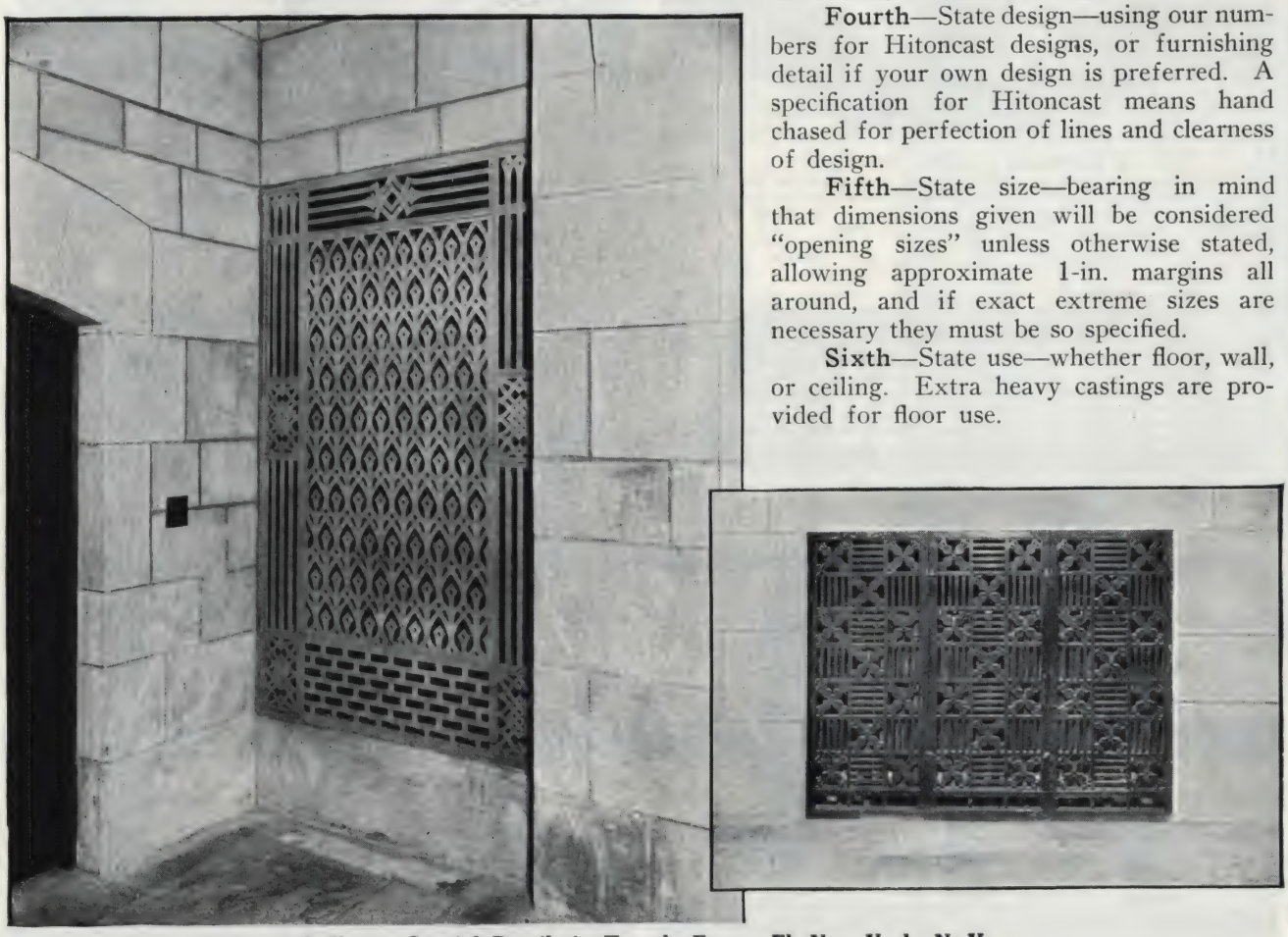
Second—State if grille or register—a register will have a bottom with movable louvers.

Third—State material—cast iron, brass, bronze, aluminum, or Monel Metal.

Fourth—State design—using our numbers for Hitoncast designs, or furnishing detail if your own design is preferred. A specification for Hitoncast means hand chased for perfection of lines and clearness of design.

Fifth—State size—bearing in mind that dimensions given will be considered "opening sizes" unless otherwise stated, allowing approximate 1-in. margins all around, and if exact extreme sizes are necessary they must be so specified.

Sixth—State use—whether floor, wall, or ceiling. Extra heavy castings are provided for floor use.



Grilles to Special Details in Temple Emanu-El, New York, N. Y.

allowing of maximum free-air capacity and we are continually working on new designs to satisfy the demands of the industry.

Wm. Highton & Sons have recently combined their efforts with those of the Hart & Cooley Mfg. Co. so that today we have under the new régime the largest and most efficient perforating plant

Seventh—State finish—in absence of specification, we estimate and apply priming coat. Any type of electroplated or lacquer finish can be furnished but the exact finish required must be specified.

Eighth—State construction and method for fastening, using our numbers. See pages 18 to 20.

 Continued on next page

QUALITY IN GRILLES

A Few Helpful Suggestions to Architects Regarding the Factors Determining Quality in Grilles

QUALITY IN CAST GRILLES

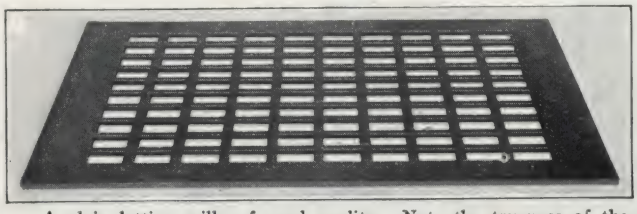
A Hitoncast Quality Cast Grille

This illustration shows a grille finished to Highton specifications for quality grilles. The front and back surfaces are perfectly smooth and flat, and moulded surfaces are hand-chased. All edges are sharp and clean. Grille is given a priming coat of paint

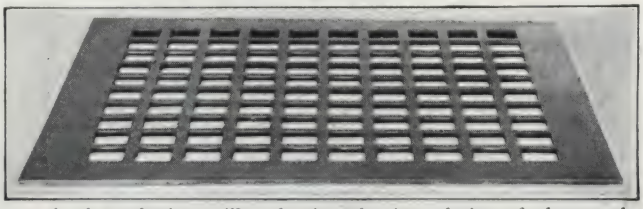
A Poor Quality Cast Grille

A type sometimes installed if supervision is not strict. This grille is just as it comes from the sand mould. It is not ground, hand-chased or finished in any way .

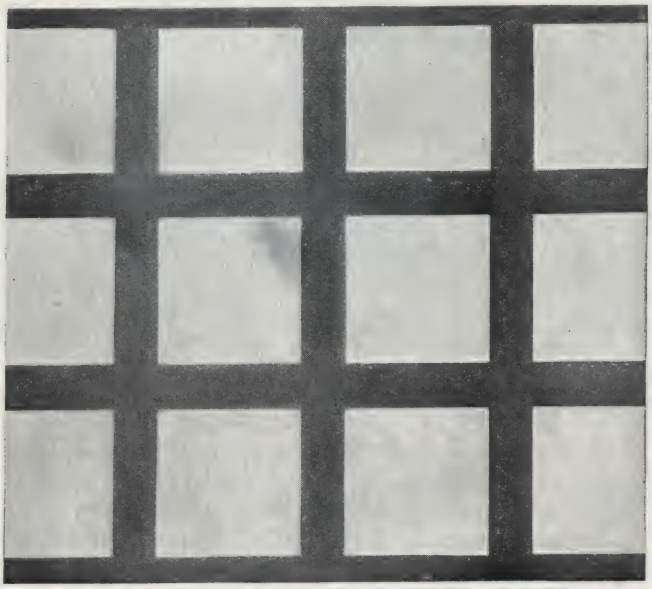
QUALITY IN STAMPED GRILLES



A plain lattice grille of good quality. Note the trueness of the lines of the design; obtained by the use of machines especially designed for this work

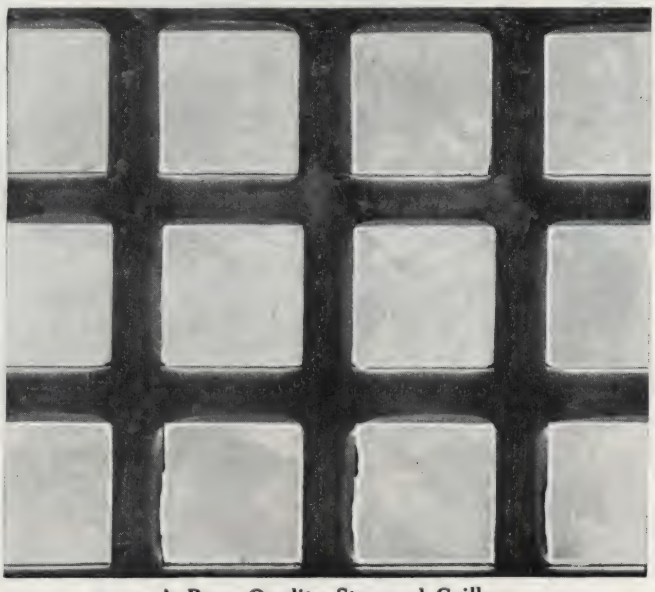


A cheap lattice grille, showing the irregularity of the punching, caused by the use of stamping machines not designed for grille work



A High Grade Stamped Grille

Note the accuracy and clean-cut edges of the stamping. No burrs to catch lint and dust



A Poor Quality Stamped Grille

Note the rounded top surface, burrs formed on edges and back, and irregularity of punching

All the above illustrations are actual photographs of grilles

Continued on next page

HITONCAST SPECIAL DESIGN CAST GRILLES

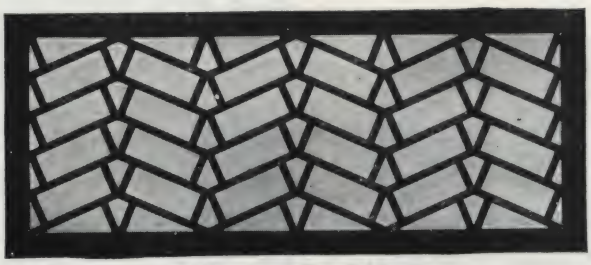
On this page are shown some of the special design Hitoncast Grilles which were created to architects' details, and are examples of the special order work we are prepared to execute.

Hitoncast No. 900

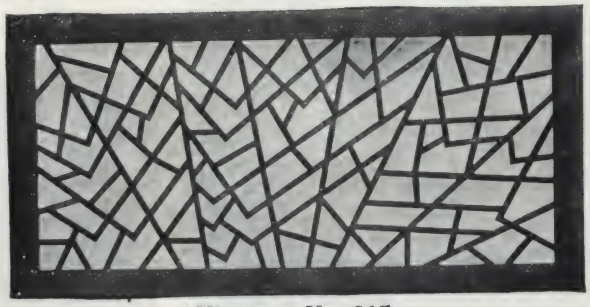
Through special equipment and master workmen we are permitted to allow perfect architectural freedom of design, while assuring both the architect and his client a first class product as to material, manufacture and finish.

Hitoncast No. 820

Hitoncast No. 902



Hitoncast No. 810

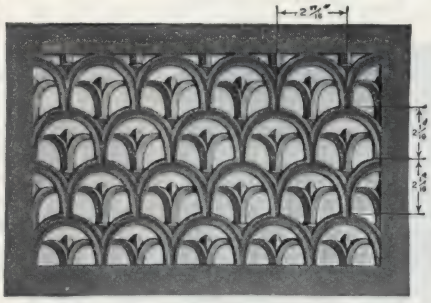


Hitoncast No. 815

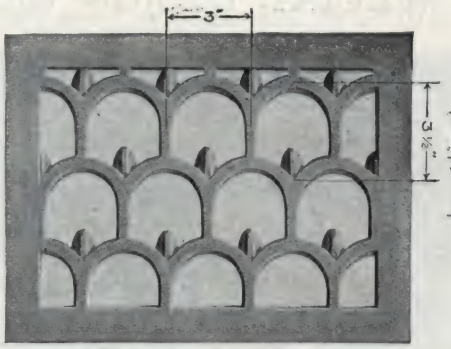
Designs Nos. 810, 815 and 820, shown on this page, are several of the number of modernistic design Cast Grilles, which show the advanced work we have done along this line.

Continued on next page

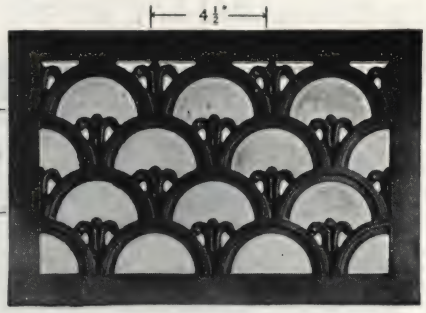
HITONCAST GRILLES



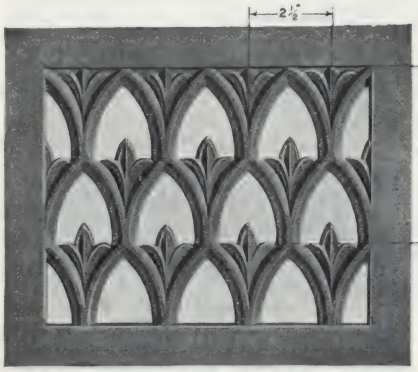
Hitoncast No. 333
Free area, 47%



Hitoncast No. 442
Free area, 74%



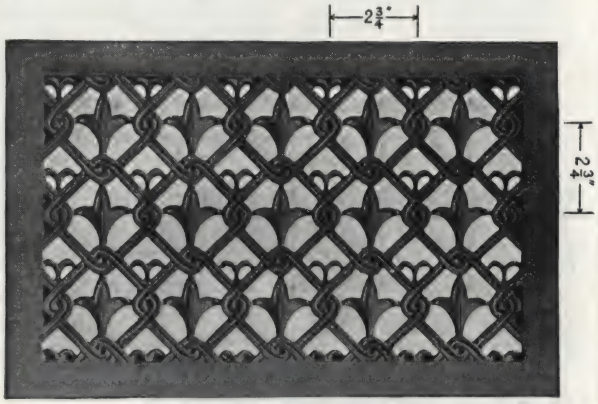
Hitoncast No. 70
Free area, 47%. Units: 4½ in. wide, 4⅛ in. high



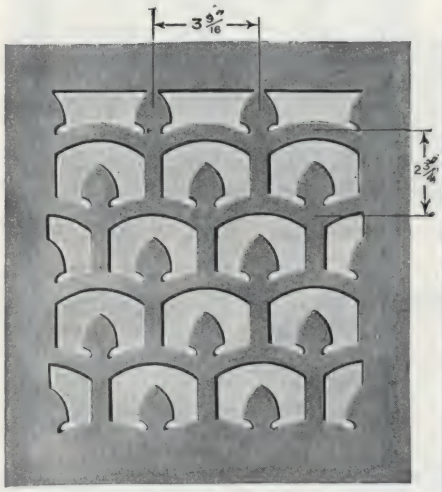
Hitoncast No. 146
Free area, 54%

Hitoncast Designs No. 70 and No. 500 shown on this page are two of Highton-H & C most popular designs. Their popularity, however, is deserved, combining as they do beauty of design with a large free air capacity. Highton-H & C has prepared full-size blueprint details on these two designs as well as about 40 of our other more popular designs, and it is suggested that architects use these blueprint folders in laying out grille openings on plans.

A *complete set of details will be gladly sent without charge* upon receipt of such request.

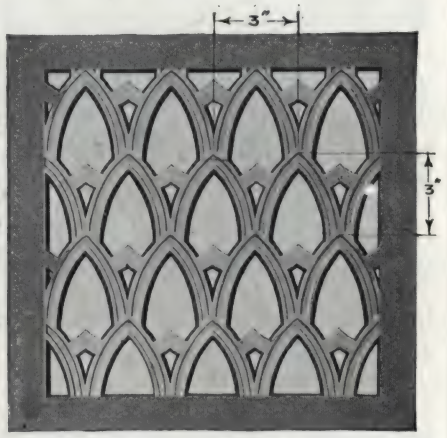


Hitoncast No. 500
Free area, 50%

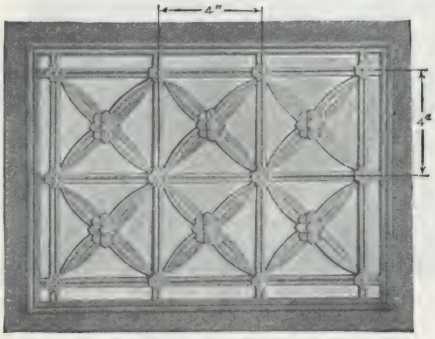


Hitoncast No. 403
Free area, 54%

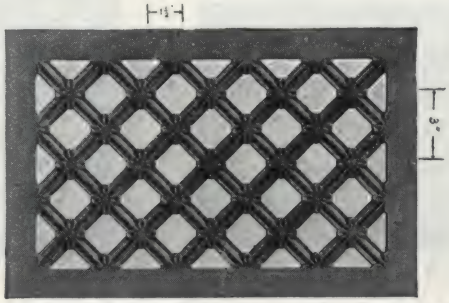
Hitoncast No. 391
Free area, 30%



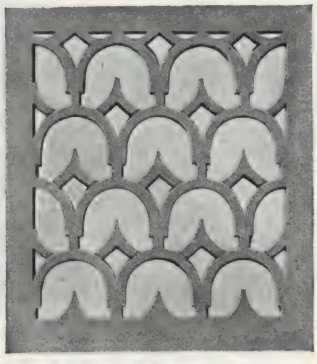
Hitoncast No. 78
Free area, 54%



Hitoncast No. 149
Free area, 61%



Hitoncast No. 134
Free area, 40%. Units: 2⅛ in. square



Hitoncast No. 74
Free area, 63%. Units: 3½ in. wide, 3 in. high

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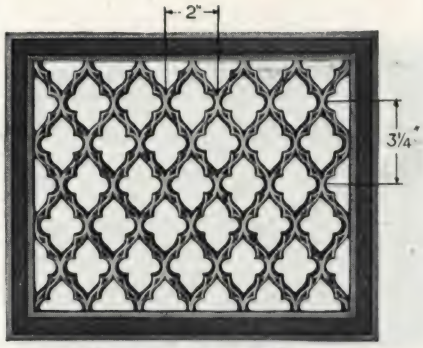
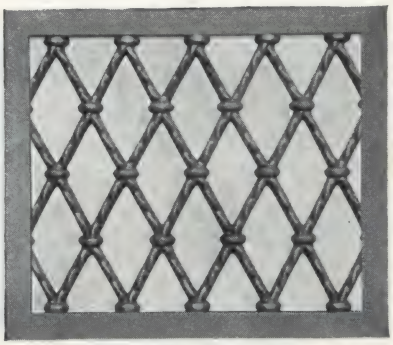
HITONCAST GRILLES

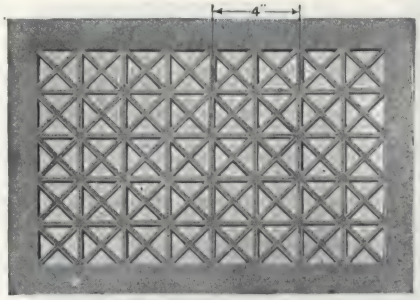


Hitoncast No. 485B
Free area, 50%
Provided with plain flat border unless otherwise specified

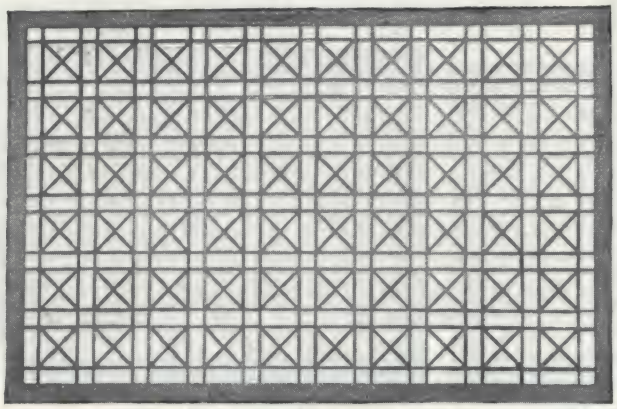
Hitoncast No. 485
Free area, 60%. Center to center of units: width 3 in., height 6 in.



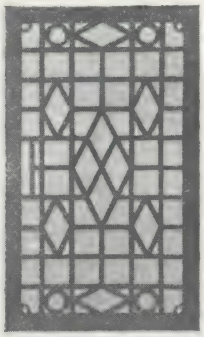
Hitoncast No. 460
Free area, 72%. Center to center of units: width 3¼ in., height 6 in.



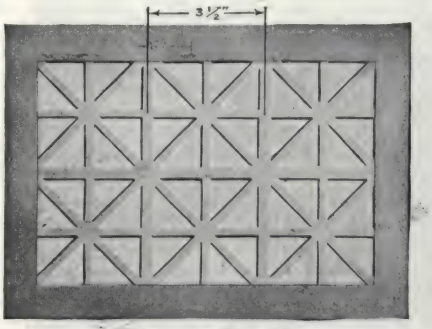
Hitoncast No. 35
Free area, 54%



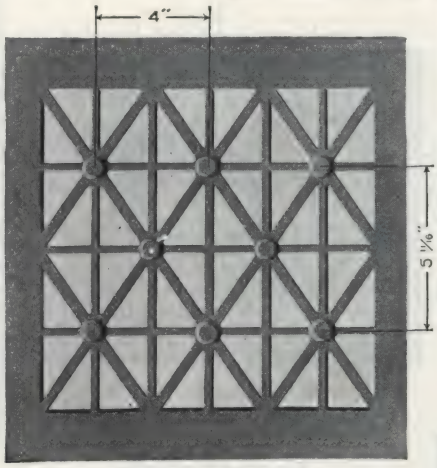
Hitoncast No. 195
Free area, 74%. Large square 3 in., small square 1 in.



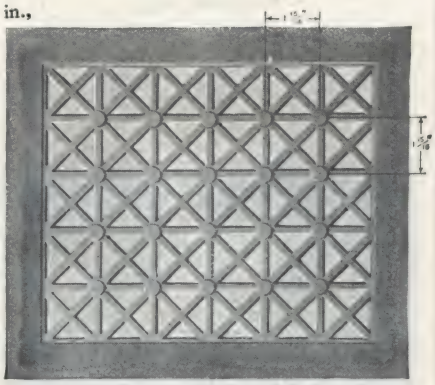
Hitoncast No. 250
Free area, 55%. Special pattern required for each size



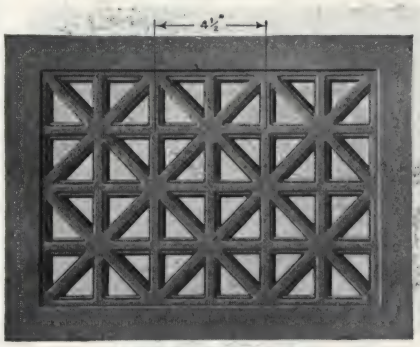
Hitoncast No. 80
Free area, 61%



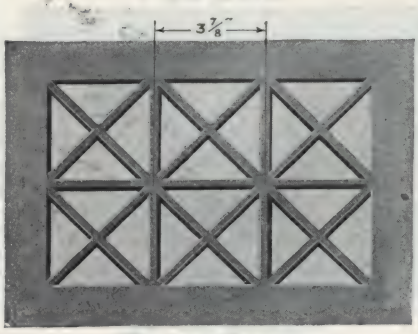
Hitoncast No. 732
Free area, 64%



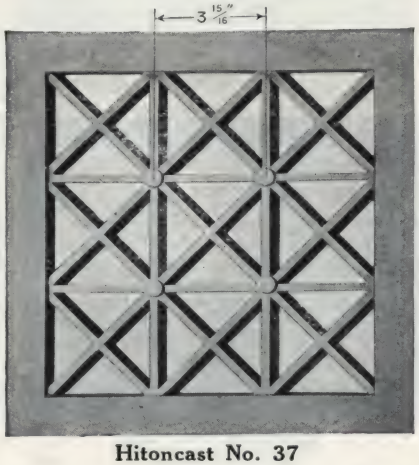
Hitoncast No. 36
Free area, 54%



Hitoncast No. 263
Free area, 48%



Hitoncast No. 39
Free area, 74%



Hitoncast No. 37
Free area, 81%

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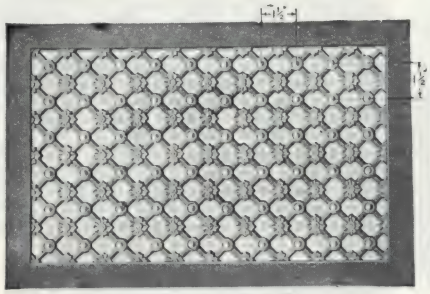
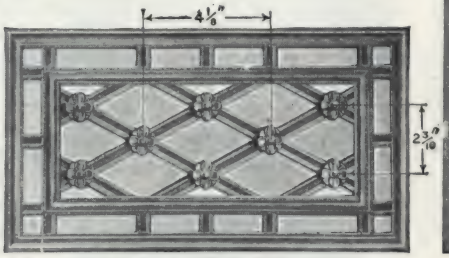
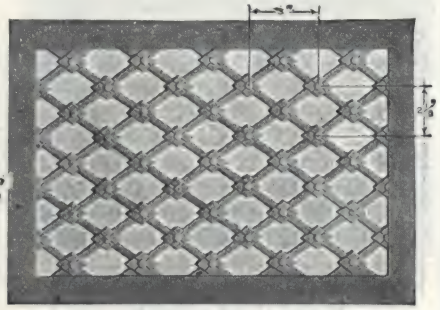
HITONCAST GRILLES



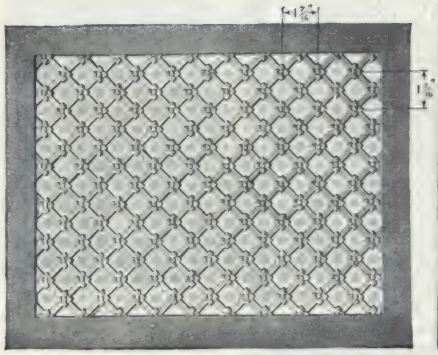
Hitoncast No. 140
Free area, 57%



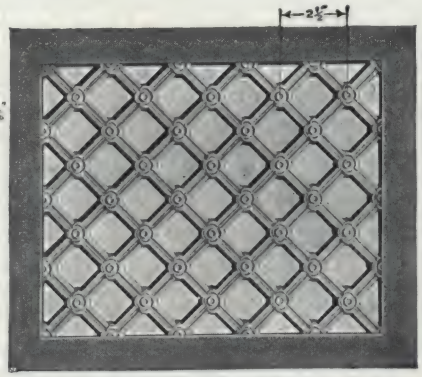
Hitoncast No. 450
Free area, 62%



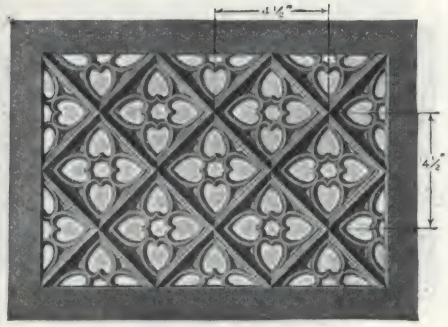
Hitoncast No. 160
Free area, 63%



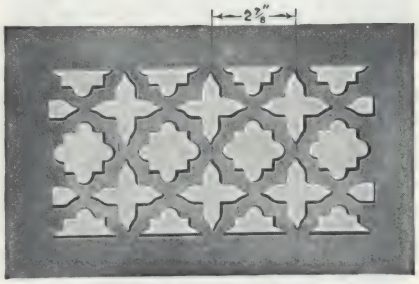
Hitoncast No. 152
Free area, 50%



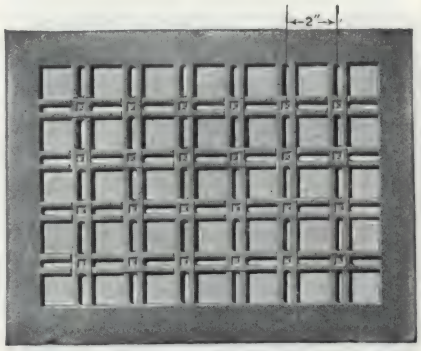
Hitoncast No. 399
Free area, 47%



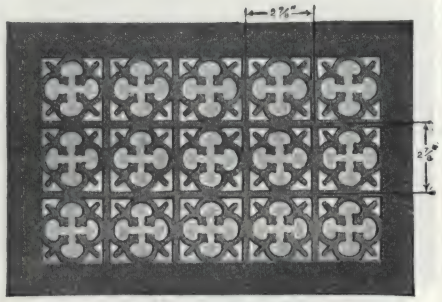
Hitoncast No. 982
Free area, 44%



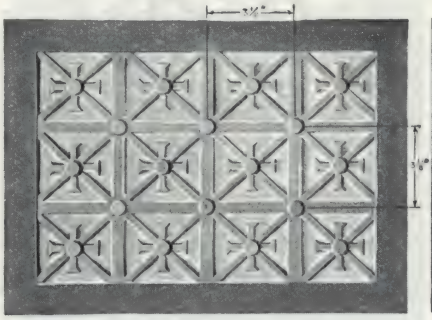
Hitoncast No. 22
Free area, 50%



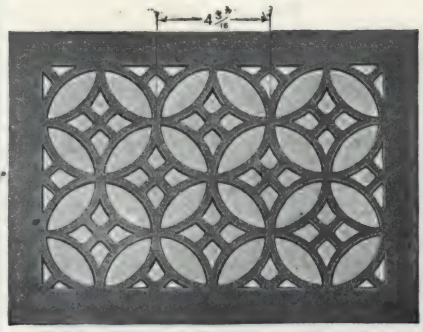
Hitoncast No. 321
Free area, 60%



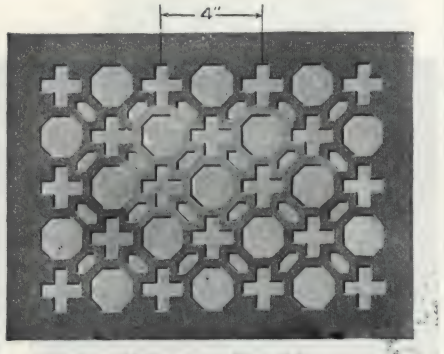
Hitoncast No. 303
Free area, 66%



Hitoncast No. 110
Free area, 60%



Hitoncast No. 749
Free area, 59%



Hitoncast No. 29
Free area, 58%

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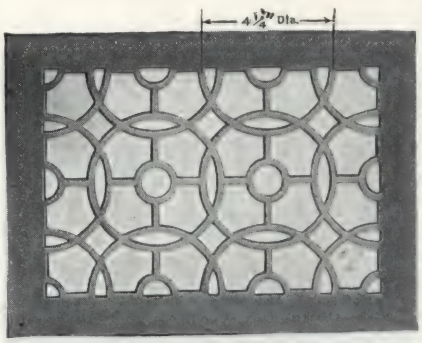
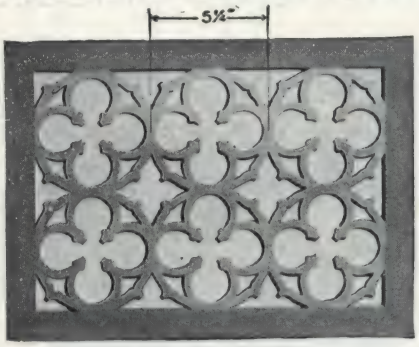
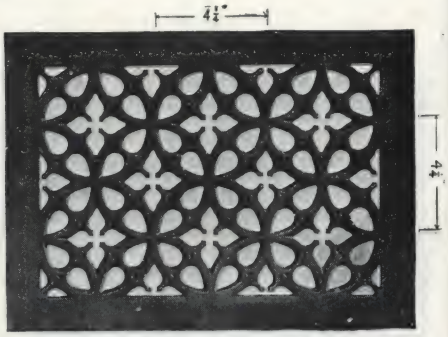
HITONCAST GRILLES



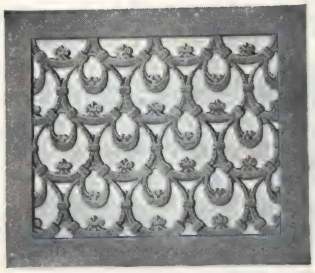
Hitoncast No. 62
Free area, 75%



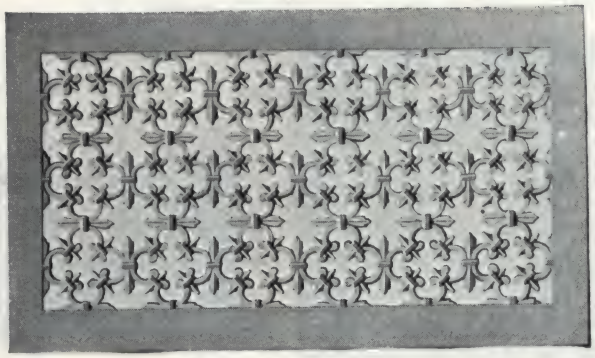
Hitoncast No. 760
Free area, 58%



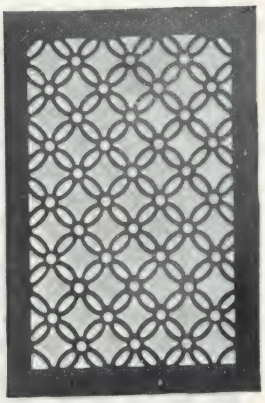
Hitoncast No. 752
Free area, 42%



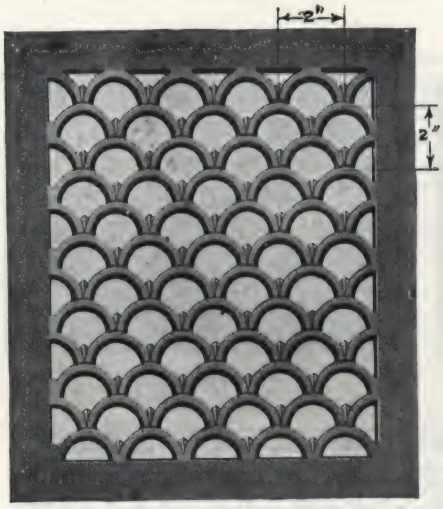
Hitoncast No. 93
Free area, 53%. Units: 2 13/16 in. wide, 3 5/16 in. high



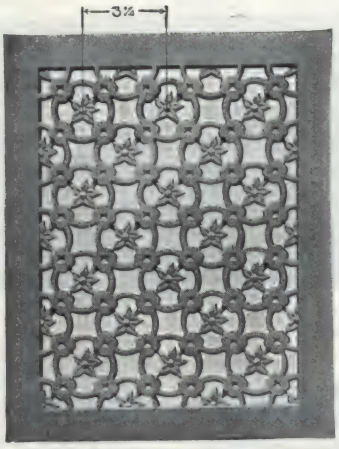
Hitoncast No. 407
Free area, 65%. Units: 2 7/16 or 3 in. center to center



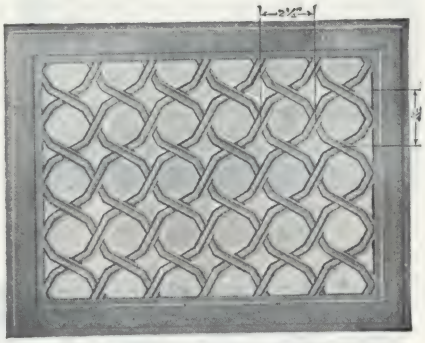
Hitoncast No. 25
Free area, 52%. Units: 2¼x2¼ or 2⅝x2⅝ in.



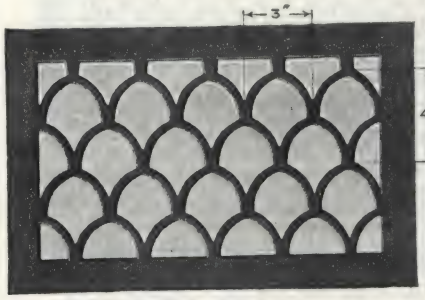
Hitoncast No. 145
Free area, 62%



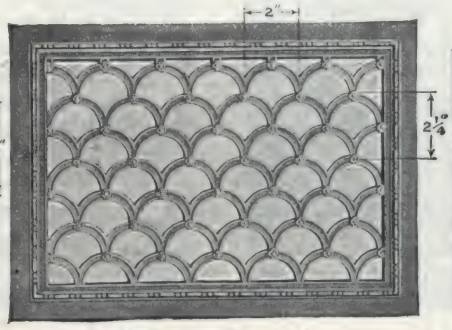
Hitoncast No. 59
Free area, 60%



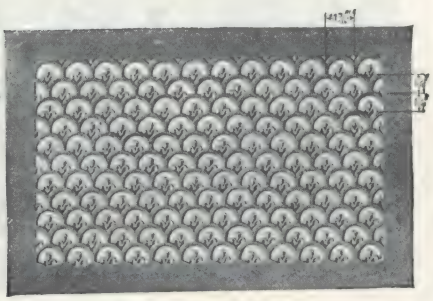
Hitoncast No. 201
Free area, 63%



Hitoncast No. 75
Free area, 76%



Hitoncast No. 130
Free area, 60%



Hitoncast No. 98
Free area, 45%

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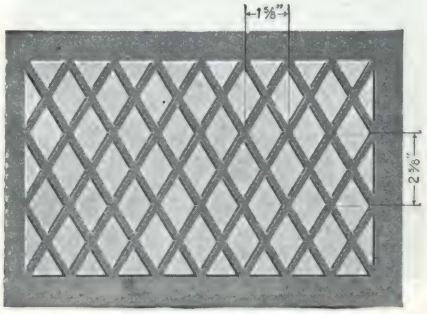
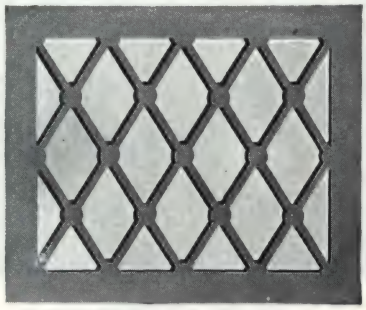
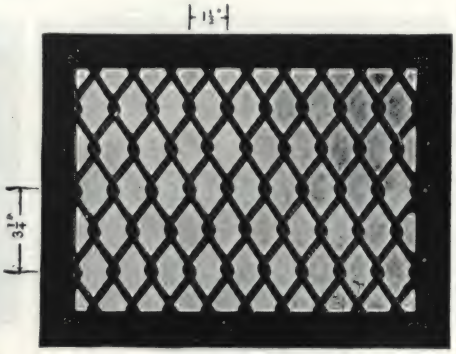
HITONCAST GRILLES



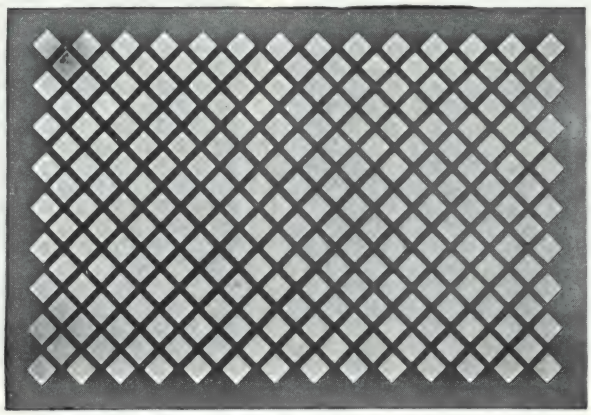
Hitoncast No. 148
Free area, 70%. Center to center of units: 1⅝ in. wide, 2⅜ in. high



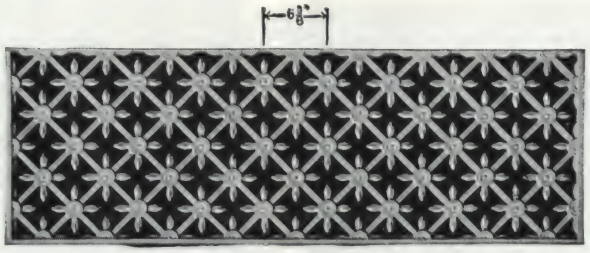
Hitoncast No. 150
Free area, 77%. Center to center of units: 3 in. wide, 4¾ in. high



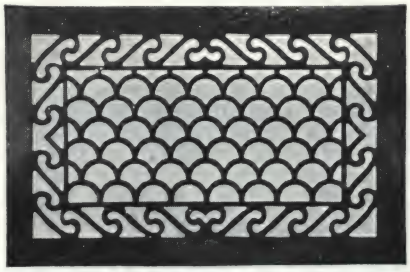
Hitoncast No. 91
Free area, 61%



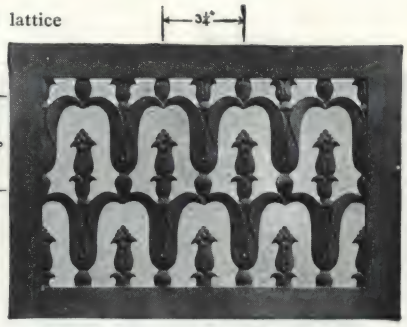
Hitoncast No. 50
Free area, 56%. ¾-in. diagonal lattice



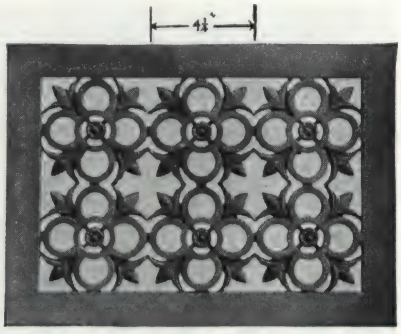
Hitoncast No. 903
Free area, 50%



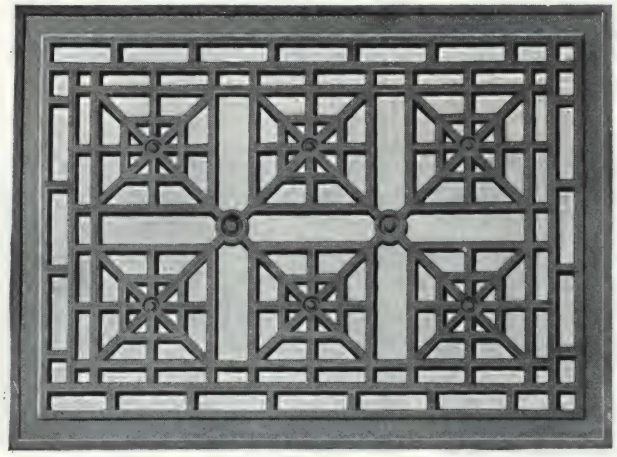
Hitoncast No. 45
Free area, 52%



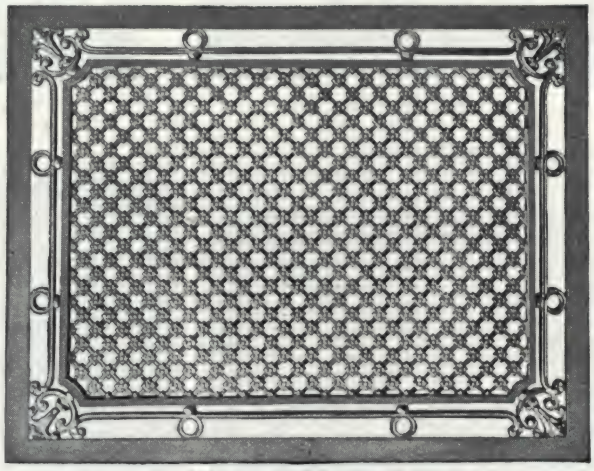
Hitoncast No. 607
Free area, 60%



Hitoncast No. 528
Free area, 45%



Hitoncast No. 619
Free area, 50%. Units: 4¾ in. square; spaced ¾ in.



Hitoncast No. 152A
Free area, 50%. Center to center of units: $1\frac{7}{16} \times 1\frac{7}{16}$ in.
Special pattern required for each size

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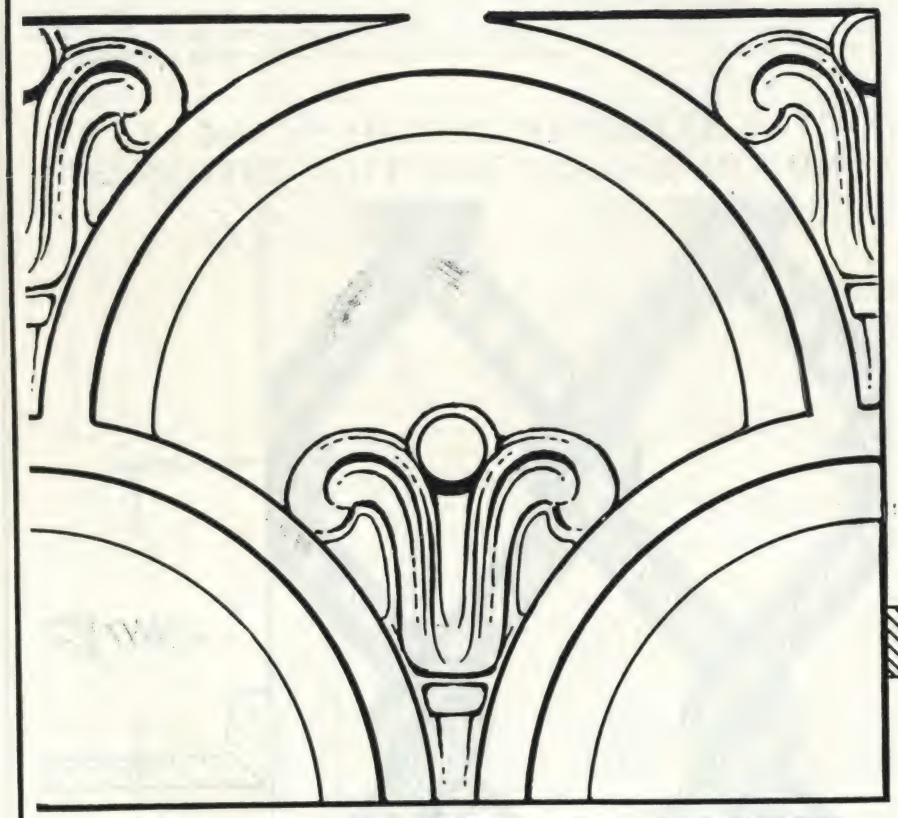
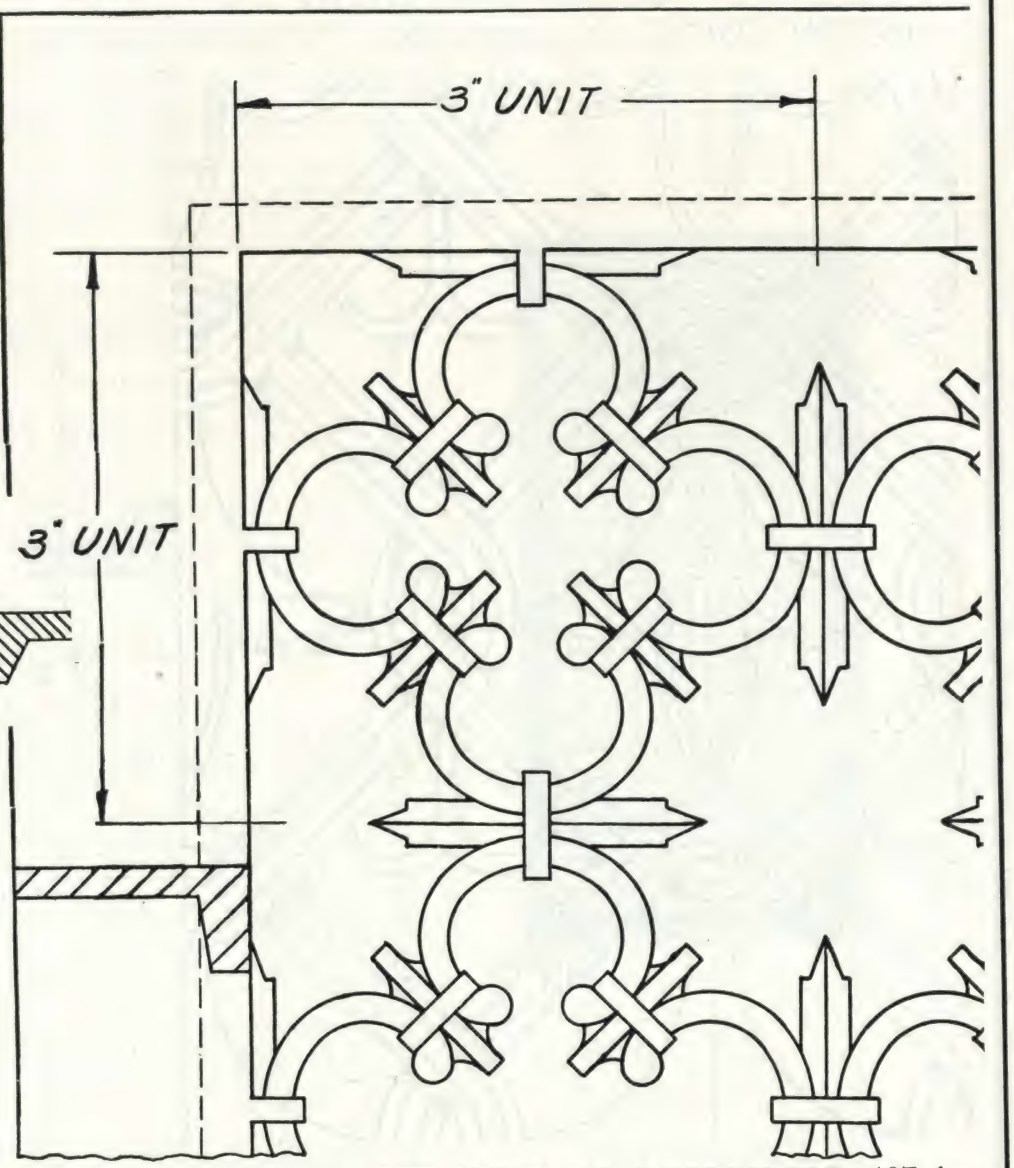
HITONCAST FULL SIZE UNIT DETAILS



STANDARD FULL SIZE UNIT OF DESIGN NO. 70—HITONCAST GRILLE

Important Note

Highton-H & C have prepared full-size blueprint details on over forty of the more popular Hitoncast and perforated grilles, similar to but more comprehensive than those shown on this and the following page. These *blueprint details* are adapted especially for architects' use and the *complete set will gladly be sent without charge* on receipt of such request.



STANDARD FULL SIZE UNIT OF DESIGN NO. 407-A—HITONCAST GRILLE

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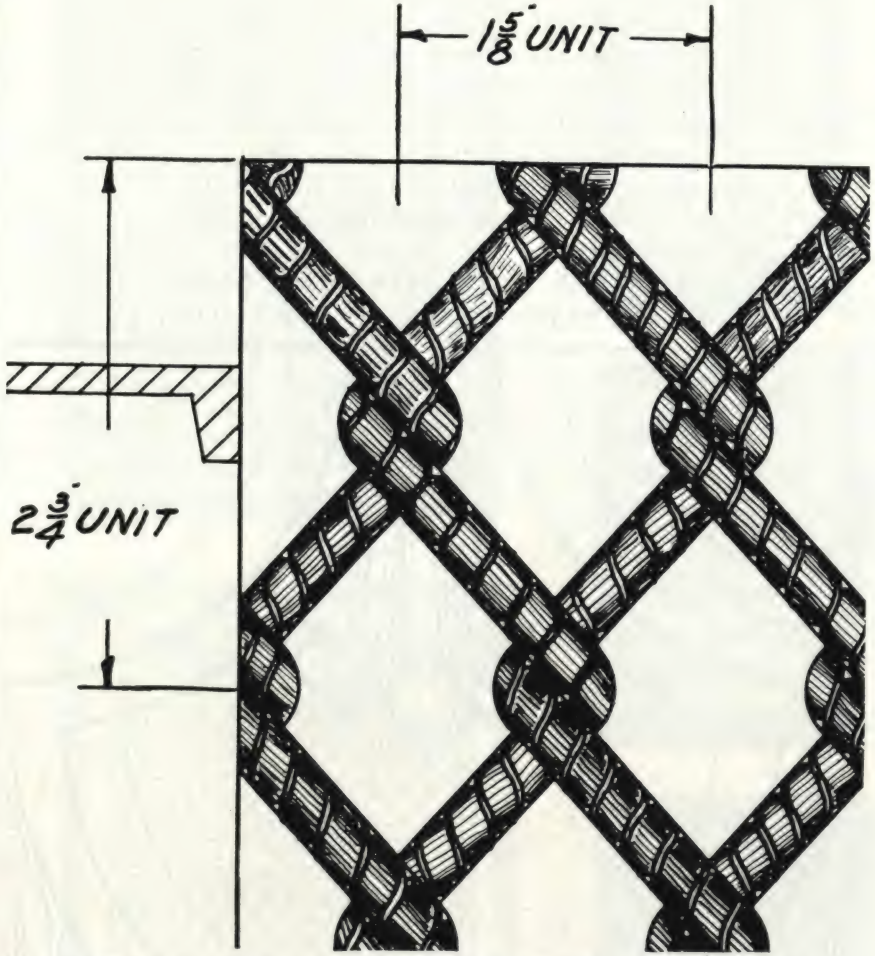
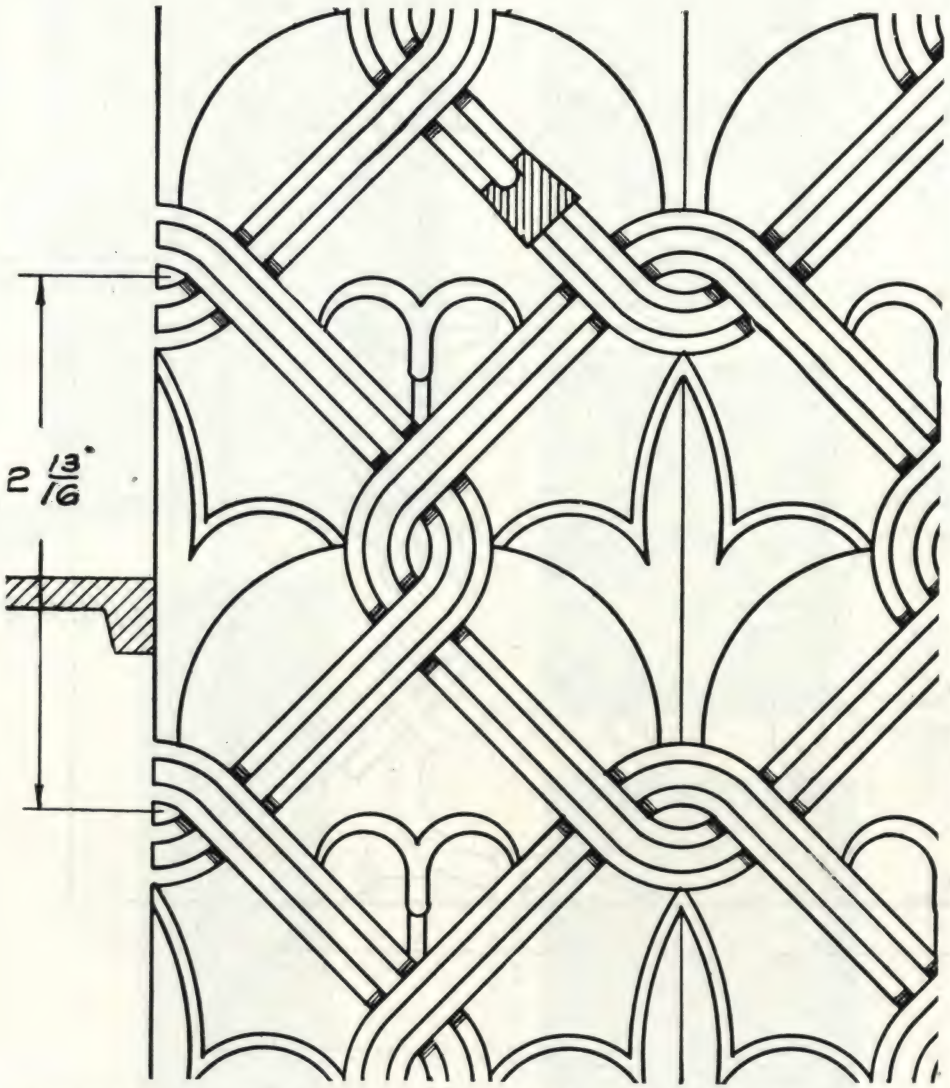
HITONCAST FULL SIZE UNIT DETAILS



STANDARD FULL SIZE UNIT OF DESIGN NO. 91—HITONCAST GRILLE

Important Note—Highton-H & C have prepared full-size blueprint details on over forty of the more popular Hitoncast and perforated grilles, similar to but more comprehensive than those shown on this and the preceding page. These *blueprint details* are adapted especially for architects' use and the *complete set will be gladly sent without charge* on receipt of such request.



STANDARD FULL SIZE UNIT OF DESIGN NO. 500—HITONCAST GRILLE

Continued on next page

PLAIN LATTICE DESIGN CAST GRILLES

Made in ½, ¾, ⅞, 1½ in. and other meshes to order. Where grilles are required for floor use, we furnish extra heavy casting at slight advance in price.

The table below shows standard size patterns carried in stock. These standard sizes are sold at a lower price than odd sized plain lattice cast iron grilles. Made in ⅞-in. mesh only and with rib opening and over-all dimensions exactly as given in table below.

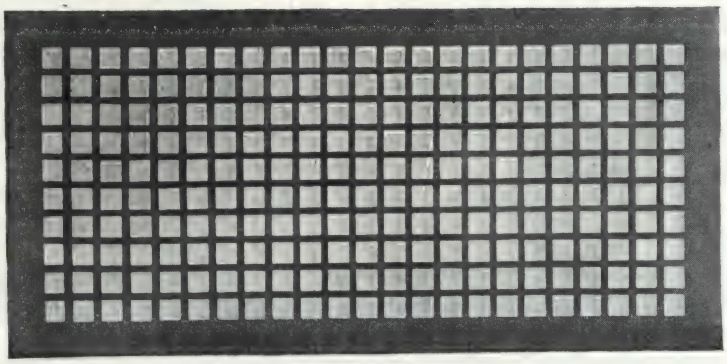
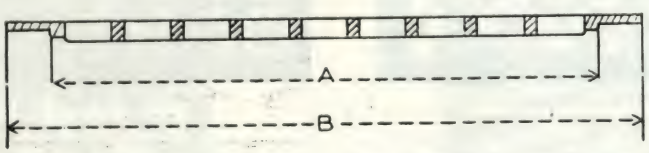


TABLE OF STANDARD SIZES OF PLAIN LATTICE GRILLES WITH ⅞-IN MESH

Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.	Duct opening, in.	Approx. over all of face, in.
4x 6	5¼ x 7¼	6x32	7 11/16 x33 5/8	9x30	10 7/8 x31 13/16	12x48	14 1/16 x50	18x27	20 5/16 x29 5/16	24x42	26 3/8 x44 3/8
4½x 6½	5 5/8 x 7 5/8	6x36	7 11/16 x37 5/8	9x32	10 7/8 x33 13/16			18x28	20 5/16 x30 5/16	24x45	26 3/8 x47 3/8
4x 8	5¼ x 9¼			9x36	10 7/8 x37 13/16	14x14	16¼ x16¼	18x30	20 5/16 x32¼	24x48	26 3/8 x50 3/8
4x10	5¼ x11¼	7x 7	8 11/16 x 8 11/16			14x15	16¼ x17 5/16	18x36	20 5/16 x38¼		
4x12	5¼ x13¼	7x 9	8 11/16 x10 11/16	10x10	11 15/16 x11 15/16	14x16	16¼ x18 5/16	18x48	20 5/16 x50¼	26x26	28 3/8 x28 3/8
4x13	5¼ x14¼	7x10	8 11/16 x11 11/16	10x12	11 15/16 x13 15/16	14x18	16¼ x20 5/16			26x28	28 3/8 x30 3/8
4x15	5¼ x16 5/16	7x12	8 11/16 x13 11/16	10x14	11 15/16 x15 15/16	14x20	16¼ x22 5/16	20x20	22 3/8 x22 3/8	26x30	28 3/8 x32 3/8
4x18	5¼ x19¼	7x14	8 11/16 x15 5/8	10x15	11 15/16 x16 15/16	14x22	16¼ x24¼	20x22	22 3/8 x24 3/8	26x32	28 3/8 x34 3/8
4x21	5¼ x22 5/16	7x15	8 11/16 x16 5/8	10x16	11 15/16 x17 7/8	14x24	16¼ x26¼	20x24	22 3/8 x26 3/8	26x34	28 3/8 x36 3/8
4x24	5¼ x25¼			10x18	11 15/16 x19 7/8	14x28	16¼ x30 5/16	20x26	22 3/8 x28 3/8	26x36	28 3/8 x38 3/8
4x28	5¼ x29¼	8x 8	9¾ x 9¾	10x20	11 15/16 x21 7/8	14x30	16¼ x32 5/16	20x28	22 3/8 x30 3/8		
4x30	5¼ x31¼	8x10	9¾ x11¾	10x22	11 15/16 x23 7/8	14x36	16¼ x38 5/16	20x30	22 3/8 x32 3/8	27x27	29 3/8 x29 3/8
		8x12	9¾ x13¾	10x24	11 15/16 x25 7/8	14x40	16¼ x42 5/16	20x32	22 3/8 x34 3/8	27x38	29 3/8 x40 3/8
5x 8	6 5/16 x 9 5/16	8x13	9¾ x14 11/16	10x30	11 15/16 x31 7/8	14x48	16¼ x50 5/16	20x36	22 3/8 x38 3/8		
5x 9	6 5/16 x10 5/16	8x14	9¾ x15 11/16	10x36	11 15/16 x37 7/8			20x48	22 3/8 x50 3/8	28x28	30 3/8 x30 3/8
5x10	6 5/16 x11 5/16	8x15	9¾ x16 11/16	10x40	11 15/16 x41 7/8	15x15	17¼ x17¼			28x30	30 3/8 x32 3/8
5x11	6 5/16 x12 5/16	8x16	9¾ x17 11/16	10x48	11 15/16 x49 7/8	15x21	17¼ x23¼	21x21	23 3/8 x23 3/8	28x32	30 3/8 x34 3/8
5x12	6 5/16 x13 5/16	8x18	9¾ x19¾			15x25	17¼ x27¼	21x25	23 3/8 x27 3/8	28x34	30 3/8 x36 3/8
5x13	6 5/16 x14 5/16	8x20	9¾ x21¾	11x17	13 x18 15/16	15x30	17¼ x32¼	21x29	23 3/8 x31 5/8	28x36	30 3/8 x38 3/8
5x14	6 5/16 x15 5/16	8x21	9¾ x22¾	11x18	13 x19 15/16	15x34	17¼ x36¼			28x40	30 3/8 x42 3/8
5x15	6 5/16 x16 5/16	8x24	9¾ x25¾	11x20	13 x21 15/16	15x36	17¼ x38¼	22x22	24 3/8 x24 3/8		
5x16	6 5/16 x17 5/16	8x27	9¾ x28 11/16					22x24	24 3/8 x26 3/8	30x30	32 3/8 x32 3/8
5x17	6 5/16 x18 5/16	8x30	9¾ x31 11/16	12x12	14 1/16 x14 1/16	16x16	18 5/16 x18 5/16	22x26	24 3/8 x28 3/8	30x32	32 3/8 x34 3/8
5x18	6 5/16 x19 5/16	8x36	9¾ x37 11/16	12x14	14 1/16 x16 1/16	16x18	18 5/16 x20 5/16	22x28	24 3/8 x30 3/8	30x34	32 3/8 x36 3/8
		8x48	9¾ x49¾	12x15	14 1/16 x17	16x20	18 5/16 x22 5/16	22x30	24 3/8 x32 3/8	30x36	32 3/8 x38 3/8
6x 6	7 11/16 x 7 11/16			12x16	14 1/16 x18	16x22	18 5/16 x24 5/16	22x32	24 3/8 x34 3/8	30x40	32 3/8 x42 3/8
6x 8	7 11/16 x 9 11/16	9x 9	10 7/8 x10 7/8	12x17	14 1/16 x19	16x24	18 5/16 x26 5/16	22x36	24 3/8 x38 3/8	30x42	32 3/8 x44 3/8
6x 9	7 11/16 x10 11/16	9x12	10 7/8 x13 7/8	12x18	14 1/16 x20	16x28	18 5/16 x30 5/16	22x38	24 3/8 x40 3/8	30x48	32 3/8 x50 3/8
6x10	7 11/16 x11 11/16	9x13	10 7/8 x14 7/8	12x19	14 1/16 x21	16x30	18 5/16 x32 5/16	22x40	24 3/8 x42 3/8		
6x12	7 11/16 x13 11/16	9x14	10 7/8 x15 7/8	12x20	14 1/16 x22	16x32	18 5/16 x34 5/16	22x42	24 3/8 x44 3/8	36x36	38 3/8 x38 3/8
6x14	7 11/16 x15 11/16	9x15	10 7/8 x16 13/16	12x22	14 1/16 x24	16x36	18 5/16 x38 5/16			36x40	38 3/8 x42 3/8
6x16	7 11/16 x17 11/16	9x16	10 7/8 x17 13/16	12x24	14 1/16 x26	16x42	18 5/16 x44 5/16	24x24	26 3/8 x26 3/8	36x42	38 3/8 x44 3/8
6x18	7 11/16 x19 11/16	9x18	10 7/8 x19 7/8	12x26	14 1/16 x28			24x26	26 3/8 x28 3/8	36x48	38 3/8 x50 3/8
6x20	7 11/16 x21 11/16	9x20	10 7/8 x21 7/8	12x28	14 1/16 x30	18x18	20 5/16 x20 5/16	24x27	26 3/8 x29 3/8		
6x22	7 11/16 x23 11/16	9x22	10 7/8 x23 7/8	12x30	14 1/16 x32	18x20	20 5/16 x22 5/16	24x30	26 3/8 x32 3/8	38x38	40 3/8 x40 3/8
6x24	7 11/16 x25 11/16	9x24	10 7/8 x25 7/8	12x32	14 1/16 x34	18x21	20 5/16 x23 5/16	24x32	26 3/8 x34 3/8	38x40	40 3/8 x42 3/8
6x28	7 11/16 x29 5/8	9x26	10 7/8 x27 7/8	12x36	14 1/16 x38	18x22	20 5/16 x24 5/16	24x36	26 3/8 x38 3/8	38x42	40 3/8 x44 3/8
6x30	7 11/16 x31 5/8	9x28	10 7/8 x29 13/16	12x40	14 1/16 x42	18x24	20 5/16 x26 5/16	24x40	26 3/8 x42 3/8		

IMPORTANT INFORMATION FOR ORDERING



For all cast grilles whether of plain lattice or ornamental design there are three important dimensions: (a) the rib size (dimension "A" in cross-section sketch); (b) the over-all size (dimension "B" in sketch) and (c) the daylight opening (measurement of section containing the holes). Note, daylight opening equals the rib opening minus approximately ½ in. on each dimension. Of these three dimensions, the most important is dimension "A," the rib opening, as this determines the fit. The rib opening is made small enough so that it will fit inside the duct opening. If standard size grilles are specified, care should be taken to make sure that the over-all dimensions "B" are large enough to cover any angle frames or grounds surrounding the opening.

Continued on next page

HIGHTON-H & C STAMPED GRILLES

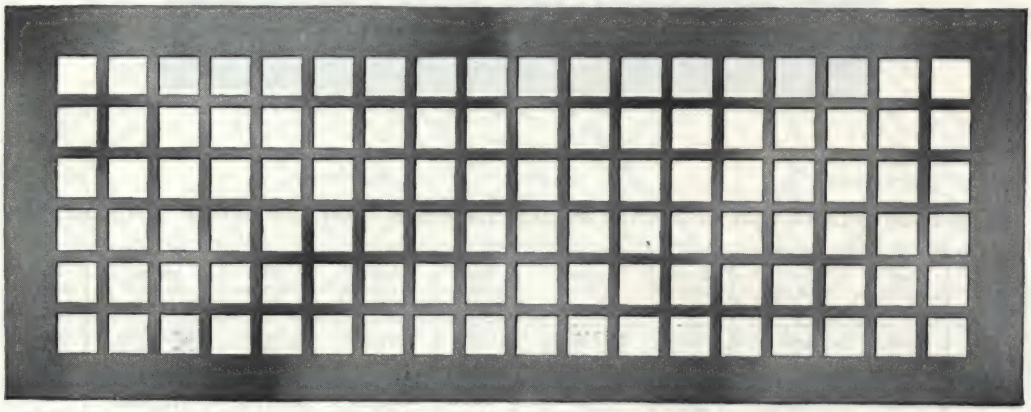
Stamped from Steel, Brass, Bronze or Aluminum

Highton-H & C Steel Grilles are made only from cold rolled steel free from scale and surface pits. They have the advantage of being lighter in weight than cast iron, unbreakable, easy to install and economical. They supplement and round out the complete line of Hitoncast Grilles shown in another section of this catalogue.

There are many kinds of steel grilles on the market. In order to secure the best in steel grilles we suggest you specify, "Highton-H & C to be made from cold rolled steel, frets to line up perfectly and back to be free from burrs, grilles to be perfectly flat when installed," and you will be assured of full satisfaction.

Plain Lattice Designs

Made in nine meshes: 1/4, 1/2, 5/8, 3/4, .762, 7/8, 1, 1 3/8, 1 1/2 in.



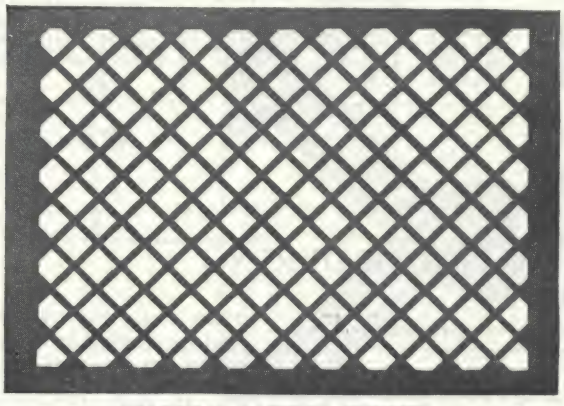
PLAIN LATTICE GRILLES

Metal thicknesses: No. 10 gauge (.134 in.), No. 12 gauge (.109 in.), No. 14 gauge (.083 in.)

Class No.	Hole size, in.	Bar width, in.	Free air capacity, per cent	One-piece size limits, in.			
				Height		Width	
				Over all	Opening	Over all	Opening
569	1/4	1/4	45	50	47 7/8	120	118
570	1/2	1/4	45	50	47 3/4	120	117 1/2
574	5/8	1/4	51	50	47 7/8	120	117 7/8
575	.762	.220	59	50	47 29/32	120	117 5/8
575A	3/4	1/4	57	50	47 3/4	120	117 3/4
575B	7/8	1/4	60	50	48 1/8	120	117 7/8
576	1	1/4	65	50	47 1/4	120	117 3/4
577	1 3/8	3/8	65	50	46 7/8	120	116 7/8
577A	1 1/2	3/8	72	50	48 3/8	120	117 3/4

Diagonal Lattice Designs

Made in 1/2, 3/4 and 1-in. mesh all with 1/4-in. bars



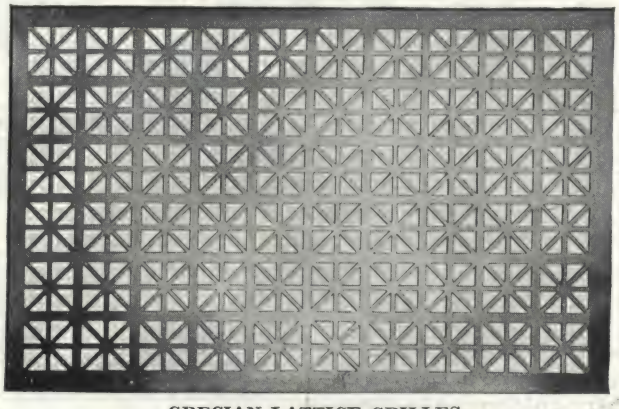
DIAGONAL LATTICE GRILLES

Metal thicknesses same as plain grilles

Class No.	Hole size, in.	Bar width, in.	Free air capacity, per cent	One piece size limits, in.			
				Height		Width	
				Over all	Opening	Over all	Opening
571	1/2	1/4	43	50	47 7/16	120	117 9/16
572	3/4	1/4	56	54	50 55/64	120	117
572A	1	1/4	62	50	47 23/32	120	117 3/16

Grecian Lattice Designs

Made with 2 1/2, 3 and 3 1/2-in. units



GRECIAN LATTICE GRILLES

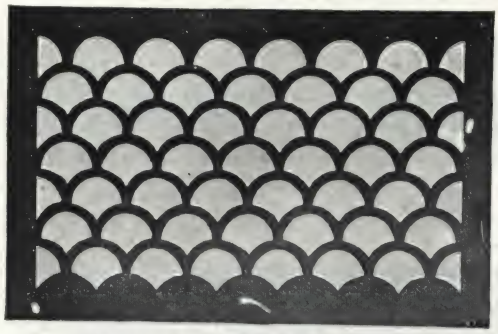
Metal thicknesses same as plain grilles

Class No.	Hole size, in.	Bar width, in.	Free air capacity, per cent	One piece size limits, in.			
				Height		Width	
				Over all	Opening	Over all	Opening
573A	2 1/2	5/16	45	50	47 1/2	120	117 13/16
573	3	5/16 or 3/8	50	60	53 3/8	120	117 3/4
573B	3 1/2	5/16	52	50	45 7/16	120	117 7/8

Continued on next page

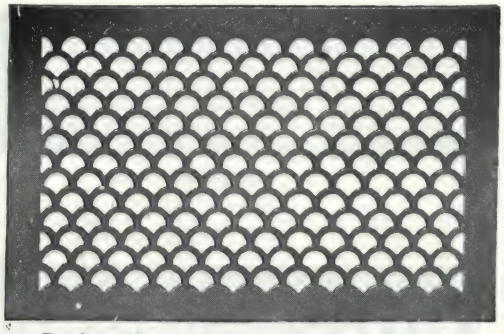
HIGHTON-H & C STAMPED GRILLES—ORNAMENTAL DESIGNS

Stamped from Steel, Brass, Bronze or Aluminum

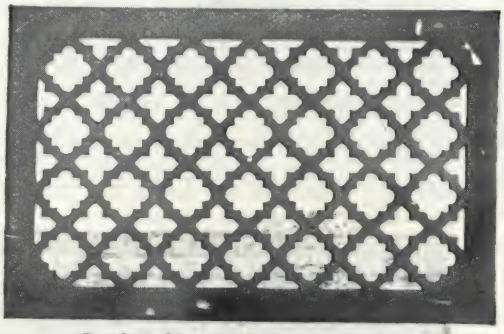


Design No. 578 Shell Pattern
Free area, 67%
Based on a circle ⅞-in. radius. Units: 2 in. center to center in width; 2¼ in. center to center in height. Overall size limits: height, 50 in.; length, 120 in.

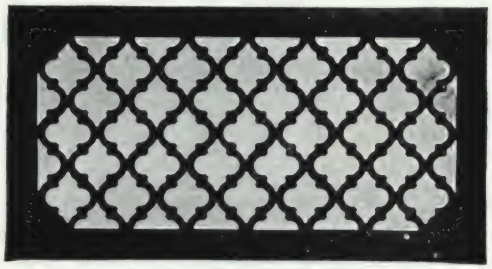
On this and the following page are shown ornamental and special designs in stamped metals. We can produce any design shown with dies on hand. Furthermore, we are especially well equipped to produce additional designs to architects' details. However, only those designs which are made up of a succession of similar units can be produced economically in stamped metals.



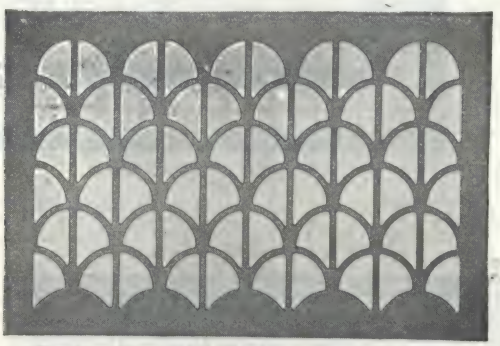
Design No. 578-A Small Shell Pattern
Free area, 60%
Based on a circle ⅞-in. radius. Units: 1⅛ in. center to center in width; 1¼ in. center to center in height. Overall size limits: height, 50 in.; length, 60 in.



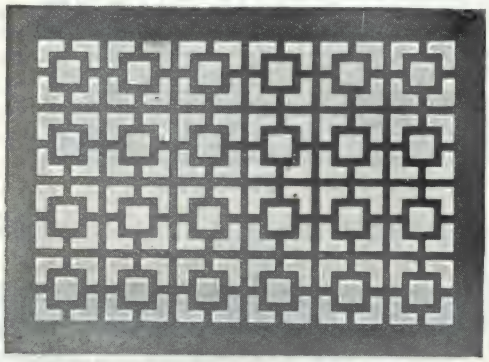
Design No. 582 Gothic Pattern
Free area, 60%
Units: 1½ in. Frets between units, ⅛ in. Overall size limits: height, 50 in.; length, 120 in. Furnished only in 12 gauge or lighter



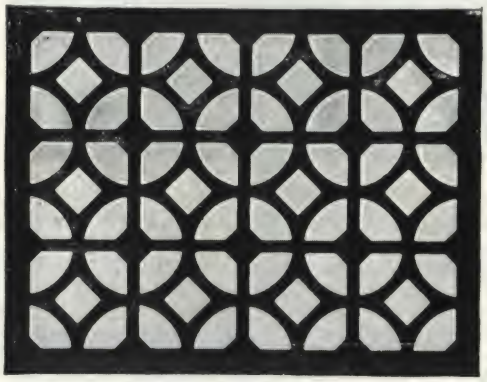
Design No. 582-A Gothic Pattern
Free area, 72%
Units: 2 in. Frets between units, ¼ in. Overall size limits: height, 50 in.; length, 120 in. Furnished only in 12 gauge or lighter



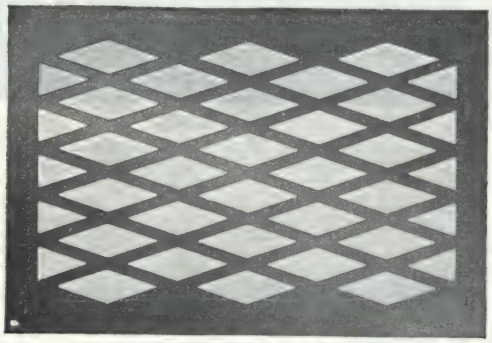
Design No. 587 Divided Shell Pattern
Free area, 65%
Units: 1½ in. center to center in width; 1½ in. center to center in height. Overall size limits: height, 50 in.; length, 60 in.



Design No. 588 Square Link Pattern
Free area, 65%
Units: 2 in. Frets between units, 1¼ in. Overall size limits: height, 50 in.; length, 120 in.



Design No. 579
Free area, 50%
Units: 2¾ in. Frets between units, ⅜ in. Overall size limits: height, 50 in.; length, 120 in. Also furnished in 2½-in. units—Design No. 579-A



Design No. 583
Free area, 56%
Diamonds, 3¼x1⅛ in. Bars, ⅛ in. Overall size limits: height, 50 in.; length, 60 in.

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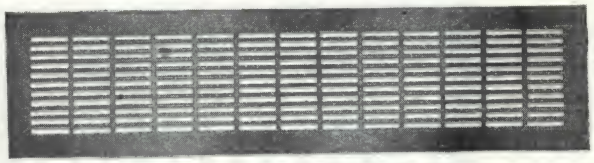
HIGHTON-H & C STAMPED GRILLES—ORNAMENTAL DESIGNS

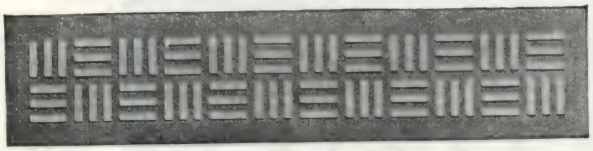
Stamped from Steel, Brass, Bronze or Aluminum



Design No. 586

Free area, 50%

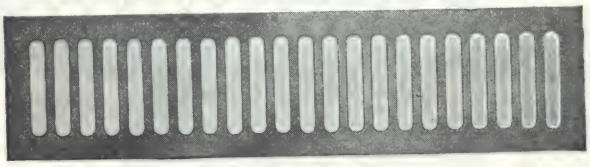
Slots: $\frac{3}{16}$x1½ in., bars $\frac{3}{16}$ in. wide. Overall size limits: height, 50 in.; length, 120 in.



Design No. 589

Free area, 50%

Slots: $\frac{7}{16}$x1¾ in., bars ¼ in. wide



Design No. 585

Free area, 41%

Slots: ⅝ in. wide up to 12 in. high, bars ⅜ in. wide. Overall size limits: height, 14 in.; length, 120 in.

Design No. 590

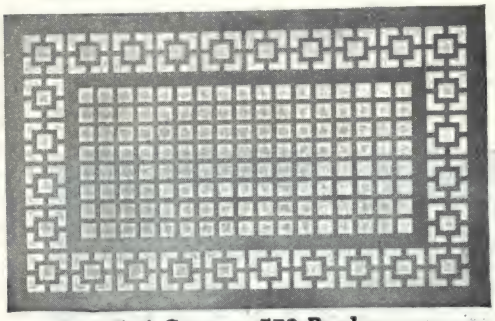
Free area, 15%

Louvers or hoods can be either 7½ or 4 in. Made from No. 16 gauge or thinner metal. Widths 6 to 30 in.; heights up to 84 in. overall

Metal thicknesses of all grilles shown above: No. 10 gauge (.134 in.), No. 12 gauge (.109 in.), No. 14 gauge (.083 in.).

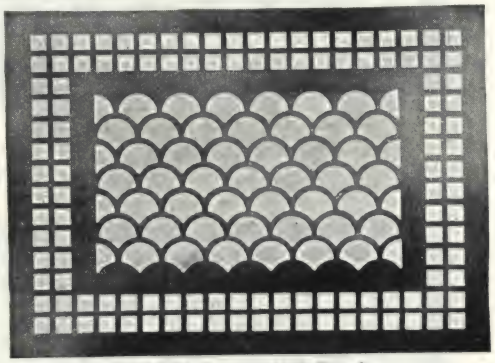
COMBINATION DESIGNS

Below are shown two cuts, illustrating the combination of a center of one design with a border of another. Many of the designs shown on the previous pages may be combined in a similar manner to secure artistic effects.



575 Center—573 Border

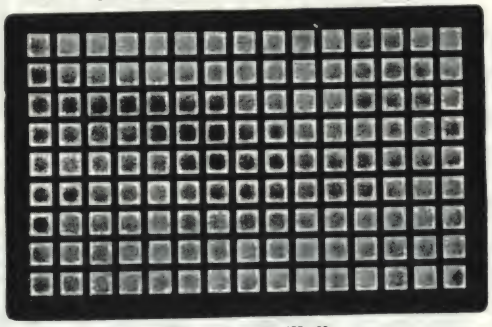
Due to the extra cost of combination designs, we recommend the use of single designs.



573 Center—575 Border

BEVELED EDGE GRILLES

For Psychopathic Hospital Buildings, etc.



"Psycho-Grille"

Perforated grille No. 10 or 12 gauge can also be furnished in any other stamped design

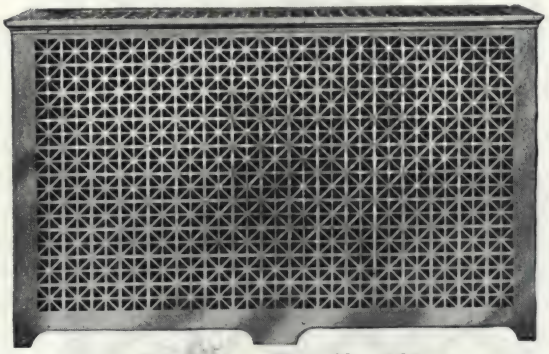
Highton-H & C have originated the above shown grille for use especially in connection with Psychopathic Hospitals where it is of extreme importance that no sharp edges protrude whereby a patient could injure himself.

All edges are smoothly beveled and corners rounded to fit snugly and evenly against the wall or surface to which grille is fastened.

Reference is also made to Hitoncast Grilles and Registers Designs No. 132 and 125 shown on page 17.

To obtain best results for grilles as described above specify Highton-H & C *"Psycho-Grille."*

HIGHTON-H & C RADIATOR ENCLOSURES



The Banker Class No. 373

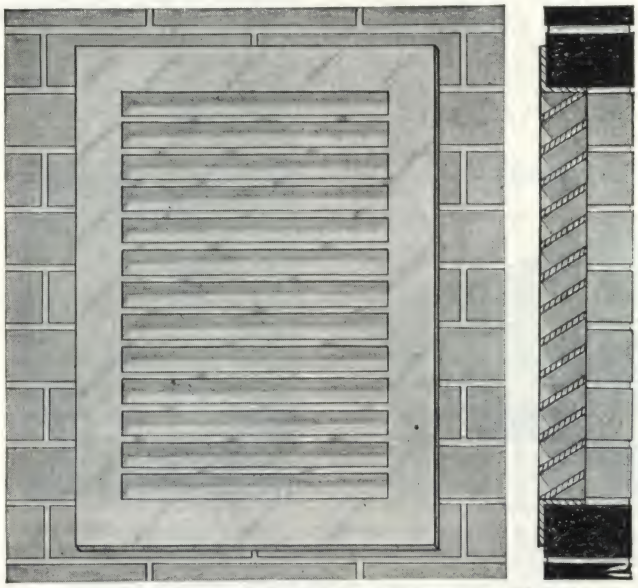
The enclosure illustrated above is one of the many artistic effects possible to secure by the use of Highton-H & C steel or wrought bronze grilles. Practically all Highton-H & C cast iron or cast bronze grilles may be used in a similar manner. All enclosures are made up to specification. They are constructed with a rigid angle frame and are unusually well built and capable of standing considerable abuse.

Because of the large variety in styles of grilles, from both steel and cast metals, it is possible to design an enclosure which will harmonize with any architectural motif.

We gladly offer the assistance of our engineering department in designing a suitable enclosure for any location.

Continued on next page

HIGHTON-H & C
SPECIAL SIDE WALL AIR INLET VENTILATOR



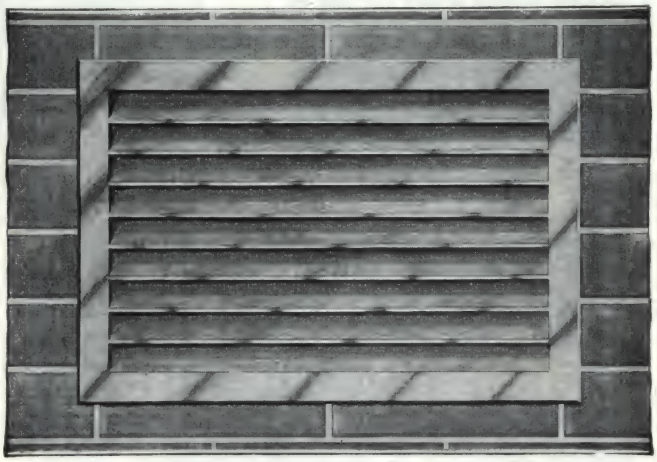
Elevation and Section of Vertical Type Inlet Ventilator Showing Position of Louvers
Ventilator illustrated is 12 in. wide by 18 in. high

With stationary louvers for use on the outside of buildings as a fresh air inlet. This ventilator is made extra heavy and so constructed as to exclude rain or snow. Made in cast iron, brass or bronze metal, in any size and to order only. When ordering give horizontal first and mark "wide" and "high" after the dimensions.

LIST OF STANDARD DUCT OPENING SIZES

10x 8	16x10	20x14	28x20	6x14	10x16	12x40
12x 8	16x12	20x16	30x 8	6x16	10x20	14x16
12x 9	16x14	20x20	30x10	8x10	10x24	14x20
12x10	16x16	22x 8	30x12	8x12	10x30	14x24
12x12	17x 5	22x12	30x16	8x15	12x14	16x16
14x 6	18x11	24x10	34x11	8x16	12x16	16x18
14x 8	18x12	24x12	36x12	8x20	12x18	16x20
14x10	18x16	24x14	40x10	8x24	12x20	16x24
14x12	18x18	24x15	40x12	8x30	12x22	16x30
14x14	20x 6	24x16	42x 8	9x14	12x24	20x24
15x 8	20x 8	24x18	49x11	9x16	12x30	20x28
16x 6	20x10	24x20	50x10	10x12	12x36	24x24
16x 9	20x12	28x16	50x12			

Made up in any special size not listed above at a small pattern charge

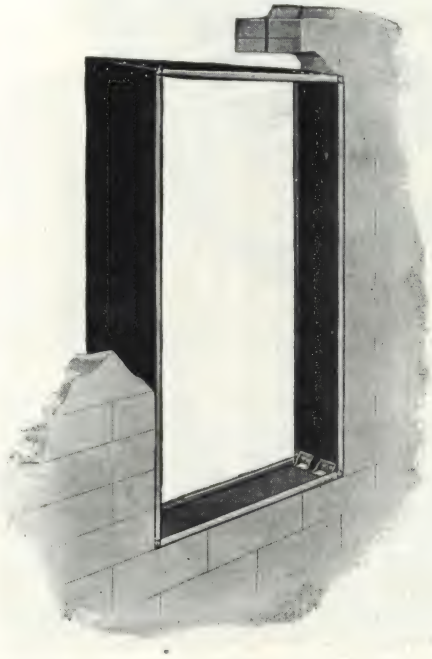


Horizontal Type Inlet Ventilator
Ventilator illustrated is 18 in. wide by 10 in. high

Specify the Highton-H & C Special Side Wall Air Inlet Ventilator
Write for further information on this special ventilator

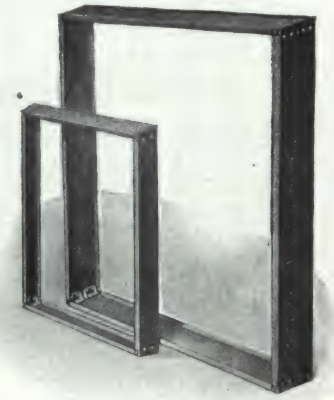
REVERSED BEVEL WALL FRAMES

Nos. 282 and 284



For use in brick or masonry walls, made in steel or cast iron (specify which) either 2 in. or 4 in. deep. Wall frames furnish a means of securely holding registers or grilles in place in masonry walls. They are solidly masoned in place and the registers being attached by screws, may be removed at any time without injury to walls. For 2-in. frames specify No. 282; for 4-in., No. 284.

Wall frames can be furnished for any size register we manufacture.



STANDARD SIZES FOR REGISTERS OF FOLLOWING SIZES

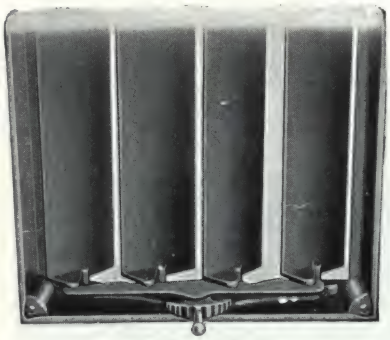
4½x 6½	6x 6	7x 7	8x24	9x26	10 x36	12x24	14x30	18x18	21x29
4 x 8	6x 8	7x10	8x27	9x28	10 x40	12x26	14x36	18x20	24x24
4 x10	6x 9	7x12	8x30	9x30	10½x16½	12x28	14x40	18x21	24x27
4 x12	6x10	7x14	8x32	9x32	11 x17	12x30	15x15	18x24	24x30
4 x15	6x12	7x15	8x36	9x36	11 x18	12x32	15x21	18x27	24x32
4 x18	6x14	8x 8	9x 9	10x10	11 x20	12x36	15x25	18x30	24x36
4 x21	6x16	8x10	9x12	10x12	12 x12	12x40	16x16	18x36	24x45
4 x24	6x18	8x12	9x13	10x14	12 x14	12x48	16x18	20x20	27x27
5 x 8	6x20	8x13	9x14	10x15	12 x15	14x14	16x20	20x22	27x38
5 x 9	6x22	8x14	9x15	10x16	12 x16	14x15	16x22	20x24	30x30
5 x10	6x24	8x15	9x16	10x18	12 x17	14x16	16x24	20x26	30x36
5 x12	6x28	8x16	9x18	10x20	12 x18	14x18	16x28	20x28	36x36
5 x14	6x30	8x18	9x20	10x22	12 x19	14x20	16x30	20x30	.....
5 x16	6x32	8x20	9x22	10x24	12 x20	14x22	16x32	20x32	.....
5 x18	6x36	8x21	9x24	10x30	12 x22	14x24	16x36	20x36	.....

Continued on next page

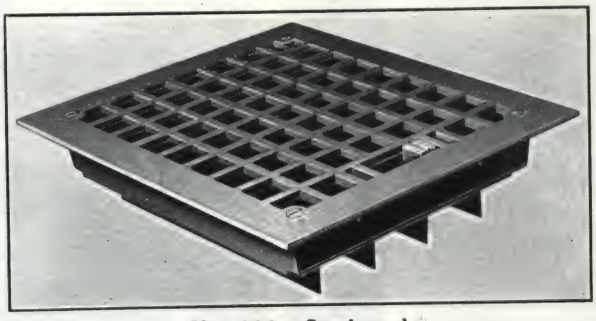
HIGHTON-H & C VENTILATING REGISTERS

The items shown on this and the following page are representative of our varied lines of registers. In addition to those shown, practically any grille, either cast or steel, shown on the preceding pages may be attached to a register box. Registers should be specified by the "duct or opening" size. Faces of standard registers have square mesh design, approximately 7/8-in. square. It is important to specify *standard sizes* as listed in Catalogue 29 to avoid the delay and extra cost of special patterns.

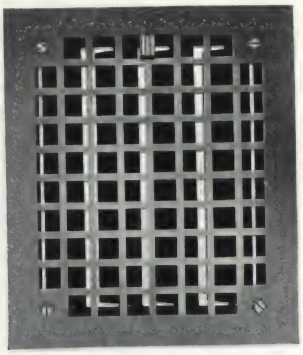
Hand Operated Registers



No. 240—All Cast
Body from cast iron with wheel movement as shown. Face also cast iron exactly the same as No. 230. An excellent register for use where resistance to rust is desired. Also made with bronze face or all bronze



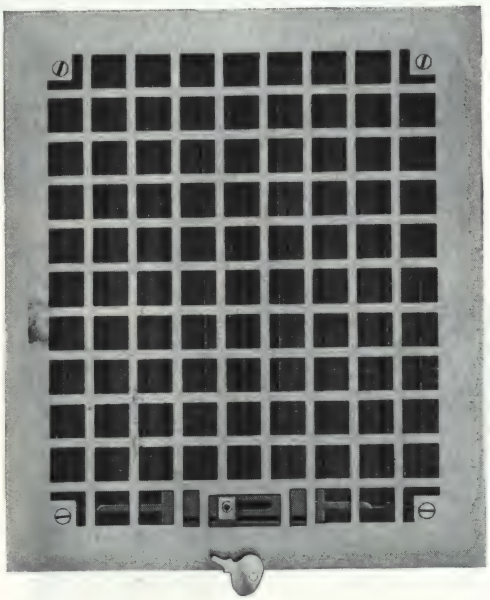
No. 230—Semi-steel
Cast face mounted on unbreakable steel body



No. 800—All Steel
Steel face and steel body

HIGHTON-H & C "SUR-LOCK" REGISTER

Trade-Mark Applied For



"Sur-Lock" Type Register
No. 7230
Positive in Action

An entirely new lock register that can be furnished all steel or with a cast iron face and a steel box.

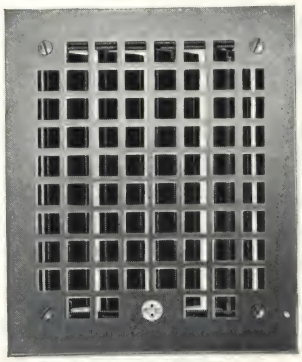
The special features are first, that the louvers can be regulated to any desired position. Secondly, the operating device is covered to prevent dust or dirt injuring the mechanism and to also present a more attractive appearance from the front. Thirdly, the locking device is entirely independent of the register face, and special design faces can be furnished using the regular register body. Last, but not least, the most important feature of this new register is that it can be securely locked, and nobody can push a stick or similar object through the fretwork and move the louvers when the register is in a locked position.

This new and special lock can be applied to any register, either standard or special size, which has a steel body. With "Sur-Lock" the louvers operate in the usual way and are locked with a removable key. For all registers with cast boxes we supply a different device—a key operated lock.

To insure the best specify Highton-H & C "Sur-Lock" register.

Samples or more complete information will be gladly sent on request.

Continued on next page



No. 6800—All Steel

HIGHTON-H & C STANDARD KEY OPERATED REGISTERS

In all registers designated as key operating, the louvers can be operated only by use of a key.

No. 6800, shown at left, has steel face and steel body.

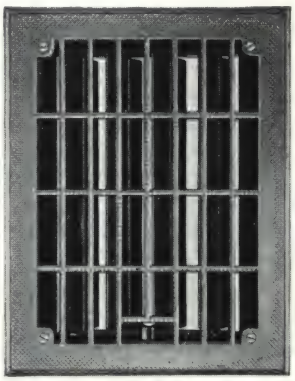
No. 6230, similar, with cast face, steel body.

No. 6240, similar, with cast face, cast body.

HIGHTON-H & C PEBBLE FLOOR REGISTERS

On account of having beveled edge and narrow rim, register or face can be set without recessing. Metal is of sufficient weight to insure adequate strength. The pebbles prevent the foot from slipping. For Pebble Faces only in sizes listed below, specify No. 272.

FLOOR OPENING	
8x10	10x13
8x12	12x14
9x12	12x15
10x12	14x16



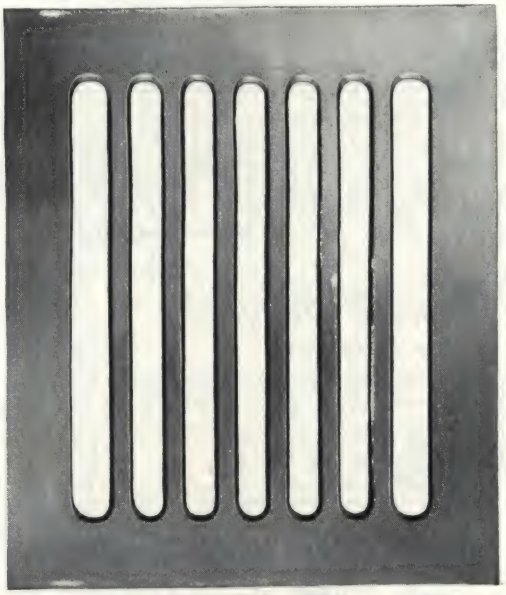
No. 270 Pebble Floor Register

Multiple valve—cast iron face and steel body. Made only in sizes listed at left

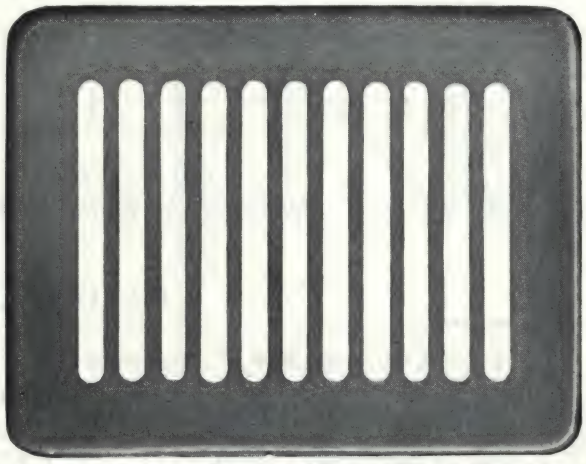
HIGHTON-H & C SANITARY REGISTERS AND GRILLES

Designed for use where extreme cleanliness is the prime requsite. Highton-H & C sanitary grilles and registers are especially easy to keep in a clean and sanitary condition.

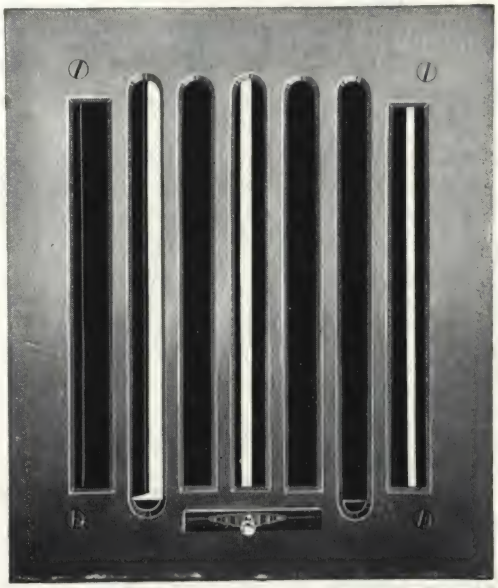
Where the best is required, specify Highton-H & C Round Edge Sanitary Grilles and Registers. Where economy is an important factor, square edge pattern may be used at lower cost. In all cases bars must run vertical. Give width first, height second, and state which dimension is height.



No. 135—Square Edge Sanitary Grille

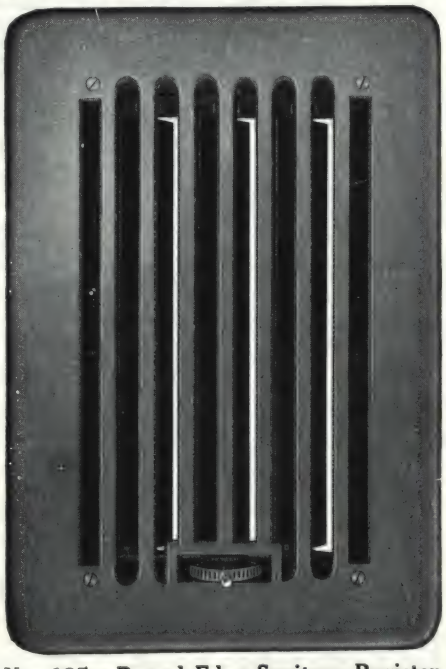


No. 132—Round Edge Sanitary Grille



No. 137—Square Edge Sanitary Register

Designs Nos. 132 125 were developed to eliminate all rough or sharp edges, and are particularly appropriate for psychopathic hospitals. Reference is also made to Beveled Edge Perforated Grilles, described on page 14 of this catalogue.



No. 125—Round Edge Sanitary Register

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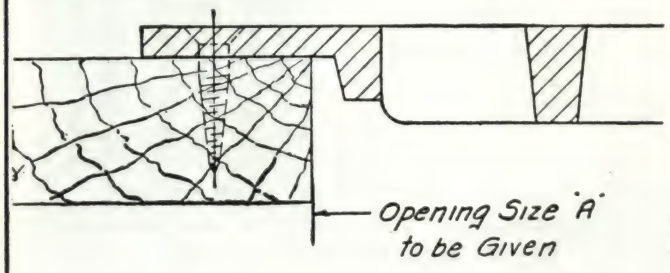
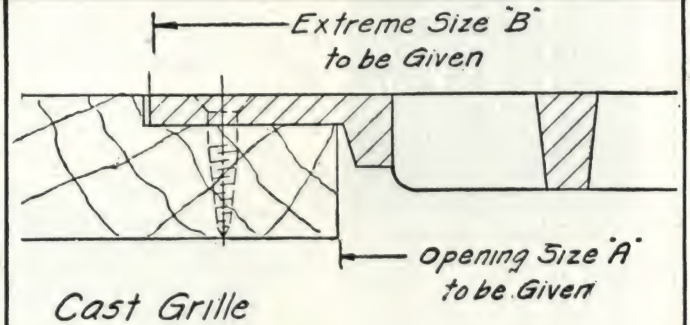
CONSTRUCTIONS AND METHODS FOR FASTENING HITONCAST CAST AND STAMPED GRILLES



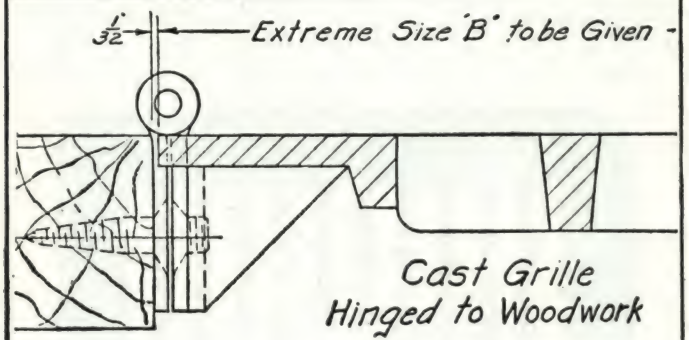
Cast Grille Overlapping the Opening

METHOD 10



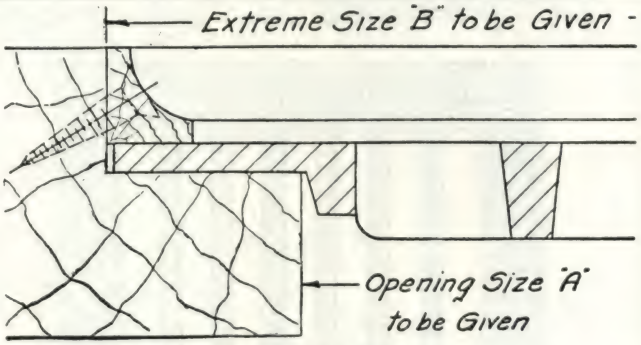
Cast Grille Set in Rabbet

METHOD 11



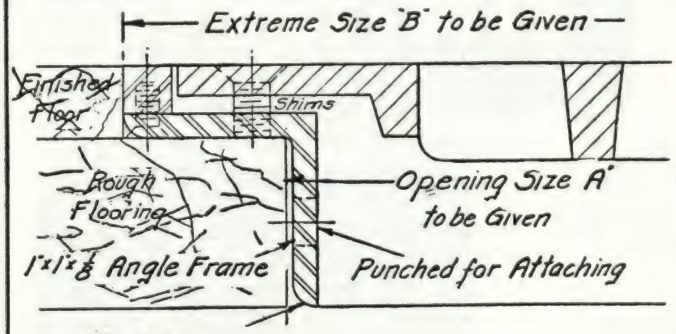
Cast Grille Hinged to Woodwork

METHOD 12



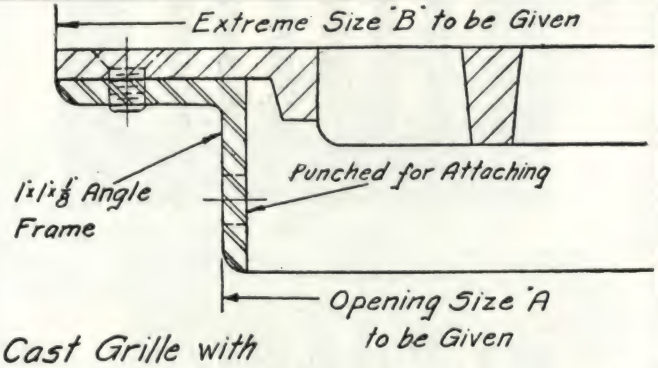
Cast Grille Secured By Moulding

METHOD 13



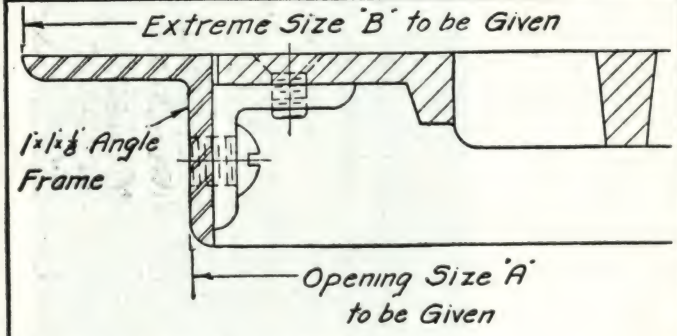
Cast Grille in Floor Frame

METHOD 14



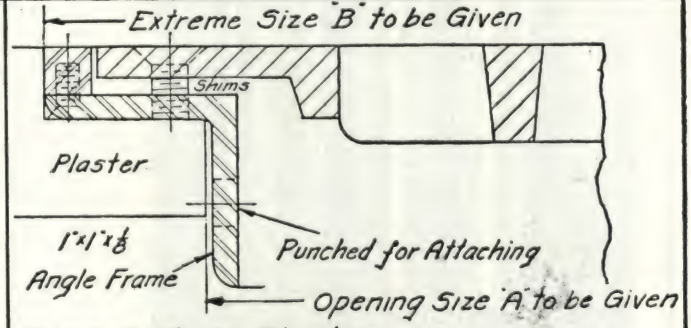
Cast Grille with Angle Frame on Back

METHOD 15



Cast Grille Attached to Frame with Angle Clips

METHOD 16

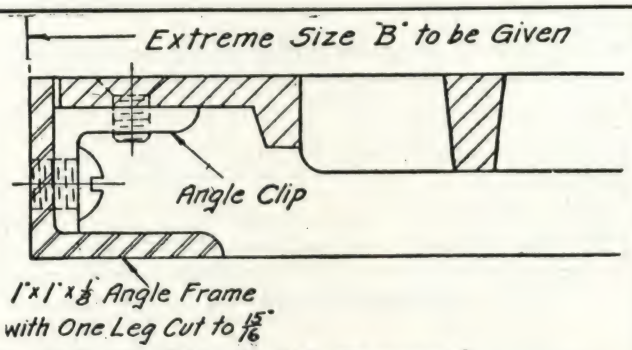


Cast Grille in Plaster with Wall Frame

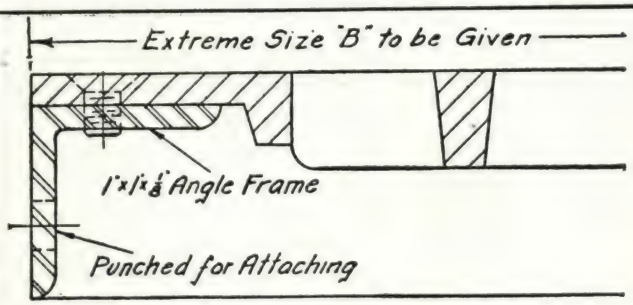
METHOD 17

Continued on next page

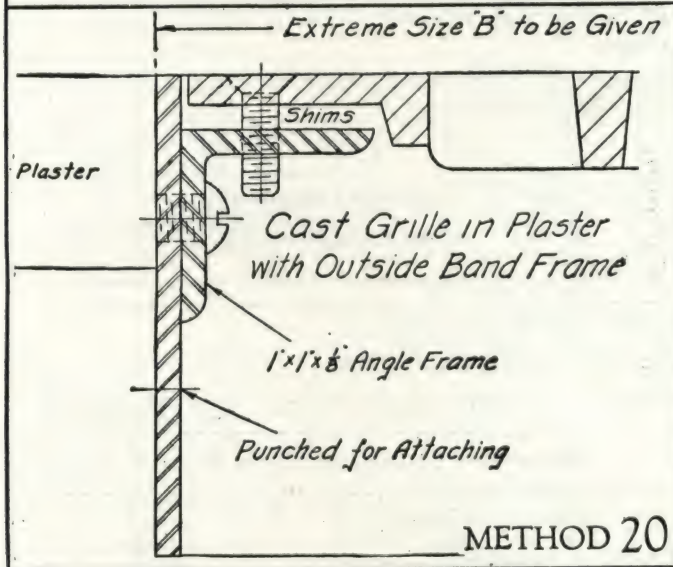
CONSTRUCTIONS AND METHODS FOR FASTENING HITONCAST CAST AND STAMPED GRILLES



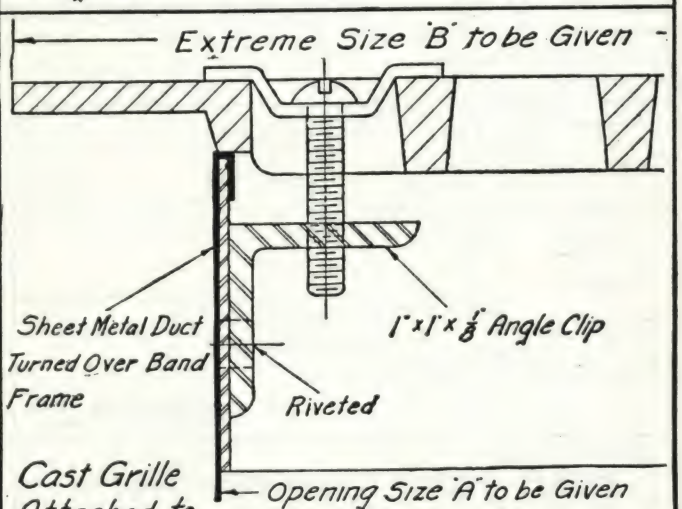
Cast Grille Attached to Reversed Frame with Angle Clips METHOD 18



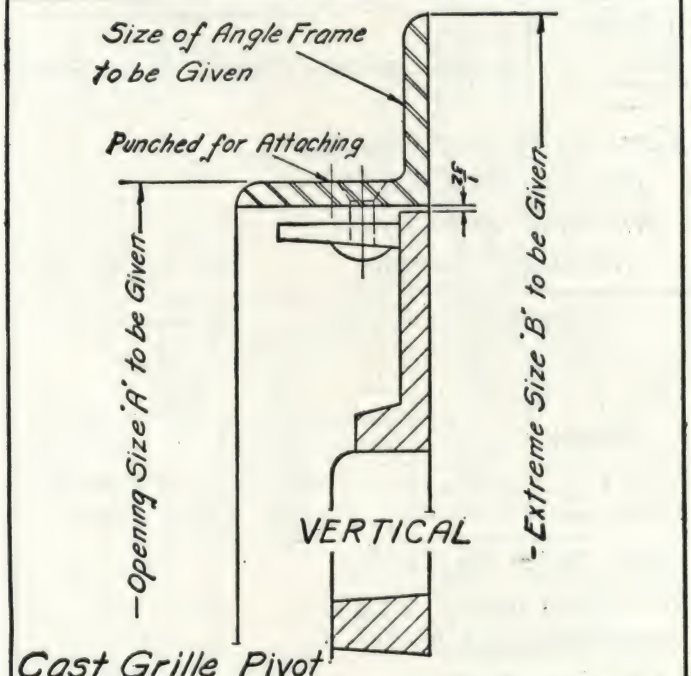
Cast Grille with Reversed Angle Frame on Back METHOD 19



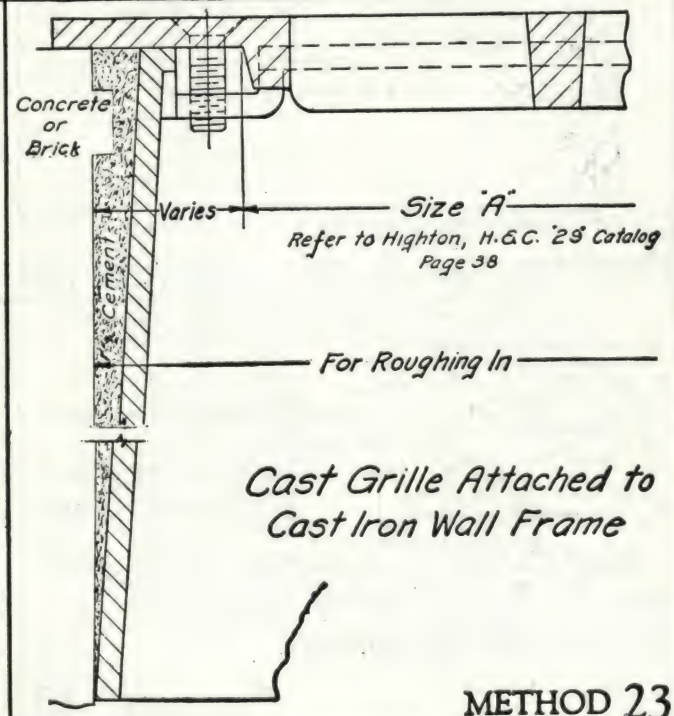
METHOD 20



Cast Grille Attached to Inside Steel Band Frame METHOD 21



Cast Grille Pivot Hinged to Angle Frame METHOD 22

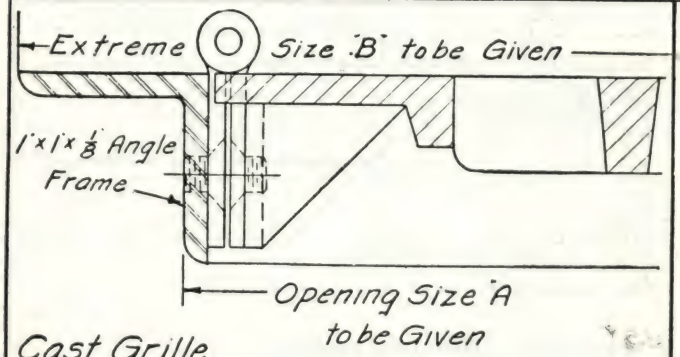


Cast Grille Attached to Cast Iron Wall Frame

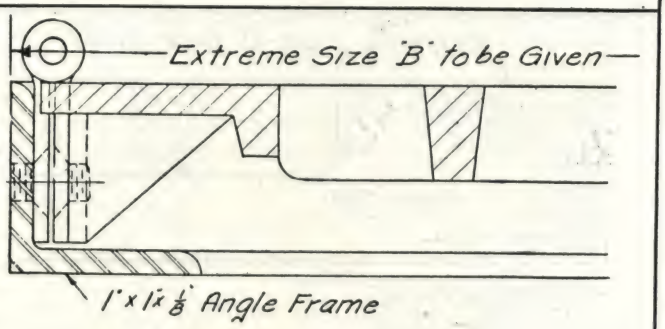
METHOD 23

Continued on next page

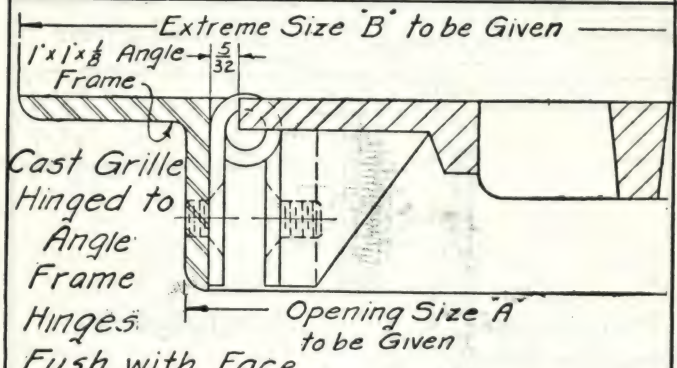
CONSTRUCTIONS AND METHODS FOR FASTENING HITONCAST CAST AND STAMPED GRILLES



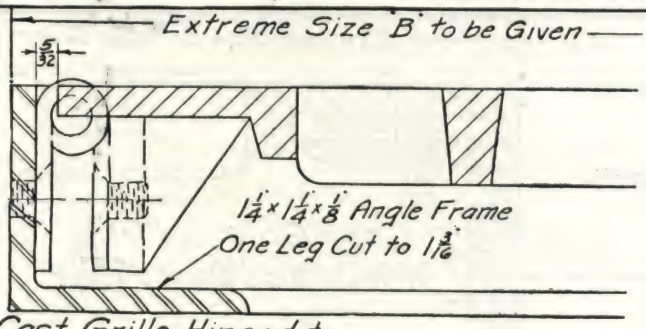
Cast Grille Hinged to Angle Frame METHOD 24



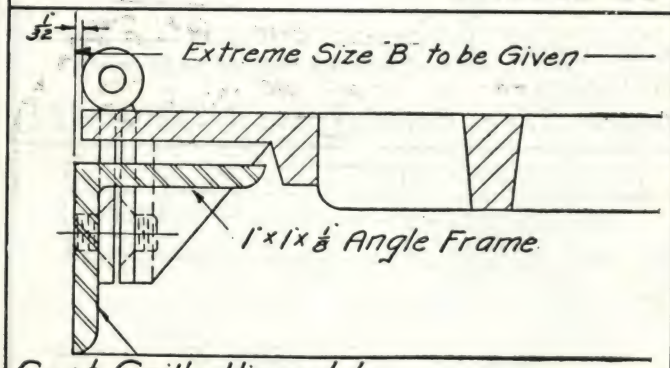
Cast Grille Hinged to Reversed Angle Frame METHOD 25



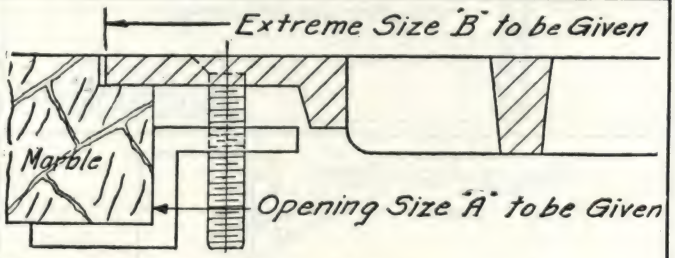
Cast Grille Hinged to Angle Frame Hinges Fush with Face METHOD 26



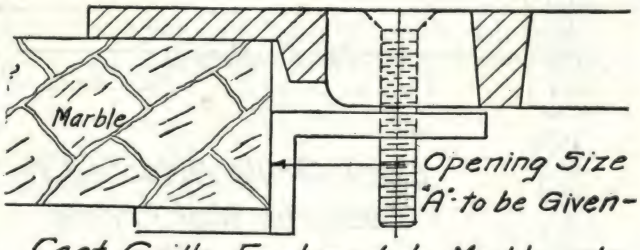
Cast Grille Hinged to Reversed Angle Frame Hinges Fush with Face METHOD 27



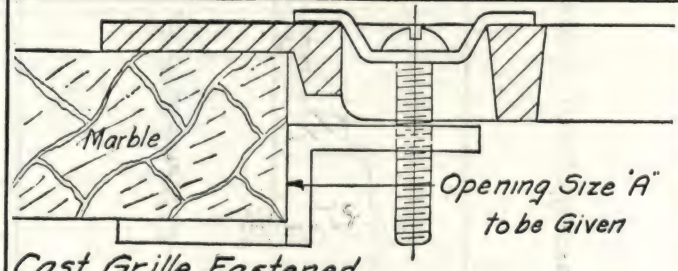
Cast Grille Hinged to Reversed Angle Frame METHOD 28



Cast Grille Fastened to Marble with "Z" Lugs Attached with Screw Through Margin METHOD 29



Cast Grille Fastened to Marble with with Z Lugs Attached with Screw Through Blocked Out Unit METHOD 30



Cast Grille Fastened to Marble with "Z" Lugs and Stamped Metal Block-out Caps METHOD 31

Continued on next page

REFERENCES

The leading architects and builders are using Highton Registers, Faces, Grilles, Screens, etc., where quality and service count, as you will note from the following list of buildings where they have been installed.

Connecticut

Building	Architect
Bridgeport Telephone Building, Bridgeport	R. W. Foote
Aetna Life Insurance Building, Hartford	James Gamble Rogers
Hartford County Building, Hartford	Paul P. Cret (Smith & Bassets, Assoc.)
Hartford National Bank & Trust Co., Hartford	Stone & Webster
Second Church of Christ, Scientist, Hartford	Isaac A. Allen & Son, Inc.
Sterling Memorial Library, New Haven	James Gamble Rogers

Georgia

First National Bank, Atlanta	Pringle & Smith

Illinois

Austin High School, Chicago	Board of Education
Barnard School, Chicago	Board of Education
Chandler Department Store, Chicago	E. O. Blake
Ed. Hines Hospital, Chicago	Private Plans
Evanston Hospital Nurses' Home, Chicago	H. B. Wheelock
Goldblatt Store, Chicago	A. S. Alschuler
Harrison & Wabash Building, Chicago	A. S. Alschuler
Hartman's Building, Chicago	A. S. Alschuler
Kelly High School, Chicago	Board of Education
Kozminski School, Chicago	Board of Education
Merchandise Mart, Chicago	Graham, Anderson, Probst & White
Michigan Lake Building, Chicago	A. S. Alschuler
Onahan School, Chicago	Board of Education
Tonti School, Chicago	Board of Education

Massachusetts

Dillon Field House, Boston	Coolidge, Shepley, Bullfinch & Abbott
Edison Building, Boston	Bigelow, Wadsworth, Hubbard & Smith
Harvard College, Boston	Coolidge, Shepley, Bullfinch & Abbott
Harvard Units Nos. 1 and 2, Boston	Coolidge, Shepley, Bullfinch & Abbott
Herald Traveler, Boston	Henry Bailey Allen
Manger Hotel, Boston	Funk & Wilcox
North Station, B. & M. R. R., Boston	Funk & Wilcox
Temple Israel, Boston	McLaughlin & Burr
Tower Building, Boston	Thomas James Company
U. S. Machinery Building, Boston	Parker, Thomas & Rice
Y. W. C. A., Boston	Shepard & Stearns
Deerfield Academy, Deerfield	Charles A. Platt

New Jersey

Building	Architect
Convention Hall and Theatre, Asbury Park	Ernest A. Arend and Warren & Wetmore
Newark & Essex Bank Building, Newark	J. H. & W. C. Ely
Y. M. C. A., Paterson	F. W. Wentworth
Trenton Central High School, Trenton	E. S. & L. C. Licht

New York

Kings County Hospital, Brooklyn	Leroy Ward
Elmira Telephone Building, Elmira	Voorhees, Gmelin & Walker
Myron Taylor Hall, Ithaca	Jackson Robertson & Adams
Anthony Campagna Residence, New York	Dwight J. Baum
Baptist Home for the Aged, New York	Augustus N. Allen
Broadway Temple, New York	Voorhees, Gmelin & Walker
Bronx Hospital, New York	Louis Allen Abramson
Childs Education Building, New York	Delano & Aldrich
Chrysler Building, New York	William Van Allen
Empire State Building, New York	Shreve, Lamb & Harmon
Guggenheim Dental Clinic, New York	York & Sawyer
Hunter College, New York	Thompson, Holmes & Converse
Jewish Theological Seminary, New York	Gehron, Ross & Alley
Eighth Avenue Subway Stations, New York	Board of Transportation
Riverside Church, New York	James Gamble Rogers
Temple Emanu-El, New York	Robt. D. Kohn (Chas. Butler & Clarence S. Stein, Assoc.)
Tudor City Apartments, New York	Fred F. French Company
Union League Club, New York	Morris & O'Connor
Western Union Telegraph Building, New York	Voorhees, Gmelin & Walker
Y. M. H. A., New York	Necarsulmer & Lehlbach
Pelham Memorial High School, Pelham	Hart & Shape

Ohio

Church of Christ, Scientist, Cleveland	Walker & Weeks
Medical Arts Building, Cleveland	Graham, Anderson, Probst & White

Pennsylvania

Pennsylvania Hospital, Philadelphia	Zantzinger, Borie & Medary

District of Columbia

Italian Embassy, Washington	
Accacia Mutual Life Insurance Building, Washington	Hoggson Brothers

Other Prominent Installations

Akron, Ohio
Firestone Tire Co.

Allentown, Pa.
Merchants National Bank

Atlanta, Ga.
Chandler Residence
Lombard Residence

Atlantic City, N. J.
Ritz Carlton Hotel

Attleboro, Mass.
Masonic Building

Baltimore, Md.
Gardenville School
Maryland Casualty Co.
Baltimore & Ohio R. R. Office Bldg.
Cardinal Gibbons Residence
Municipal Hospital
Aheb Shalem Temple
Popular Grove School
Hutzler Bldg.
Citizens National Bank Bldg.
Emerson Hotel
War Memorial Bldg.
Mercantile Bank
State Normal School
Park and Fire Board Bldg.
Baltimore City Morgue
Benesch Bldg.
St. Paul's Church

Bangor, Me.
Eastern Maine State Hospital

Boston, Mass.
Harvard Club
R. H. Stearns Bldg.
First National Bank
John Hancock Bldg.
South Terminal
Suffolk County Courthouse
Employers Liability Bldg.
Harvard Medical School
Hornblower & Weeks Bldg.
Federal Trust Co. Bldg.
Merchants National Bank Bldg.
Evans Memorial Hospital
Beacon Trust Co.
Old Colony Trust Co.
The Waterman Bldg.
Schraffts' Candy Store
New Health Bldg.
New Second Universalist Church
St. Paul's Church
Park Square Office Bldg.
Fenway Apartments
Federal Reserve Bank

Brookline, Mass.
Corey Hill Hospital

Buffalo, N. Y.
Marine National Bank
Buffalo City Hospital

Brighton, Mass.
St. Joseph's Academy
St. Elizabeth's Hospital

Cambridge, Mass.
Cambridge Hospital

Charleston, S. C.
Dime Bank & Trust Co.

Cleveland, Ohio
Cleveland Railway Co.
First Church of Christ, Scientist
Cleveland & Western Coal Co.
Leader-News Bldg.
Hanna Bldg.
Engineer's Bank Bldg.

Cortland, N. Y.
Cortland Theatre

Cumberland, Md.
Kelly-Springfield Tire Co.

Detroit, Mich.
Hotel Statler
Book-Cadillac Hotel

Fieldstone, N. Y.
E. A. Hoffman Residence

Fitchburg, Mass.
D. Frank Dillon Residence

Flint, Mich.
Genesee Bank

Glasgow, Scotland
Royal Hospital

Glen Cove, N. Y.
Geo. D. Platt Residence

Greeley, Colo.
Weld County Courthouse

Greenwich, Conn.
Stillman Rockefeller Residence

Hartford, Conn.
National Fire Insurance Bldg.
Supreme Court and Library

Haverhill, Mass.
Merrimack National Bank
Colonial Theatre

Lake Placid, N. Y.
Bank of Lake Placid

Lakewood, N. J.
Lakewood Hospital

Lewiston, Me.
Bates College

Louisville, Ky.
Inter-Southern Insurance Bldg.

Lowell, Mass.
Chalifoux Department Store

Mahanoy City, Pa.
First National Bank

Manchester, N. H.
Amoskeag Bank Bldg.
Manchester Savings Bank

Mattapan, Mass.
Boston State Hospital

Medford, Mass.
State Armory

Massena Springs, N. Y.
U. S. Aluminum Co.

Middlebury, Vt.
Middlebury College

Montclair, N. J.
Vincent S. Mulford Residence

Montpelier, Vt.
State Capitol

Montreal, Canada
Eaton Building
Montreal High School

Nashua, N. H.
Public Library
St. Joseph's Hospital
Memorial Hospital

Nashville, Tenn.
George Peabody College

Naugatuck, Conn.
N. Y., N. H. & H. R.R. Station

New York, N. Y.
Elks Home, Brooklyn
Woolworth Bldg.
Bellevue Hospital
New York Club
Lincoln Trust Co.
Metropolitan Museum of Arts
Hotel Ambassador
Roosevelt Home
Over 35 Public Schools

Oklahoma City, Okla.
Shidler School

Pawtucket, R. I.
Sayles Memorial Hospital

Philadelphia, Pa.
Girard Trust Co.
Bulletin Bldg.
Wanamaker Stores
Gimble Brothers Bldg.
Mount Sinai Hospital
Jewish Hospital

Pittsburgh, Pa.
Mellon National Bank

Pittsfield, Mass.
Pittsfield High School

Portland, Me.
Custom House
City Hall
Maine General Hospital

Providence, R. I.
State Armory

Richmond, Va.
Westhampton High School
Richmond Trust Co.

Salem, Mass.
Salem Hospital

Springfield, Mass.
Hampden County Courthouse

St. Louis, Mo.
Scruggs-Vandervoort Dept. Stores

Syracuse, N. Y.
Park Hill School

Torrington, Conn.
Charles Hungerford Hospital

Valley Forge, Pa.
Bishop White Memorial Chapel

Washington, D. C.
New Bureau of Engraving and Printing
Hamilton Hotel
Eastern High School

Worcester, Mass.
Greendale Hospital
Bancroft Hotel

HITONCAST

GRILLES & REGISTERS

H&C

HIGHTON

ESTABLISHED 1898

INDEPENDENT REGISTER & MFG. CO.

Registers, Ventilators and Grilles

CLEVELAND, OHIO

Products

WROUGHT STEEL REGISTERS; REGISTER FACES, wrought steel and "FABRIKATED"; GRILLES, "FABRIKATED," wrought steel, brass or bronze; STEEL ANGLE FRAMES.

Also Wall Registers for use in the baseboard, Floor Borders, Adjustable Ceiling and Wall Ventilators, Smoke Pipe Registers and Pipeless Furnace Gratings.

Special Designs and Finishes

Our new factory is equipped with modern facilities for making many variations from standard designs, styles, sizes and finishes of ventilating specialties. Prime coat, ready for painting, japan, imitation oak, lacquer or electroplate are usual finishes for registers, faces and grilles.

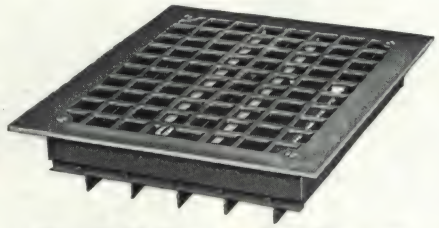
Our new catalogue containing many standard designs, with tables and finishes, will be sent upon request.

Designation

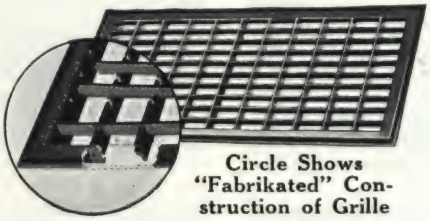
A "register face" is the open grille only without valves. It is the front of the register.

A "register" is this register face, to which is attached a valve or valves to open and close to control air flow.

INDEPENDENT



No. 12-75 Wrought Steel Register
For operation by lever, key-lock, pole or chain and pulleys



Circle Shows "Fabrikated" Construction of Grille

Bottom View of "Fabrikated" Grille
Showing how cross supports afford maximum strength, and minimum surface to flow of air

A "grille" is a register face without lever slot or corner screw holes, thus making the design continuous. Screw holes can be placed in the rim if desired.

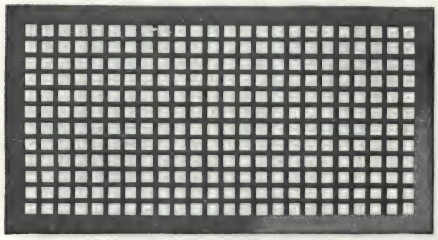
No. 12-75 Wrought Steel Register

Recommended for floor, wall or ceiling. Supplied promptly in practically any size or finish. For large sizes for use in floor, or where large open area or extra strength is required, we recommend "Fabrikated" registers, as described and illustrated in our catalogue. Lock registers, operated by a key can be furnished in either style.

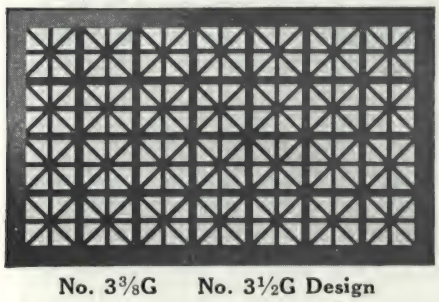
"Fabrikated" Register Faces and Grilles

"Fabrikated" has an open area of approximately 82% in every face or grille of every size, comparable with from 50% to 75% found in the usual patterns and styles. A smaller size may be used to secure the same open area, or the same size will give much greater capacity.

"Fabrikated" construction is unusually strong. The outer frame is welded to form a solid piece, and the grille is made up of steel strips set on edge, the same as girders of a bridge. Faces are rigid, do not sag or change shape in service, and the possibility of breakage is practically eliminated. "Fabrikated" construction obviates the necessity of special patterns for each size. Faces or grilles can be furnished, in practically any size and finish desired, with little delay.



Nos. 50, 75, 100 and 875 Square Design



No. 3⅜G No. 3½G Design

Wrought Steel Grilles

(Grilles also made of brass and bronze).

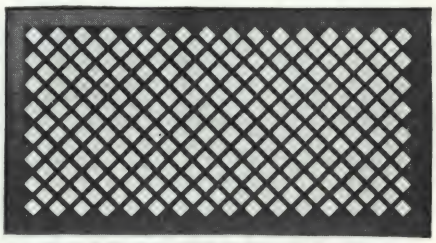
These grilles are perforated from sheet metal to sizes as specified. They are made to order and in any finish. Standard thickness of No. 12 gage (approximately ⅛ in.) is recommended.

Grilles can be made into complete registers, with air valves. Inquiries should include: quantity and finish, style of perforation, opening and over-all size, and location and number of screwholes.

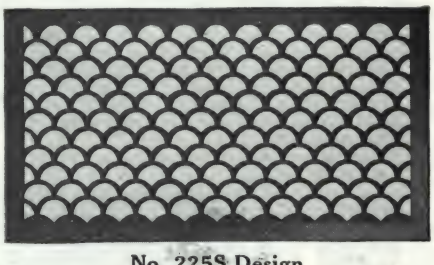
WROUGHT STEEL GRILLE OPENINGS

No.	Openings, in.	Bars, in.	Multiples, in.	Open area, per cent
3⅜G	3x3	⅜	3⅜	45 to 50
3½G	3x3	½	3½	45 to 50
75D	¾	¼	1 7/16	57
225S	Width, 1¾	¼	*Width, 2	67
	Height, 1 7/16	¼	*Height, 2¼	
50	½	¼	¾	45
75	¾	¼	1	57
875	⅞	¼	1⅛	61
100	1	¼	1¼	64

*Center to center measurement. Specify which dimension is height.

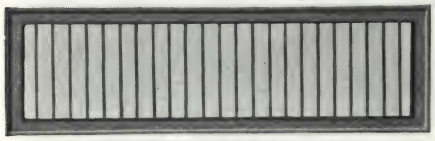


No. 75D Diagonal Square Design



No. 225S Design

No. 201BE Grille in Special Design



No. 201BE Special Design

Showing bevel edge angle frame which can be furnished with any "Fabrikated" grille not exceeding 30 in. in length or width

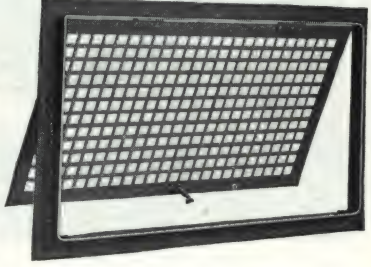
"Fabrikated" construction. Made in practically any size or finish. Made with angle steel frame and interior steel bands, approximately ⅛ in. wide and of varying depths depending on size and use. Bars 1 in. center to center. ⅞ in. by any length openings. 87% open area.

Grilles can also be made in complete registers with valves or louvres. State over-all or opening sizes, finish and quantity.

Angle Frames

Any of our grilles can be furnished with steel angle frames to which they may be hinged or screwed.

Standard sizes of angle frame material; ⅞x⅞x⅛ in. and 1¼x1¼x⅛ in.



Angle Frame

THE METALACE CORPORATION

EXECUTIVE OFFICE AND PLANT
60 K Street, SOUTH BOSTON, MASS.

SALES AND SERVICE OFFICES

SOUTH BOSTON, MASS. 60 K Street
NEW YORK, N. Y., 101 Park Avenue
CHICAGO, ILL., 14 E. Jackson Boulevard
SAN FRANCISCO, CAL., 7 Front Street

Product

METALACE WOVEN GRILLE, made on power looms by the diagonal strand process. A new and unique grille material.

Uses

All kinds of grille work for heat transmission, ventilation and decorative open paneling everywhere. Adaptability ranges from light weight panels in radiator enclosures up to heavy ornamental grilles in large wall openings, bank caging, guards, and fencing. Among the many uses are the following:

Radiator enclosures
Built-in radiators
Unit heaters
Ventilating ducts
Screen door guards
Window guards
Cashier cages
Metal beds and chairs
Baskets, hampers
Fire screens
Electric refrigerators
Kitchen cabinets
Elevator cabs
Loud speakers
Radio cabinets
Automobile radiator guards

Characteristics

The outstanding features of the remarkable grille are *beauty, strength* and *convenience.*

It is *strong* to the end of indestructibility—first because it is made of extremely tough metal strands, and second because the unique process by which it is woven firmly interlocks the strands so they cannot be distorted or spread.

The rare *beauty* in all of its designs harmonize with any ornamental setting for grilles.

One of the extraordinary advantages in using Metalace as a grille is that the material may be cut on the premises to exact sizes to meet specifications, thus effecting great convenience and time saving, particularly where grilles may be set with wood moulding.

The *convenience* it offers to contractors and grille makers is of special importance. Shipped in rolls, it may be cut easily to meet any specifications and attached with simplicity.

Designs

There are eleven designs shown on these pages. As the need presents itself others will be produced and supplied, because the possibilities in design are practically unlimited. A Metalace grille can be produced for every requirement.

Material

Cold rolled steel, bronze and aluminum are used. Any of these metals will be supplied as specified.

Distribution

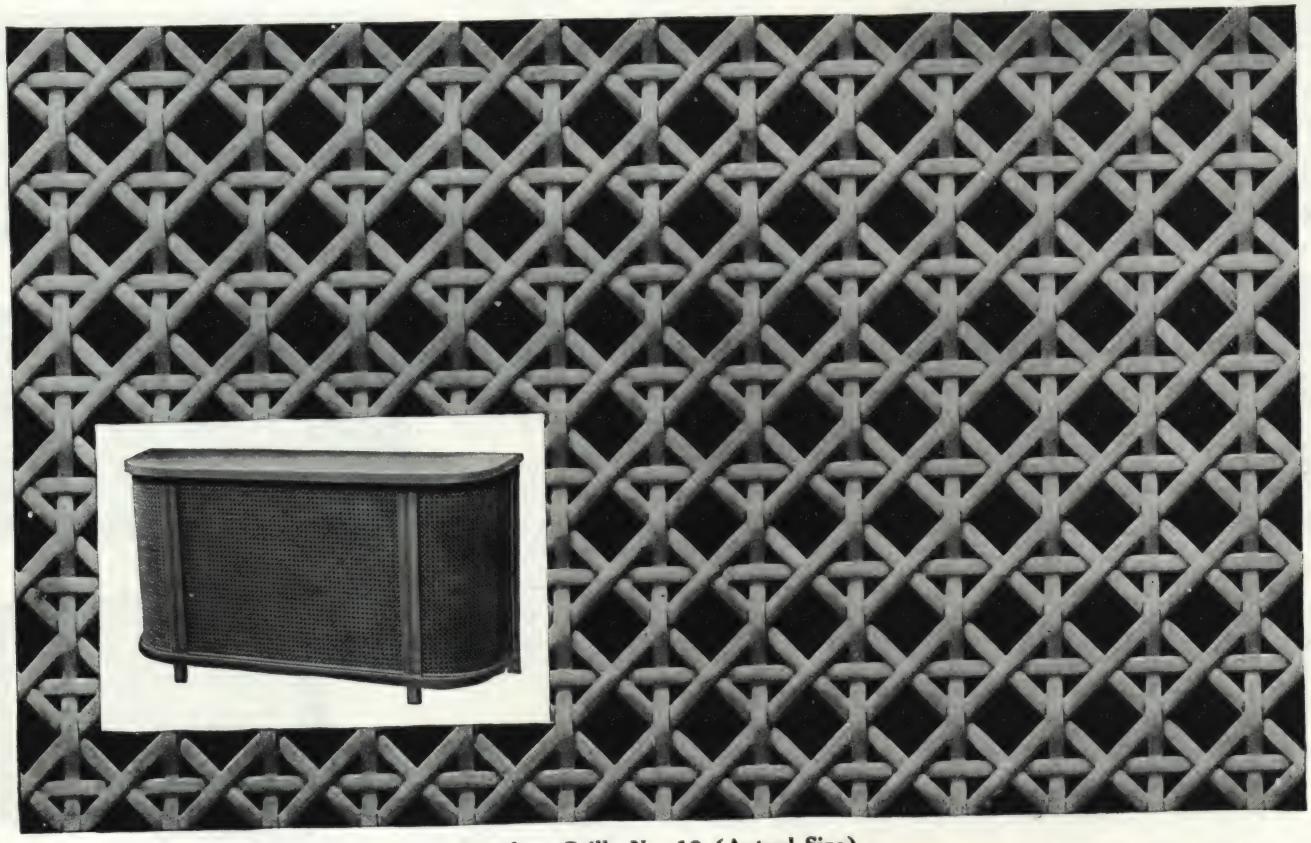
Wire and grille dealers in principal cities stock Metalace in rolls or cut to size, available for immediate delivery. Rolls are 3 and 6 ft. wide, and 25 and 50 ft. long. Most grille manufacturers and radiator enclosure makers use Metalace regularly and can supply it on demand.

Samples and Catalogues

Samples and descriptive literature may be secured from distributors and dealers or from any of the Company's offices on request.

Specifications

Information on wire sizes, shapes and methods of installing are shown on third page following. Any further information will be gladly supplied upon request.



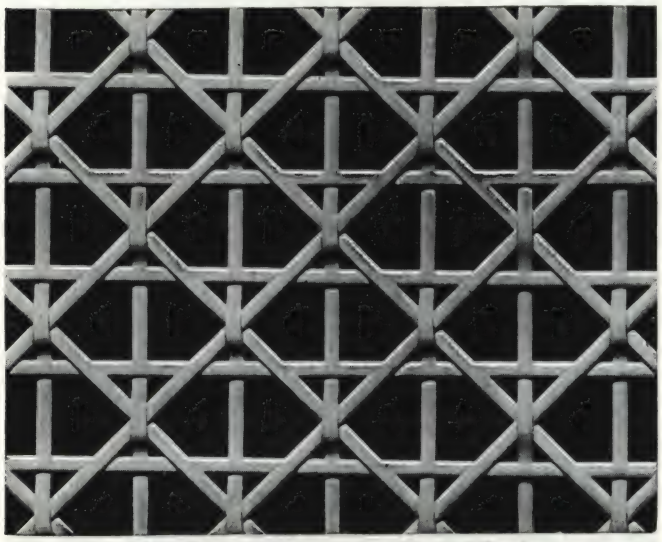
Metalace Grille No. 10 (Actual Size)

Continued on next page

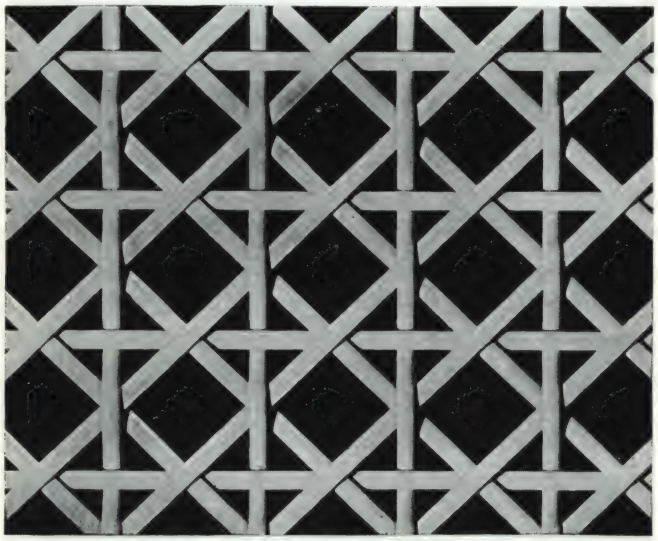
METALACE—LIGHT AND MEDIUM WEIGHT GRILLES

These patterns and No. 10 on previous page are for light and medium weight grilles used in radiator enclosures, built-in radiators, unit heaters and small wall vents.

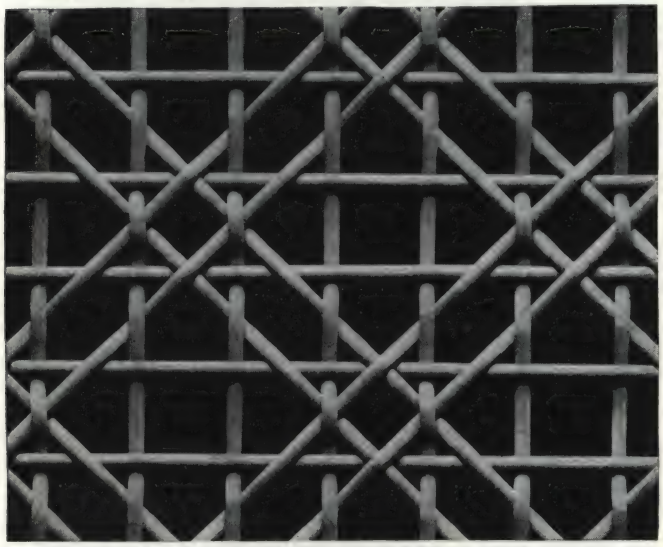
Free air spacing in these patterns, from the closely woven to the open woven, ranges from 40% to 70%. The concealing properties are excellent, due to the diagonal crossing of the strands.



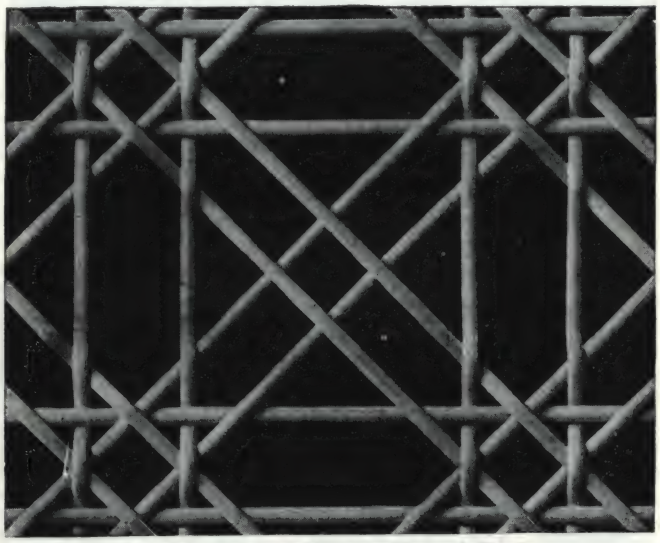
Metalace Grille No. 12 (Actual Size)



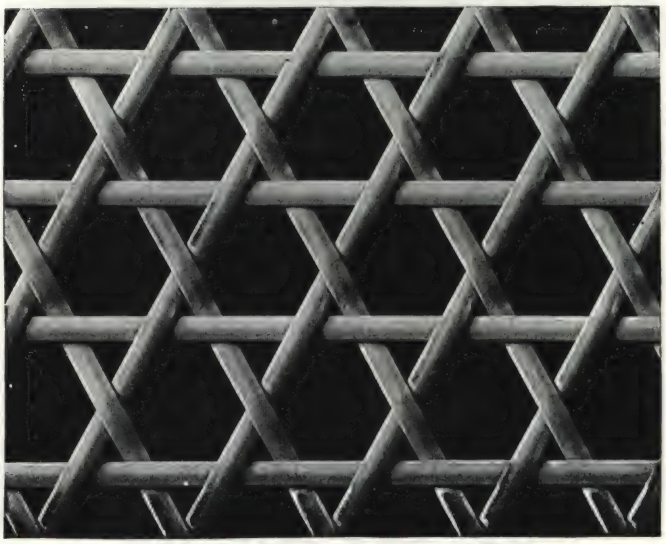
Metalace Grille No. 41 (Actual Size)



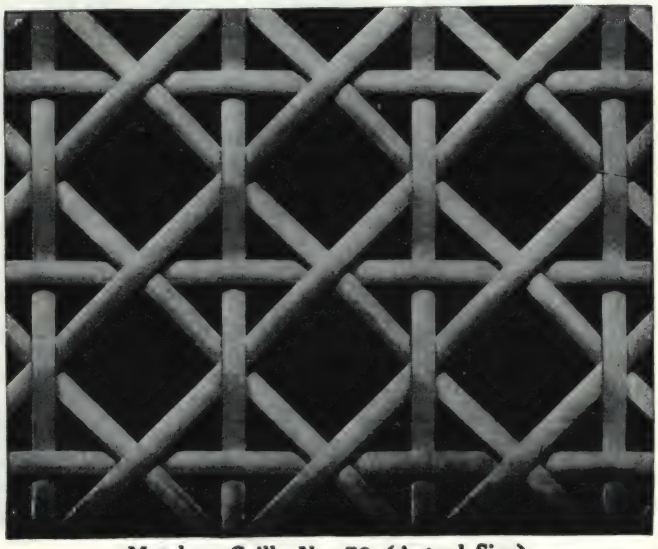
Metalace Grille No. 30 (Actual Size)



Metalace Grille No. 40 (Actual Size)



Metalace Grille No. 50 (Actual Size)



Metalace Grille No. 70 (Actual Size)

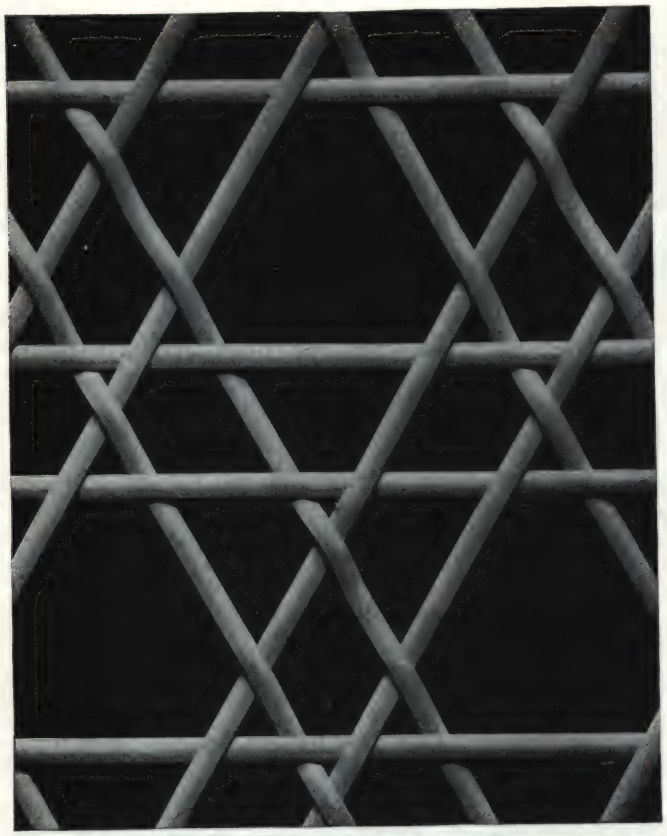
Continued on next page

METALACE—HEAVY GRILLES

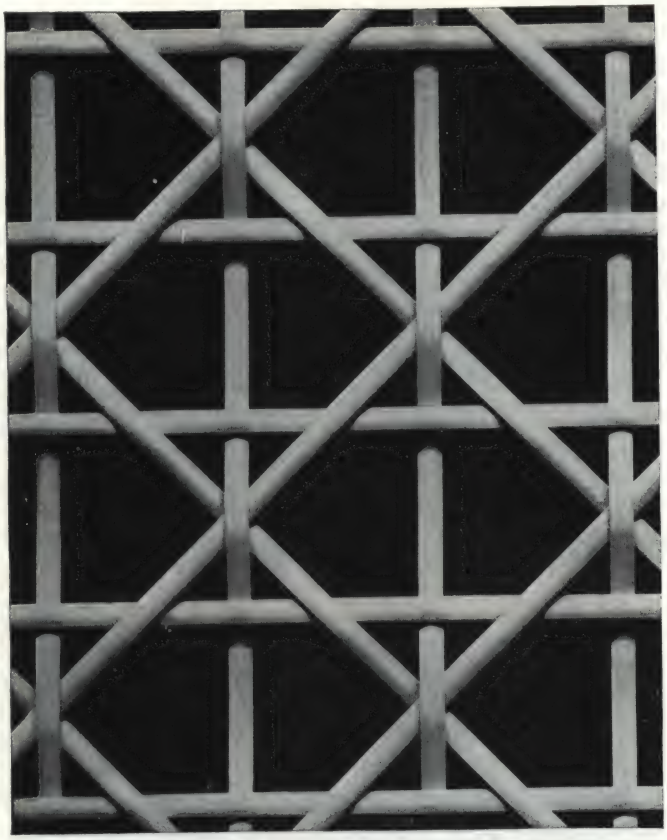
The heavy grilles displayed on this page are for large wall openings, partitions, window and door guards and pipe organ grilles.

Air spacing is very liberal, ranging from 60% to 70%.

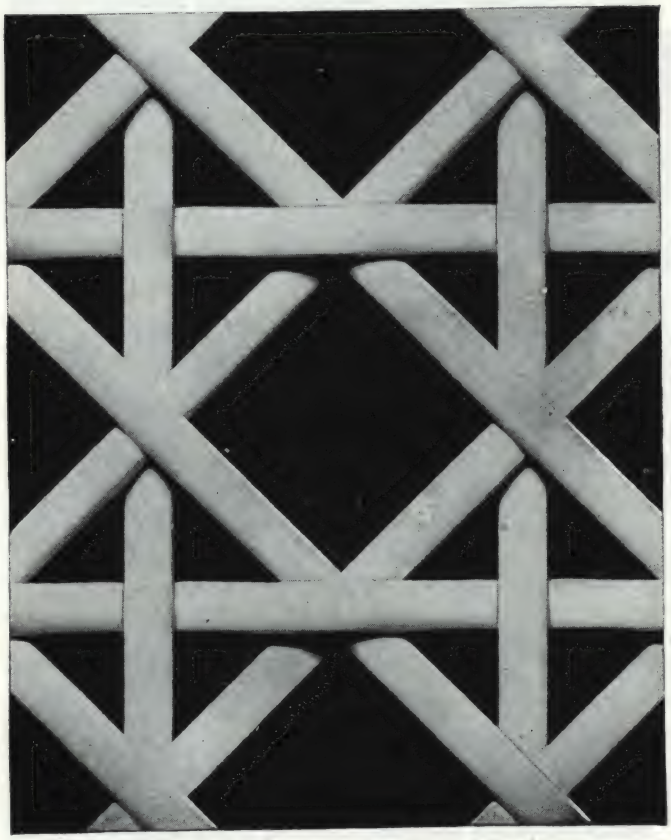
They are extremely strong and rigid.



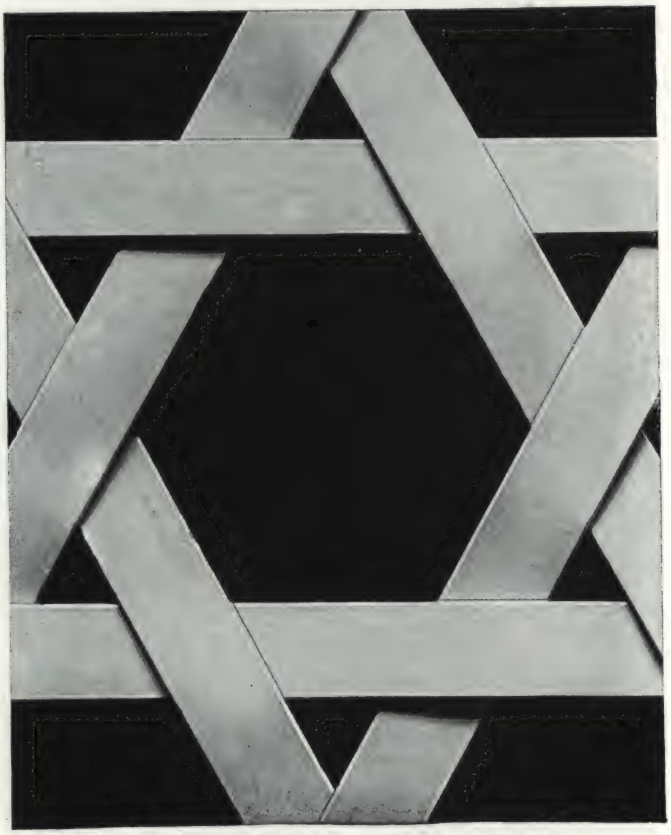
Metalace Grille No. 65 (Actual Size)



Metalace Grille No. 90 (Actual Size)



Metalace Grille No. 110 (Actual Size)



Metalace Grille No. 143 (Actual Size)

Continued on next page

Installation

On Metal frames Metalace can be welded, soldered, riveted, bolted, clamped or plied by any of the usual methods suitable to metal.

On wood construction it is fastened to surface with staples and edges covered with moulding—a very simple procedure.

Below are shown some of the more popular methods employed for installing Metalace. Standard specifications showing many of the methods of installation will be supplied upon request.

Any grille manufacturer or cabinet maker can apply Metalace conveniently and economically.

Painting and Finishing

Always clean the grille thoroughly before applying any finish.

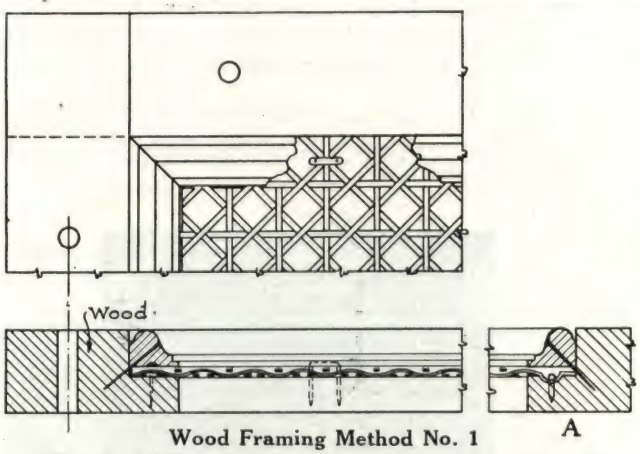
Steel Metalace should always be finished to prevent corrosion, and give proper decorative effect. It may be painted or lacquered by usual methods or electroplated in nickel, chromium, copper, brass, silver or gold.

Bronze Metalace does not require any finish although beautiful effects can be produced by oxidizing and buffing the high spots.

Aluminum Metalace may be treated as steel with paint or lacquer.

METALACE DIMENSIONS

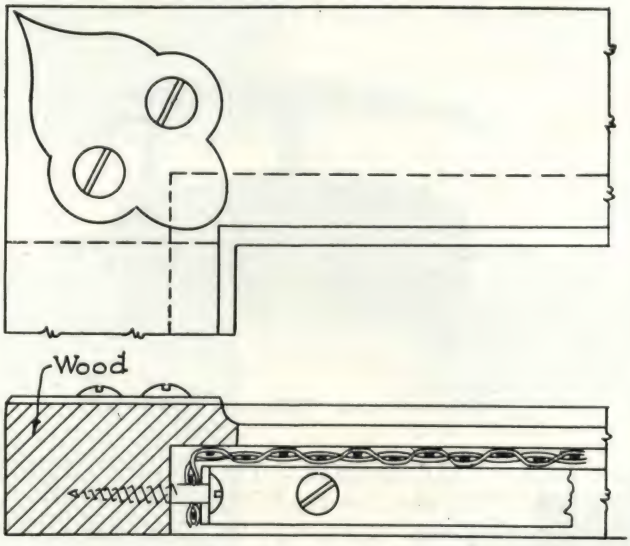
Grille No.	Wire width, in.	Wire thickness, in.	Wire shape	Code name
10	5/64	.025	Face curved	Grusta
12	5/64	.025	Face curved	Frenda
30	5/64	.025	Face curved	Ioltua
40	5/64	.025	Face curved	Rumlia
41	1/10	.034	Face curved	Brastia
50	1/8	.040	Face curved	Costia
65	1/8	.040	Face curved	Borica
70	1/8	.040	Face curved	Yurvia
90	1/8	.040	Face curved	Unvera
110	1/4	.052	Face curved	Sangura
143	1/2	.052	Flat	Oxepra



Wood Framing Method No. 1

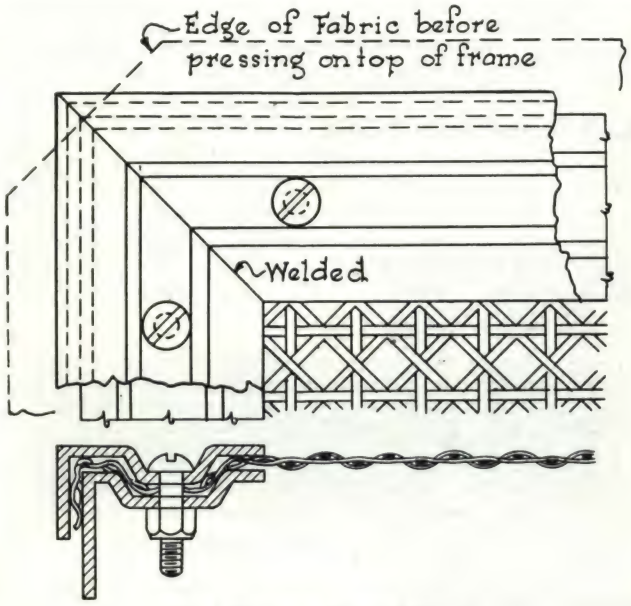
For Small Panels—One dimension not over 14 in. The frame is wood mortised at corners. Fabric is cut to fit loosely in frame and double pointed tacks used to fasten to wood. Corner moulding is nailed over edge of fabric. This method does not apparently stretch the fabric.

For Large Panels—A modification is shown at "A." Here is a rounded groove in the ledge on which the fabric rests. When the tacks are driven and the fabric is drawn to the bottom of this groove, the fabric is stretched.



Wood Framing Method No. 2

The frame is wood mortised at corners and held together with fancy corner plates. The fabric is bent over at the edges with 5/8-in. margin, the face of the fabric being slightly smaller (1/8 in.) than the frame. Flat strips are laid against the turned edges of the fabric and screwed to the frame stretching the fabric. The top edge of the frame tends to prevent the fabric pulling out of the strips. The fabric may be bound with U-shaped strips of 24-gauge steel 3/8 in. wide drilled for screws about 8-in. centers. Allow about 1/8-in. clearance for stretching.

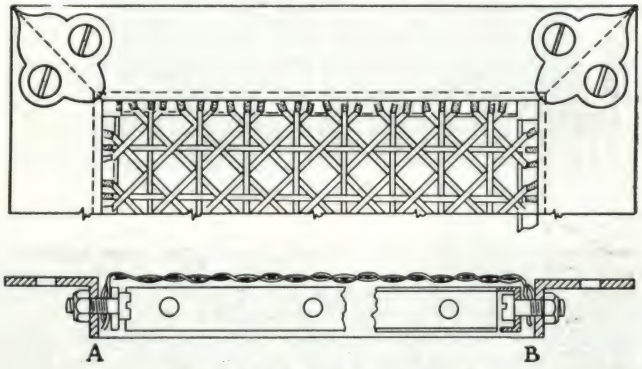


Metal Framing Method No. 3

The frame is composed of double special angles of unequal lengths. The inner frame has a comparatively large depression in its top face and the outer frame has a depression which loosely fits this depression.

The corners of the fabric are cut away and the edges bent over with a 5/8-in. margin. The distance across the face of the fabric should just fit the inner frame.

The fabric is laid over the inner frame and when the outer frame is pressed down over it and bolted, it forces the fabric into the depression of the inner frame and stretches it.



Metal Framing Method No. 6

Outside frame of 1x5/8-in. angle mitered at corners and held together by fancy corner plates screwed on. Fabric is bent over on edges with 5/8-in. margin so that face of grille is slightly narrower than frame in both directions.

Two methods are shown to bolt on fabric, "A" and "B." "A" shows flat straps, and "B" channel straps which are stiffer. When the straps are bolted up the fabric is stretched.

ESTABLISHED 1857

L. J. MUELLER FURNACE CO.

Makers of Registers, Grilles and Ventilators

GENERAL OFFICES

337 So. Second Street, MILWAUKEE, WIS.

BRANCH OFFICES

ST. LOUIS, MO., 4246 Forest Park Boulevard
MINNEAPOLIS, MINN., 631 Third Avenue, So.
MEMPHIS, TENN., Medical Arts Building
CHICAGO, ILL., 211 West Wacker Drive
DETROIT, MICH., 2280 Fourteenth Avenue
SEATTLE, WASH., 2401-5 Utah Street
BALTIMORE, MD., 909 Cathedral Street
SALT LAKE CITY, UTAH, 601 McIntyre Building
LOS ANGELES, CAL., 5450 West Boulevard

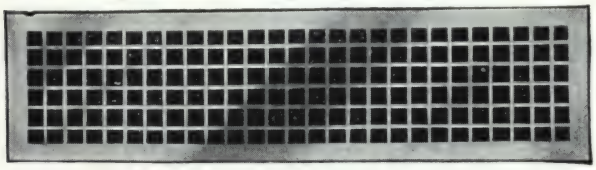
Products

REGISTERS; GRILLES; MUSHROOM VENTILATORS.

For Mueller Gas-Fired Warm Air Furnaces, Gas-Fired Steam and Hot Water Boilers and Air Conditioning Systems, see Manufacturers' Index.

Cast Iron and Steel Grilles

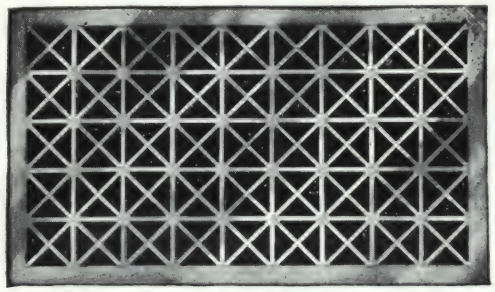
Can be made in any size and finish. Some sizes carried in stock. Any size can be made to order. When ordering, specify whether dimensions are size of opening or extreme size of grille. Can be furnished curved if desired. Also furnished in sheet brass or bronze.



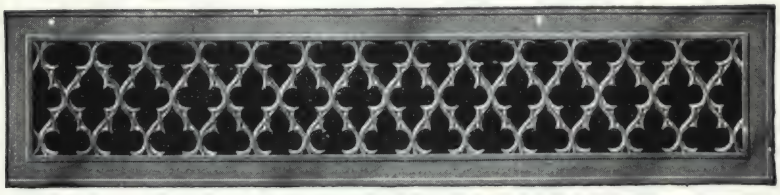
Cast Iron or Steel Grille

Special Design Grilles

Below are shown two of the many special design grilles that we manufacture, in cast iron, brass or bronze. Send specifications for any grilles desired, for prices.



One of Many Special Design Grilles



Special Design No. 258

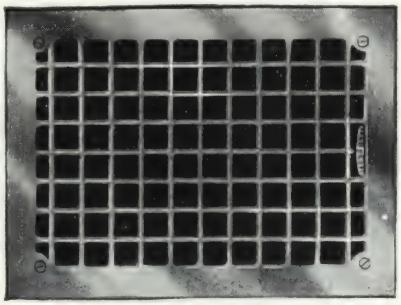
Wire Grilles

Wire grilles made in many different styles, sizes and finishes. Prices on application.

Floor Registers

Plain lattice design—semi-steel construction—boxes and valves of sheet steel, faces cast of semi-steel. These registers have great strength and are unusually neat in appearance.

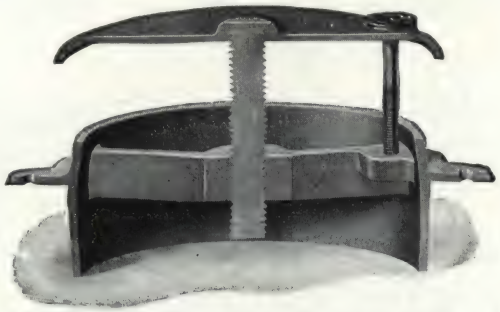
Carried in stock in all standard sizes and finishes. Can be made to special order in any size. Prices will be quoted on application.



Floor Register

Mushroom Ventilators

For use in schools, theaters, churches, and public buildings. Easily adjusted to distribute an equal volume of air.



Perspective of Mushroom Ventilator

Advantages — The Mueller Mushroom Ventilator has the following advantages: positive locking feature, no depression in cap to collect dirt, no setscrew projecting; easy, quick and permanent adjustment.

Carried in five sizes: 4, 5, 6, 8 and 10-in. diameter.

Catalogue and Prices

Upon request we will furnish illustrated catalogue of our complete line of registers, ventilators and grilles. Prices on odd sizes of registers and grilles, also special design grilles will be submitted on application.

TUTTLE & BAILEY MFG. CO.

ESTABLISHED 1846

Founders of the Register and Grille Industry in America

441 Lexington Avenue, NEW YORK, N. Y.

BRANCHES

BOSTON, MASS., 36 Portland Street
CHICAGO, ILL., 407 So. Dearborn Street
KANSAS CITY, MO., 704 East 18th Street
LOS ANGELES, CAL., 2105 So. San Pedro Street

Representatives in all Principal Cities of the United States

Products

REGISTERS, GRILLES, VENTILATORS, of stock or special design.

For our Radiator Cabinets and Shields, see Manufacturers' Index.

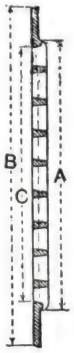
Ferrocraft Cast Grilles

"Ferrocraft" is our name for certain cast products made exclusively in our foundries. It applies to our special cast work and is registered in the United States Patent Office.

These grilles can be cast in iron, bronze, brass, aluminum or monel metal, and the precision of our castings is enhanced by hand chasing for perfect reproduction of the design.

Standard sizes are offered in Plain Lattice design, in Store Front grilles and in Sanitary design, although these may be had also in special sizes.

All other designs are made to the dimensions specified.



To Order Ferrocraft Cast Grilles—Specify

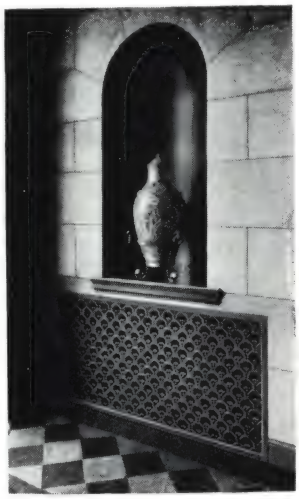
Grilles (registers have bottoms and louvres).

Material—Cast: iron, bronze, brass, aluminum or monel metal.

Design—If special, forward copy of architect's specification or detail.

Size—Dimensions given will be considered *opening size* unless otherwise explained. An exact extreme will be estimated and furnished only if specified.

Use—Whether for floor, wall or ceiling. (Floor grilles are made heavier.)



Finish—In absence of specification we quote on and apply *priming* coat. If electroplate is ordered without mention of color or sample, we furnish *statuary bronze* plate.

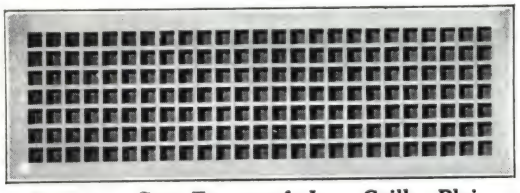
Drilling if required—No screw holes are drilled in rims unless ordered; specify location *only* if important.

Location of handhole doors and hinges—if required.

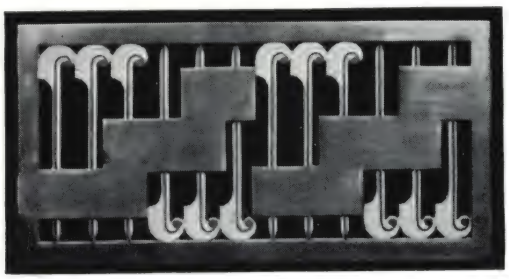
Radius of curved grilles—(Explain if dimensions given are taken along chord or arc); state if face of grille is to be convex or concave and indicate which is the curved dimension.

Which dimension is "height"—For all designs other than plain lattice so we will know which way grille is to set.

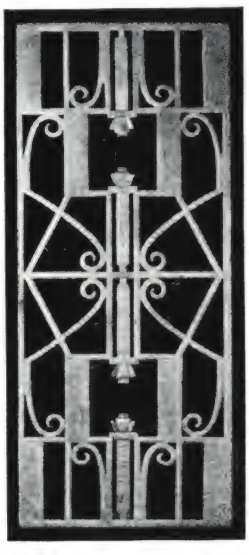
T&B Design No. 600



Style 1. Cast Ferrocraft Iron Grille, Plain Lattice, Standard 7/8-in. Mesh



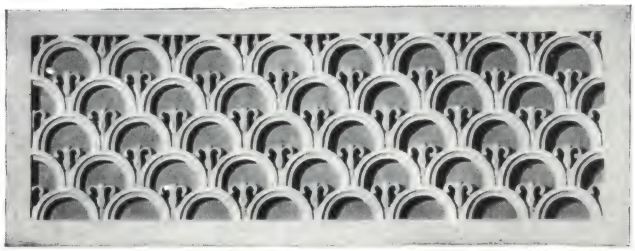
T&B Design No. 603



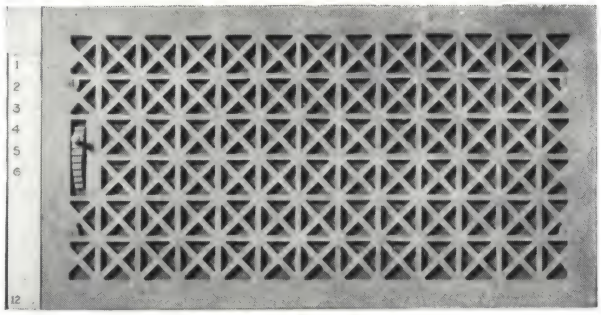
T&B Design No. 602

Continued on next page

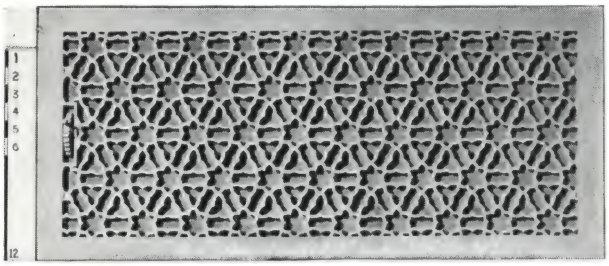
Popular Special Designs for Ferrocraft Cast Grilles and Registers



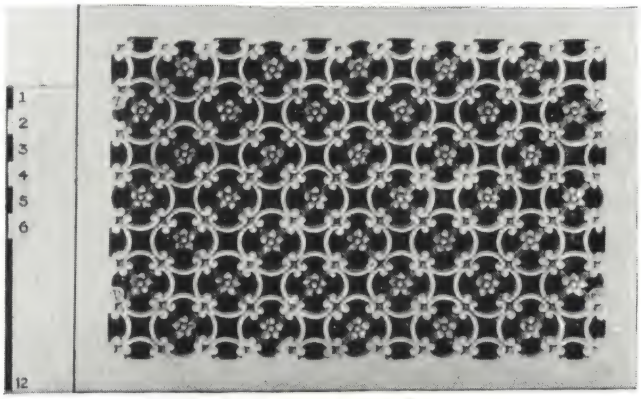
T&B Design No. 50



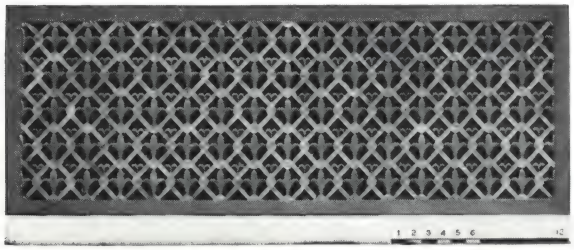
T&B Design No. 43
T&B Design No. 42 (with Buttons)



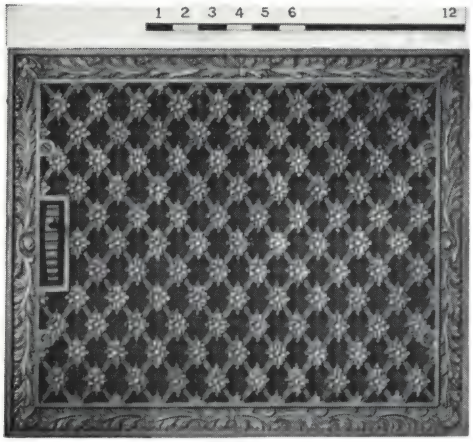
T&B Design No. 10



T&B Design No. 95



T&B Design No. 121



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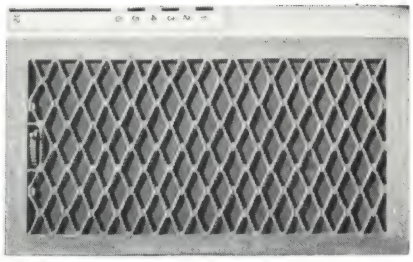
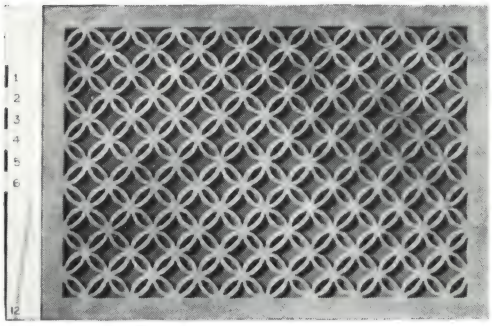
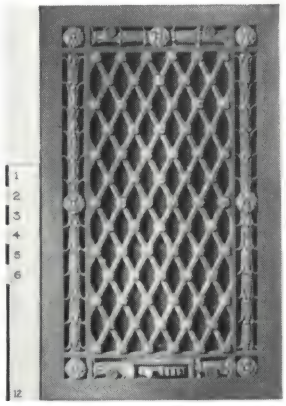


T&B Design No. 19

T&B Design No. 113



T&B Design No. 33



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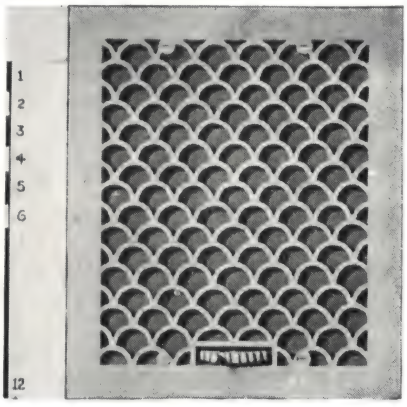

T&B Design No. 153

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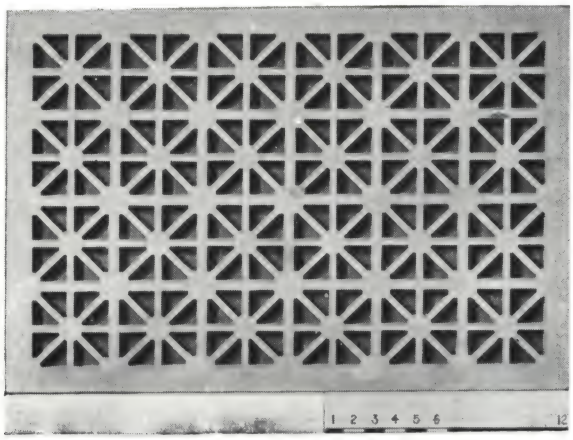

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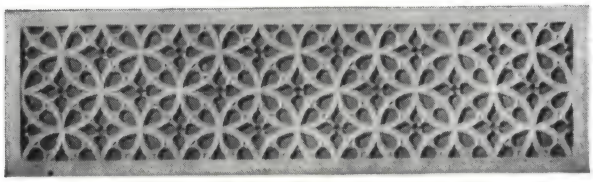

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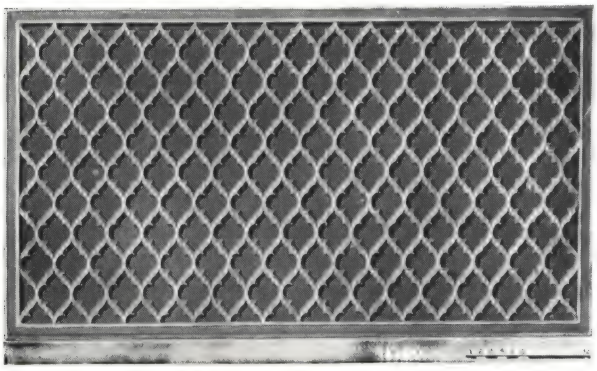

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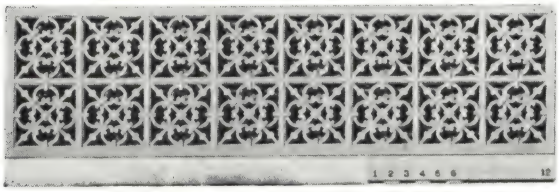
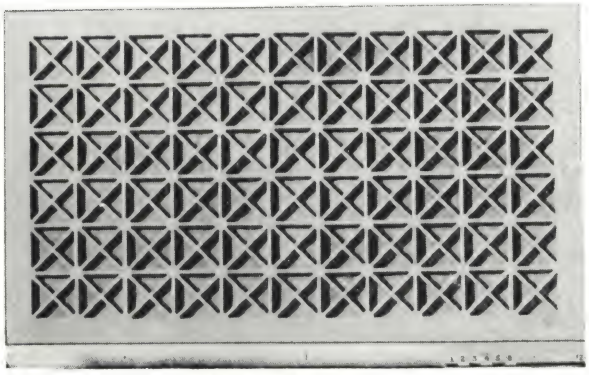


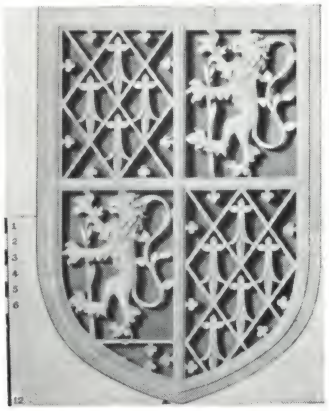
T&B Design No. 335



T&B Design No. 381

Standard Patterns

We have standard patterns for the five designs shown below in the dimensions indicated. These designs in these sizes, requiring no new pattern work, can therefore be produced at very reasonable prices.

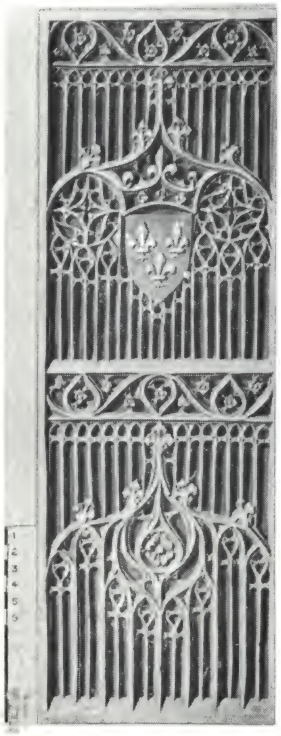


T&B Design No. 108
Opening Size, 15x22⅝ in.
Approximate extreme size, 17¾x25 1/16 in.

T&B Design No. 109
Opening Size, 15x22⅝ in.
Approximate extreme size, 17¾x25 1/16 in.

Right:

T&B Design No. 296
Made in the following Opening Sizes: 14, 24, 30, 36, 48, 60, 72 and 92 in. Diam.



T&B Design No. 126
Approximate extreme size, 14⅜x43⅜ in.

T&B Design No. 238
Approximate extreme size, 25¼x52 in.

Our catalogue—"Grilles"—contains many more designs and "How to Install"

Continued on next page

Gordon Adjustable Frames

Gordon Adjustable Frames for a perfect joint around grilles at ducts—simplify installation. (Ask for "Grilles" Supplement No. 3.)

Stamped Metal Grilles

Steel, bronze, brass, aluminum or monel metal.

Rims will not be drilled unless so ordered.

Finishes are priming coat, black or white japan, tanbos or electroplate in any standard finish or to match sample.

Unless ordered otherwise Stamped Bronze Grilles will be finished in "Statuary"—Stamped Brass Grilles polished—Stamped Aluminum and Monel Metal Grilles without polishing.

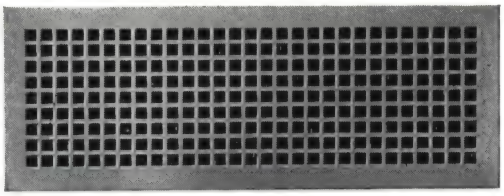
Specify Daylight "C" according to Table.

If Opening Size specified does not agree with "C" as in Table, next smaller Daylight "C" will be furnished.

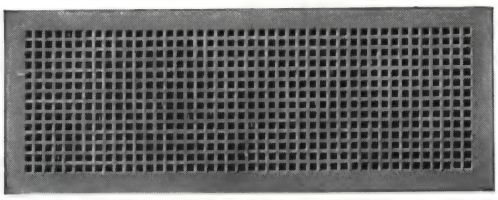
If Extreme "B" is specified and also Opening not agreeing with "C" as in table, one pair of rims may be wider than the other.

If Extreme Size "B" only is specified we will use our judgment in selecting the Daylight Size "C," in which case one pair of rims may work out wider than the other pair.

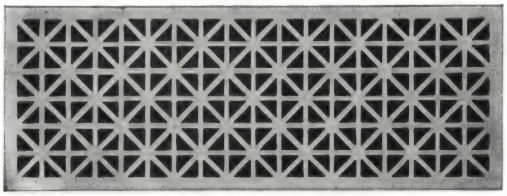
If Daylight Size "C" or Opening Size is specified, and Extreme Size "B" is not stated, the width of the rims will vary according to our judgment, but will be of even width all around.



Style "01" Standard ⅞-in. Square Mesh Grille



Style "02" ½-in. Square Mesh Grille
Style "03" ½-in. Diagonal Mesh Grille *(Not illustrated)*



Style "04" Grecian Mesh Grille 3⅞ In. Between Centers

DAYLIGHT OPENINGS "C" FOR STEEL GRILLES OF THE ABOVE DESIGNS

Number of punch holes or units	Size of opening "C," in. Styles 01	02	03	04	Number of punch holes or units	Size of opening "C," in. Styles 01	02	03	Number of punch holes or units	Size of opening "C," in. Styles 01	02	03	Number of punch holes or units	Size of opening "C," in. Styles 01	02	03	Number of punch holes or units	Size opening "C," in. Style 02	Number of punch holes or units	Size opening "C," in. Style 02
1	27/32	1½	1 3/32	3 1/2	25	26 1/8	17	24 7/16	49	51 3/8	33 1/2	47 3/4	73	76 21/32	50	71 3/32	98	67 3/16	122	83 11/16
2	1 29/32	1 3/16	2 1/16	7 3/8	26	27 5/32	17 11/16	25 13/32	50	52 7/16	34 5/16	48 23/32	74	77 23/32	50 11/16	72 1/16	99	67 7/8	123	84 3/8
3	2 5/16	1 7/8	3 1/32	11 1/4	27	28 7/32	18 3/8	26 3/8	51	53 1/2	34 7/8	49 11/16	75	78 25/32	51 3/8	73 1/32	100	68 9/16	124	85 1/16
4	4	2 9/16	4	15 1/8	28	29 9/32	19 1/16	27 1/32	52	54 17/32	35 5/16	50 21/32	76	79 27/32	52 1/16	74	101	69 1/4	125	85 3/4
5	5 1/16	3 1/4	5	19	29	30 5/16	19 3/4	28 5/16	53	55 19/32	36 1/4	51 21/32	77	80 7/8	52 3/4	74 31/32	102	69 13/16	126	86 7/16
6	6 3/32	3 15/16	5 31/32	22 7/8	30	31 3/8	20 7/16	29 5/32	54	56 21/32	36 15/16	52 5/8	78	81 15/16	53 7/16	75 13/16	103	70 5/8	127	87 1/8
7	7 3/32	4 5/8	6 15/16	26 3/4	31	32 7/16	21 1/8	30 1/4	55	57 23/32	37 5/8	53 19/32	79	83	54 1/8	76 29/32	104	71 5/16	128	87 13/16
8	8 1/32	5 5/16	7 29/32	30 5/8	32	33 15/32	21 13/16	31 7/32	56	58 3/4	38 5/16	54 9/16	80	84 1/32	54 13/16	77 7/8	105	72	129	88 1/2
9	9 1/32	6	8 7/8	34 1/2	33	34 17/32	22 1/2	32 3/16	57	59 13/16	39	55 17/32	81	85 3/32	55 1/2	78 27/32	106	72 11/16	130	89 3/16
10	10 3/16	6 11/16	9 27/32	38 3/8	34	35 19/32	23 5/16	33 3/16	58	60 27/32	39 11/16	56 1/2	82	86 5/32	56 3/16	79 13/16	107	73 3/8	131	89 7/8
11	11 3/8	7 3/8	10 13/16	42 1/4	35	36 5/8	23 7/8	34 5/32	59	61 29/32	40 3/8	57 15/32	83	87 5/32	56 7/8	80 13/16	108	74 1/16	132	90 9/16
12	12 7/16	8 1/16	11 25/32	46 1/8	36	37 11/16	24 9/16	35 1/8	60	62 31/32	41 1/16	58 1/16	84	88 1/4	57 9/16	81 25/32	109	74 3/4	133	91 1/4
13	13 15/32	8 3/4	12 25/32	50	37	38 3/4	25 1/4	36 7/32	61	64 1/32	41 3/4	59 13/32	85	89 5/16	58 1/4	82 3/4	110	75 7/16	134	91 15/16
14	14 17/32	9 7/16	13 23/32	53 7/8	38	39 25/32	25 15/16	37 1/16	62	65 3/32	42 7/16	60 3/8	86	90 3/8	58 15/16	83 23/32	111	76 1/8	135	92 5/8
15	15 19/32	10 1/8	14 23/32	57 3/4	39	40 27/32	26 5/8	38 1/32	63	66 5/32	43 1/8	61 3/8	87	91 13/32	59 5/8	84 11/16	112	76 13/16	136	93 5/16
16	16 5/8	10 13/16	15 11/16	61 5/8	40	41 29/32	27 5/16	39	64	67 3/16	43 13/16	62 11/32	88	92 15/32	60 5/16	85 21/32	113	77 1/2	137	94
17	17 11/16	11 1/2	16 21/32	65 1/2	41	42 31/32	28	39 31/32	65	68 1/4	44 1/2	63 5/16	89	93 17/32	61	86 5/8	114	78 3/16		
18	18 3/4	12 3/16	17 5/8	69 3/8	42	44	28 11/16	40 13/16	66	69 9/32	45 5/16	64 9/32	90	94 9/16	61 11/16	87 1/32	115	78 7/8		
19	19 25/32	12 7/8	18 19/32	73 1/4	43	45 1/16	29 3/8	41 29/32	67	70 11/32	45 7/8	65 1/4	91	95 5/8	62 3/8	88 5/16	116	79 5/16		
20	20 27/32	13 5/16	19 5/16	77 1/8	44	46 1/8	30 1/16	42 29/32	68	71 3/32	46 9/16	66 7/32	92	.....	63 1/16	89 17/32	117	80 1/4		
21	21 29/32	14 1/4	20 1/32	81	45	47 5/32	30 3/4	43 7/8	69	72 15/32	47 1/4	67 5/16	93	.....	63 3/4	90 17/32	118	80 15/16		
22	22 31/32	14 15/16	21 1/2	84 7/8	46	48 7/32	31 7/16	44 27/32	70	73 1/2	47 5/16	68 5/32	94	.....	64 7/16	91 1/2	119	81 5/8		
23	24	15 5/8	22 5/32	88 3/4	47	49 9/32	32 1/8	45 13/16	71	74 9/16	48 5/8	69 1/8	95	.....	65 1/8	92 5/32	120	82 5/16		
24	25 1/16	16 3/16	23 7/16	92 5/8	48	50 11/32	32 13/16	46 25/32	72	75 5/8	49 5/16	70 3/32	96	.....	65 13/16	93 7/16	121	83		
													97	.....	66 1/2	94 13/16				

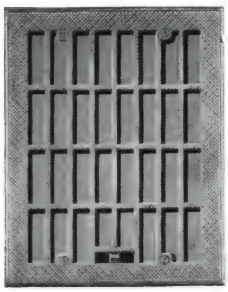
Note: Gauge for sheet steel, U. S. Standard; for sheet bronze and brass, Browne & Sharpe Standard.

Registers and Ventilators

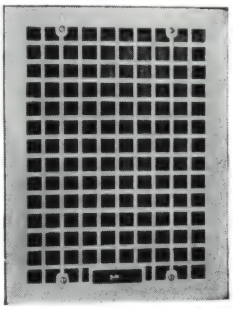
Standard registers can be furnished in all finishes.

Fusible Link Registers for fireproof buildings (ventilating ducts in multiple dwellings).

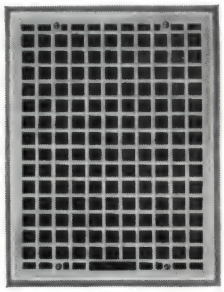
Ventilators for ceilings, walls, windows, doors, etc. Adjustable Ventilators for circulation from floor to floor; sliding Dampers for shallow ducts, and wherever a graduated flow of air is desired. In finishes suitable to every purpose.



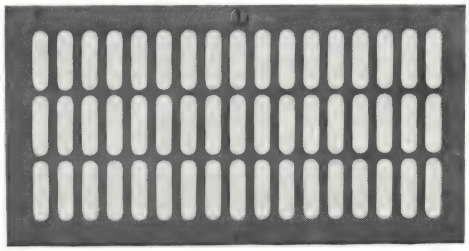
Style No. 80
"Cobble" Semi-steel



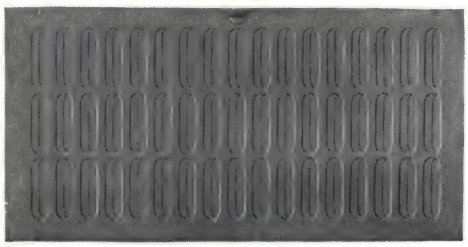
Style No. 60
Semi-steel



Style No. 72 All-steel
with "Lox-it"



Open



Shut
T&B "Tri-Sli" Damper

WICKWIRE SPENCER STEEL COMPANY

Clinton Perforated Metal Grilles

GENERAL OFFICES
41 East 42nd Street
NEW YORK, N. Y.

OFFICES AND WAREHOUSES
WORCESTER, MASS., Webster Street
CHICAGO, ILL., 208 So. La Salle Street
LOS ANGELES, CAL., 1070 No. Alameda Street
BUFFALO, N. Y., River Road
CLEVELAND, OHIO, 1217 Guarantee Title Building
TULSA, OKLA., 1304 The Philtower
SAN FRANCISCO, CAL., 114 Townsend Street
SEATTLE, WASH., 1025 Sixth Avenue, So.
PORTLAND, ORE., 361 14th Street, No.

Products

CLINTON PERFORATED METAL GRILLES.

For our pages on Electrically Welded Wire Fabric for concrete reinforcement, Woven Wire Lath and Wire and Iron Fences and Gates, see Manufacturers' Index.

Clinton Perforated Metal Grilles

The Clinton Works of the WICKWIRE SPENCER STEEL COMPANY was the first plant in America to perforate grilles. In over fifty years of constant operation, we have built and maintained dies enabling us to produce grilles of all standard and many unusual designs. Our heavy and modern equipment provides for fabricating steel or bronzes into grilles as heavy as ¼ in. in thickness. Grilles of curved shapes and grilles made in accordance with your own designs and specifications can also be supplied.

We have our own finishing plant for electroplating and can match any special finish desired. Invisible doors, hinged grilles, angle frame mountings, and many other specialities are within the scope of our manufacture.

We carry in our warehouse at all times a large tonnage of various gauges of sheet bronzes, steel and other metals. This large stock of material enables us to render most efficient and quick service.

Materials—We recommend for consideration "Wissco" Bronze, a special alloy developed by the metallurgists of WICKWIRE SPENCER STEEL COMPANY. It has a higher tensile strength than Commercial Bronze and can be finished in any color to harmonize with the surroundings.

"Wissco" Bronze compares in price with electroplated steel, but for durability, it equals Commercial or Naval Bronze.

Clinton Grilles are also furnished in other metals—steel, brass, copper, bronze, nickel, zinc, aluminum, monel, etc.

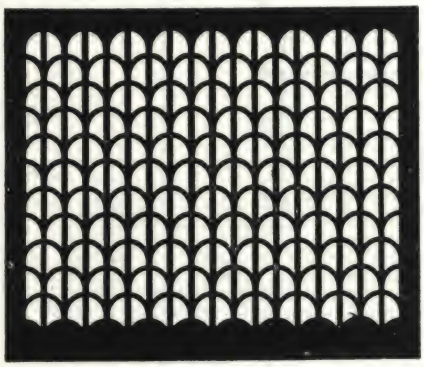
Finish—Grilles may be electroplated, japanned, painted, buffed or we can duplicate any finish upon receipt of sample. When grilles are to be finished with paint, we recommend that they be shipped with shop coat only and that the finishing coat be applied on the job.

Dimensions and Shapes—Grilles can be made in any sizes or shape up to 60x156 in. in one piece. Larger sizes are made in two or more pieces carefully joined together with suitable butt straps, so that the joint is virtually invisible from the front.

Designs—45 different designs are procurable from standard dies and any new design required may be made to order. Our new Clinton Grille Handbook, the most complete of its kind, gives a detailed analysis of grille layouts and is invaluable to the architect.

Thickness—It is well to bear in mind that perforated metal grilles are stronger than cast grilles and a much thinner metal can be used. We perforate the various designs in steel in gauges ranging between ¼ in. to 16 U. S. gauge and in bronze ¼ to 16 B&S gauge.

Special Features—Angle frames, screwholes (plain or countersunk), invisible doors, handholes or any other special features can be supplied exactly according to your specifications.

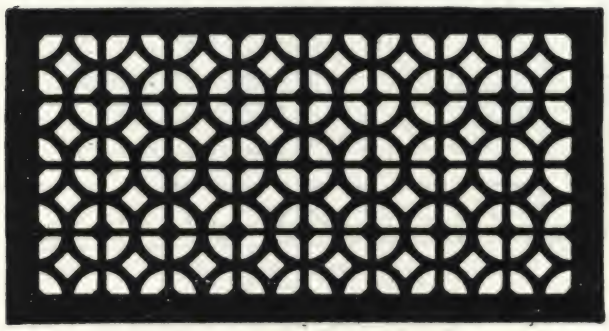


Design 121
Free air opening, 54%

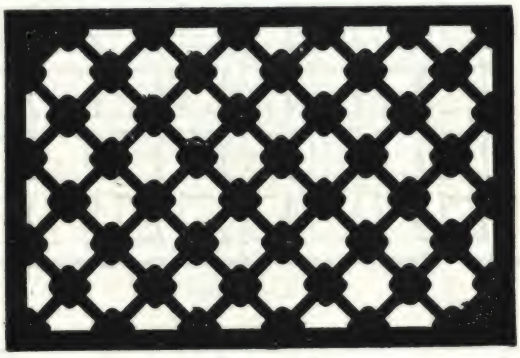
Specifications — When specifying please give all the following information.

Quantity
Style of perforation
Gage of material
Kind of metal
Width of blank margins, and whether included in dimension quoted
Screwholes or other special features
Finish

In other than lattice grilles and similar symmetrical designs, be careful to indicate which dimension is the vertical height of each grille when installed.



Design 122
Free air opening
⅝-in. bar, 47% ½-in. bar, 43.4% ⅝-in. bar, 40.3%



Design 137
Free air opening, 48.5%

THE NEWMAN MANUFACTURING CO.

FOUNDED 1882

Heating and Ventilating Grilles of Brass Bronze, Copper, Aluminum, Steel, Nickel Silver, Zinc, Monel Metal, Wrought Iron

MAIN OFFICE AND PLANT
CINCINNATI, OHIO

BRANCHES: CHICAGO AND NEW YORK
SALES OFFICES IN 84 CITIES

Products

PERFORATED (STAMPED) HEATING and VENTILATING GRILLES and REGISTERS—brass, bronze, plated steel, copper, nickel, zinc, aluminum, monel metal and special alloys.

CAST GRILLES and REGISTERS.

RADIATOR ENCLOSURES, BULKHEAD GRILLES, etc.

For our pages on Ornamental Brass and Bronze Work; Solid, Kalamein, Hollow and Extruded Doors; Windows; Storefronts; see Manufacturers' Index.

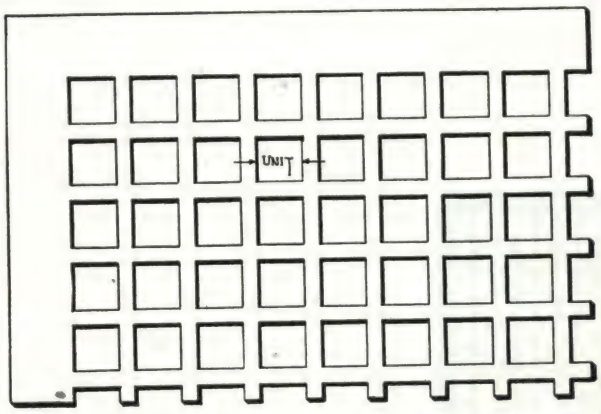
For Iron Work and Lighting Fixtures, see our Midwest Metal Art Division in Manufacturers' Index.

Facilities

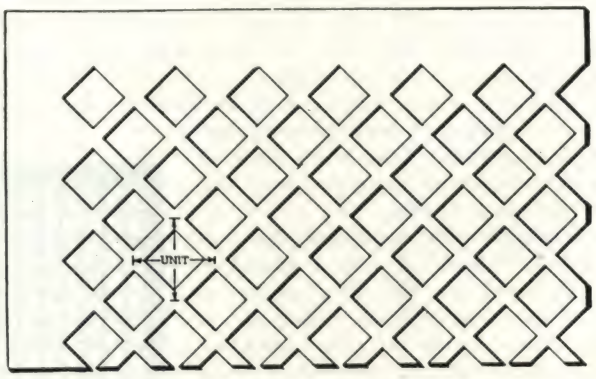
Plant contains 226,000 sq. ft. of space, devoted exclusively to ornamental metal fabrication, with Grille Department one of the largest and finest in the United States. Specializing in cast and wrought iron, as well as the non-ferrous metals.

Catalogue

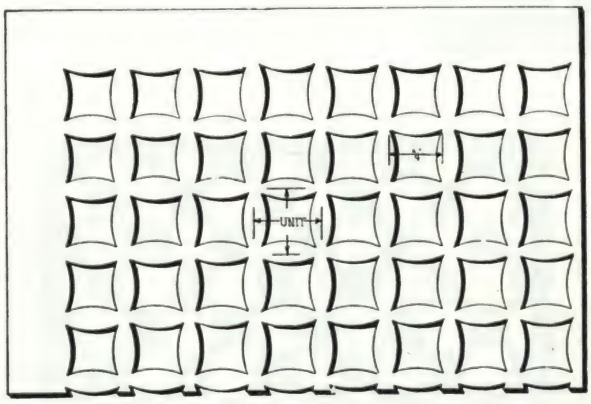
Write for Grille Catalog giving complete schedules of opening sizes and full information about finishes.



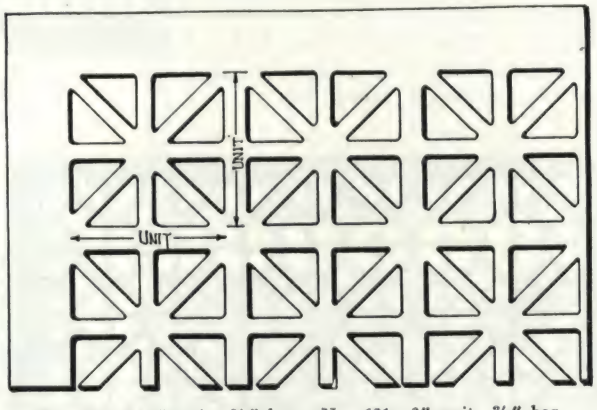
No. 670—½" unit, ¼" bar. No. 671— ⅝" unit, ¼" bar
No. 672—¾" unit, ¼" bar. No. 673— ⅞" unit, ¼" bar
No. 674— 1" unit, ¼" bar. No. 675—1⅜" unit, ¼" bar



No. 417—½" unit, ¼" bar. No. 418— ⅝" unit, ¼" bar
No. 419—¾" unit, ¼" bar. No. 420— ⅞" unit, ¼" bar
No. 421— 1" unit, ¼" bar. No. 422—1⅜" unit, ¼" bar



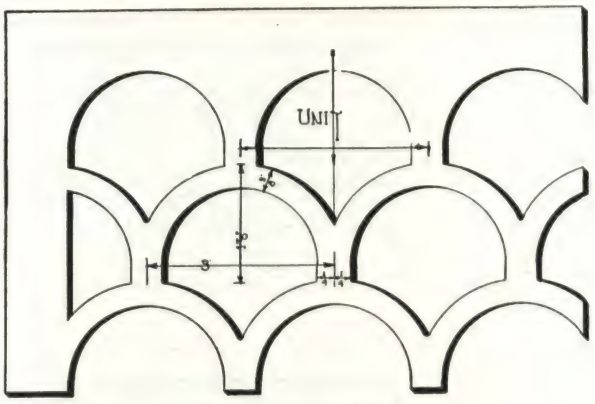
No. 250—1" unit



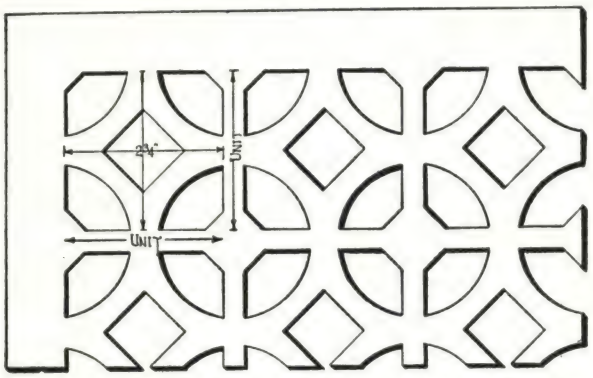
No. 620—2½" unit, ⅜" bar. No. 621—3" unit, ⅜" bar.
No. 622—3½" unit, ⅜" bar

"NEWMANCO" PERFORATED METAL GRILLES

Continued on next page

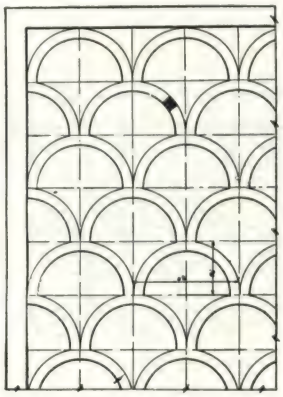


No. 200—3x1 7/8" unit

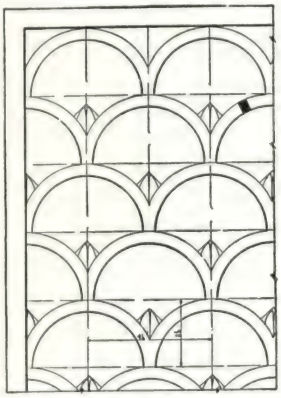


No. 820—2¾" unit, ⅜" bar. No. 821—2¾" unit, ½" bar.
No. 822—2¾" unit, ⅝" bar

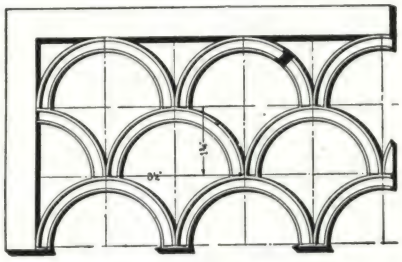
"NEWMANCO" PERPORATED METAL GRILLES



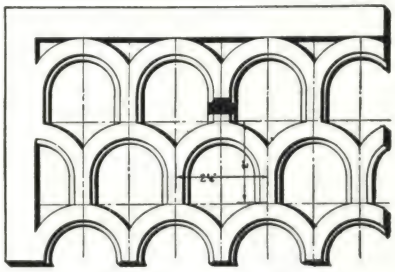
No. 223—1⅞x3¾" unit
No. 225—3 x5½" unit



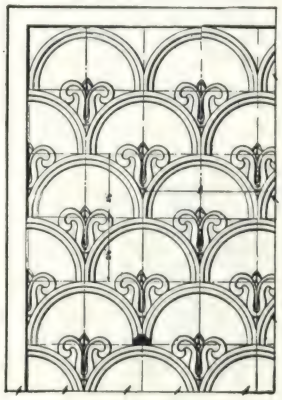
No. 216—2½x4½" unit



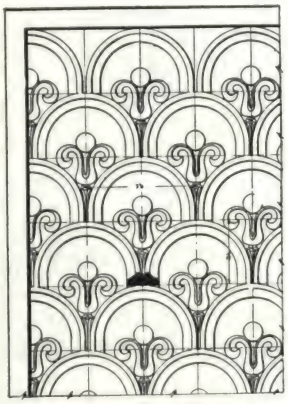
No. 224—1¾x3½" unit
No. 94—2⅛x4¼" unit



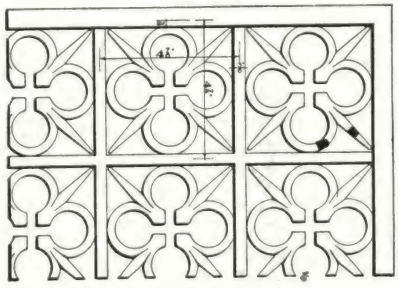
No. 354A—2x2¼" unit



No. 110—2⅛x4" unit
No. 98—2 x4" unit



No. 243—2¼x3⅞" unit



No. 605—4⅞" unit

"NEWMANCO" CAST METAL GRILLES

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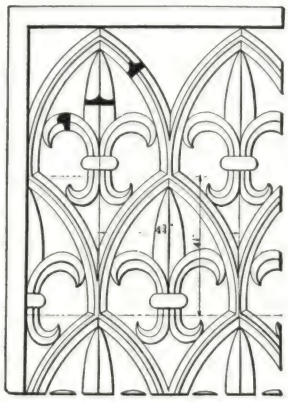
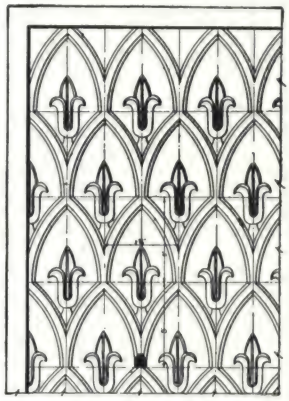
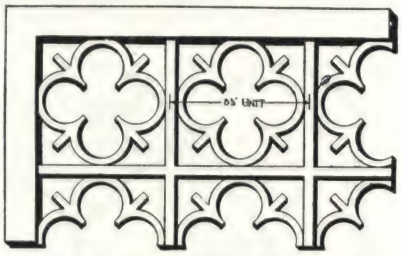


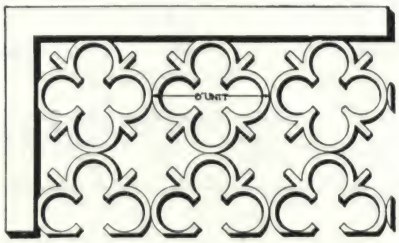
No. 355—4½x4¾" unit



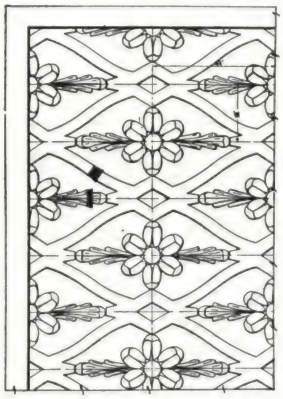
No. 608—2⅝x3" unit



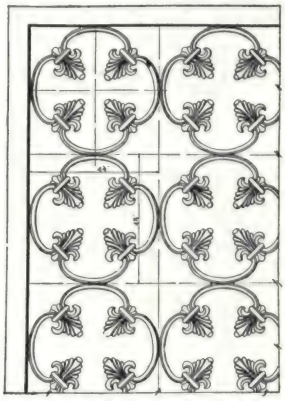
No. 394—3½" unit



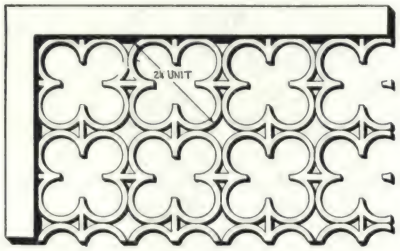
No. 526—3½" unit
No. 531—3" unit



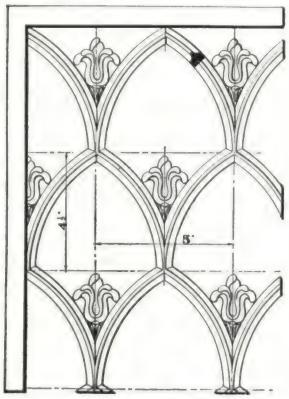
No. 409—4½x1⅛" unit



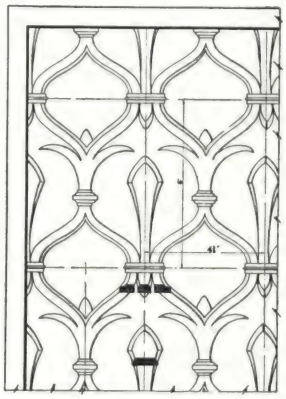
No. 241—4½" unit



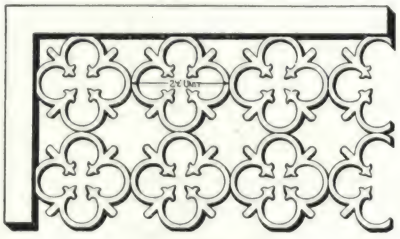
No. 594—2¼" unit



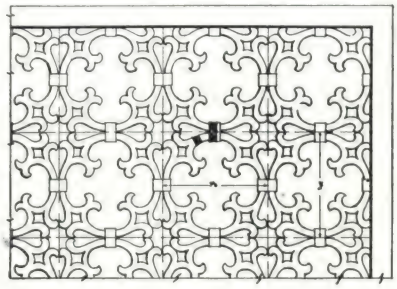
No. 80—4½x5" unit



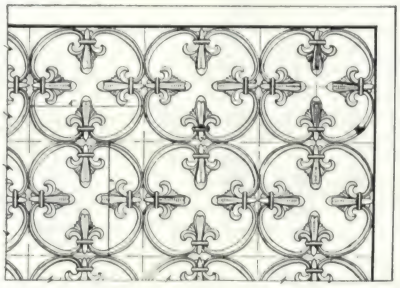
No. 289—6x4⅜" unit



No. 276—2⅝" unit
No. 400—2½" unit



No. 607—3⅝" unit



No. 112—4" unit

"NEWMANCO" CAST METAL GRILLES

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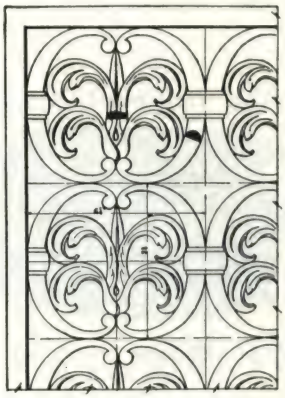
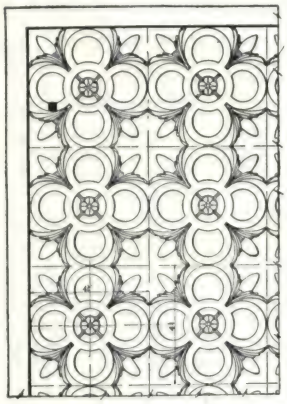
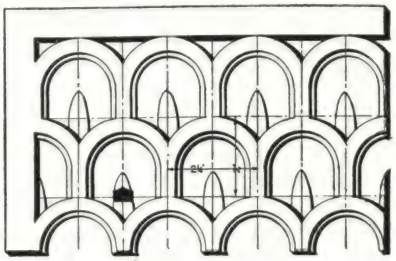


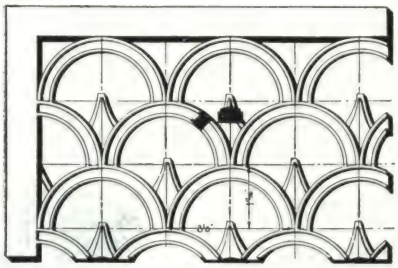
No. 295—5⅜x6¼″ unit



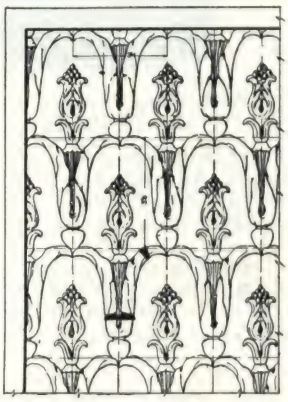
No. 527—4¼″ unit



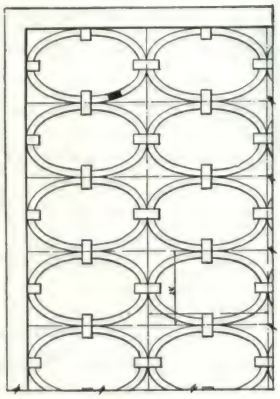
No. 282—2x2½″ unit
No. 354—2x2¼″ unit



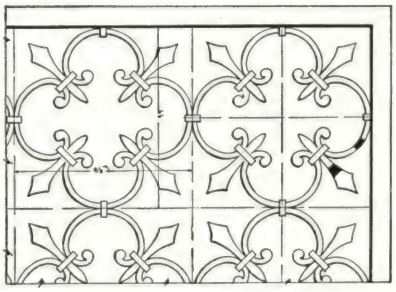
No. 274—1 $\frac{9}{16}$x3⅛″ unit



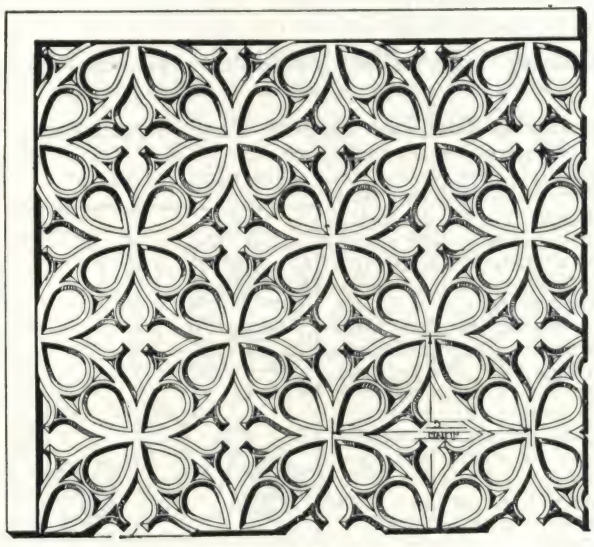
No. 606—3¼x3⅞″ unit



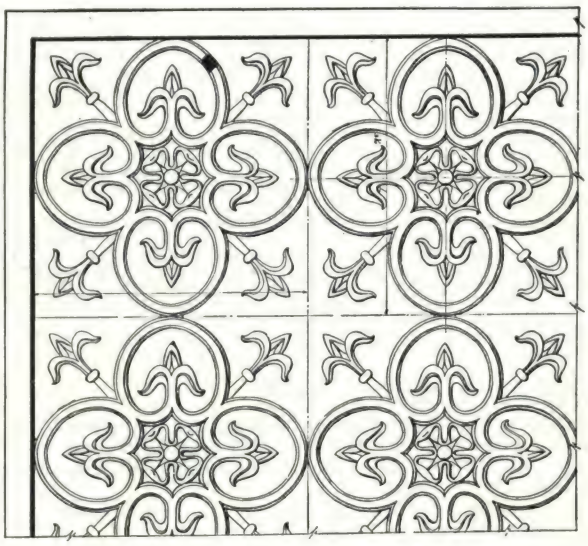
No. 222—2¾x4″ unit



No. 226—8½″ unit
No. 221—6½″ unit



No. 609—5″ unit



No. 244—7″ unit

"NEWMANCO" CAST METAL GRILLES

KNOWLES MUSHROOM VENTILATOR CO.

TELEPHONE
WALKER 2820

41 North Moore Street, NEW YORK, N. Y.

Products

CAST IRON and ALL-STEEL ADJUSTABLE MUSHROOM VENTILATORS; TU-WAY and AISLE HOOD AIR DEFLECTORS; ROUND and OBLONG GALLERY RISER VENTS; STEEL GRILLES with DAMPERS.

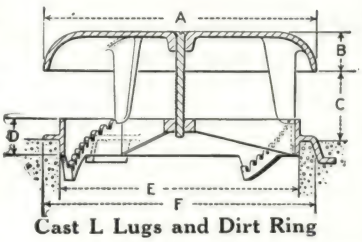
Uses and Operation of Air Controlling Heads

Used for controlling the supply of fresh air or the exhaust of vitiated air, particularly in the ventilation of auditoriums of theaters, schools, public buildings and large rooms of factories. Equally effective in up-draft or down-draft methods. Heads are usually located on the floor under the seats and connected with the plenum chamber or ducts. They are individually adjusted for their relative distance from the fan, so that each will distribute an equal quantity of air, or so that the distribution is regulated for different parts of the room.

Knowles Nu-Notch Mushroom Ventilator or Air Diffuser (Dome or Flat Top)

Cast L Lug Type

The ideal cast iron mushroom. Head has three outer bearings and is absolutely rigid. Ten recessed notches give close regulation of air. Locked into positive adjustment by tightening head screw. Supplied with dome or flat tops; three screwholes in floor flange for wood floor, or three L lugs cast on flange for setting in concrete, or three threaded holes in floor collar for inserting set screws.



Cast L Lugs and Dirt Ring

Size No.	A in.	B in.	C in.	D in.	E in.	F in.	Wgt., lb.	Area, sq. ft.	C.f.m. at Velocity of 200 ft.	250 ft.	300 ft.	350 ft.	400 ft.
5	6	7/8	1 3/4	1 5/16	5 3/16	6	4	1364	27.3	34.2	41.	47.7	54.6
6	7 1/8	1 1/8	1 1/2	1 1/2	6 3/16	7 7/8	4 3/4	1964	39.3	49.1	59.	68.7	78.6
7	8 1/4	1 1/4	2 1/8	1 1/4	7 3/16	8 1/4	6 1/2	.2673	53.5	66.8	80.2	93.5	107.
8	9 5/8	1 1/2	2	2	8 3/16	10 1/8	9	.3491	69.8	87.3	105.	122.	140.
10	11 1/2	1 5/8	3	2 1/2	10 3/16	11 7/8	14 1/2	.5454	109.	136.3	163.6	191.	218.

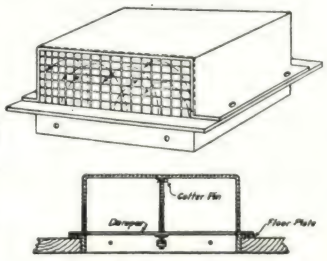
Specifications—Furnish and install where indicated on drawings or as hereinafter specified [5-in.] [6-in.] [7-in.] [8-in.] [10-in.] [Dome Top] [Flat Top] Nu-Notch Cast Iron Mushroom Air Diffusers with recessed notches for the permanent adjustment of mushroom caps at any desired opening together with center locking screw feature as manufactured by KNOWLES MUSHROOM VENTILATOR CO., New York, N. Y.

Provide under each air diffuser one No. 20 galvanized iron sleeve to be set by the heating contractor in conjunction with the general contractor at the time the floor is laid. In concrete floors when sleeves are located on forms fill sleeves with sand before being grouted in to prevent their distortion.

For wood floors: attach the mushrooms to the floor by means of flat head screws. *For concrete or similar type floors:* by inserting 3 setscrews in the collar, or by embedding 3 L lugs in cement. (In your specification please indicate the desired diameter size, style of top and method of attachment.)

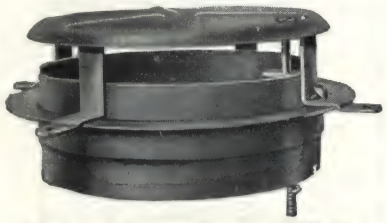
Tu-Way Air Deflectors

Delivers Full Area of Floor Opening—Designed to give maximum area with minimum fixed height. The air is discharged at both ends along the row of seats. Cast iron with heavy wire screens locked into grooves at each end. Damper easily adjusted with screwdriver on the top of hood.



Size No.	Dimensions, in. High	Wide	Long	Wt., lb.	Area, sq. ft.	C.f.m. at 300 vel.
2	2 3/8	8 1/2	4 1/2	5	.223	67
3	3 3/8	8 1/2	6 1/2	7	.333	100
4	4 3/4	8 1/2	8 1/4	11	.45	134
5	5 3/8	8 1/2	10 1/2	16	.56	167
6	6 3/8	8 1/2	12 1/2	22	.67	200

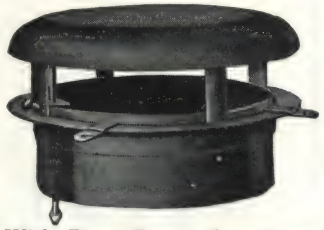
Knowles "Aerovalve"—The Improved Mushroom



Made of Heavy Steel. Will Not Crack or Break

Easy to regulate and install, and low in price. A solid air unit of fixed height with cap supports bearing directly on flange. The parts cannot be separated either before or after installation.

Quick, easy adjustment for finest control of air, by simply turning screw on top of cap. Rigid locking device prevents rattling. Quick anchorage to wood floors with screws through extended lugs on flange and to concrete with special masonry nails furnished with mushroom.



With Deep Dome Cast Iron Cap and Supports

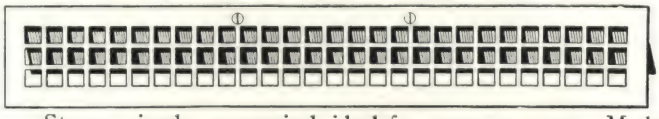
Made in two types:
(1) All heavy steel.
(2) With cast iron cap and supports.

Both types furnished either with or without adjustable air valve damper in 6 and 8 in. diameter sizes (only) same capacity as Nu-Notch type. (See table.)

Specifications for All-steel Aerovalve—Furnish and install, where indicated on drawings or as hereinafter specified (6-in.) (8-in.) Steel Aerovalve Mushrooms (with) (without) adjustable Air Valve Damper.

Specifications for Cast Iron Top Aerovalve—Furnish and install, where indicated on drawings or as hereinafter specified (6-in.) (8-in.) Cast Iron Top Aerovalve Mushrooms (with) (without) adjustable Air Valve Damper.

Knowles "Dampagrille"



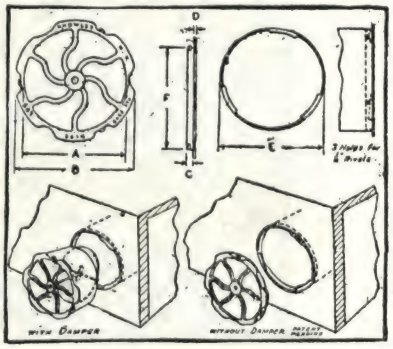
Strong, simple, economical, ideal for many purposes. Made of heavy steel, with regulating volume damper attached to inside of grille. Easily adjusted from wide open to completely closed and locked from outside after installation. Furnished in various dimensions to suit requirements.

Oblong Gallery Riser Ventilator (cast iron) Grilles

Regulating damper. In three sizes. (See Booklet.)

Knowles Disc-Loc Gallery Riser Ventilators

Designed to insure better control of air. Round holes in the gallery risers do not weaken the construction, but on the contrary, with the cast iron rings is it actually strengthened. The sleeve is a plain galvanized iron cylinder with a ½-in. turnover flange, and with a special cast iron ring riveted flush to the inside front end. Sleeves are grouted in when concrete is poured. The cast iron grille is quickly inserted and locked by a simple twist motion—no bolts, screws or springs. Furnished with or without damper to fit same rings.



Size No.	A in.	B in.	C in.	D in.	E in.	F in.	Net area, sq. ft.	Wt., lb.	C.f.m at 300 vel.
4	3 3/4	5 1/8	7/16	1/8	4 3/4	4	.08	1 1/2	24
5	4 3/4	6 1/4	1/2	1/8	5 13/16	5	.13	1 3/4	39
6	5 3/4	7 3/8	9/16	1/8	6 7/8	6	.19	2 1/4	57
7*	6 5/8	7 7/8	1 1/4	1/8	7 13/16	6 7/8	.24	3 1/2	72

*Square grille. Weights with damper on request.

Booklet—Complete engineering data upon request.

ELECTRICAL GENERATION AND DISTRIBUTION

Adam, Frank, Electric Co. D5828–5831
American Steel & Wire Co. D5856–5863
Benjamin Electric Mfg. Co. D5832–5833
Bryant Electric Co. D5867–5873
Bull Dog Electric Products Co. D5838–5841
Burke Electric Co. D5804
Bussman Mfg. Co. D5846
Conduo-Base Co. D5848–5849
Crescent Insulated Wire & Cable Co. D5864–6865
Diehl Mfg. Co. D5805
Economy Fuse & Mfg. Co. D5847
Electric Apparatus Co. D5834–5835
Electric Storage Battery Co. D5810–5811
Fretz-Moon Tube Co., Inc. D5850
Garland Mfg. Co. D5851
General Electric Co.—
- Motors, Generators, Switchboards, etc. D5813–5819
- Wiring Devices D5874–5879

Hart Mfg. Co. D5837
Hubbell, Harvey, Inc. D5880–5887
National Electric Light Assn. D5866
National Electric Products Corp. D5852
Peet & Powers, Inc. D5809
Triangle Conduit Co., Inc. D5854–5855
Trumbull Electric Mfg. Co. D5842–5843
Westinghouse Electric & Mfg. Co.—
- Electric Service Plants D5812
- Motors and Generators D5806–5808
- Safety Switches D5844–5845
- Switchboards and Panelboards D5820–5827

Wiremold Co. D5853
Wurdack, Wm., Electric Mfg. Co. D5836

BURKE ELECTRIC COMPANY

ERIE, PA.

WORKS
ERIE AND
CONNEAUTVILLE, PA.

SALES AND SERVICE OFFICES

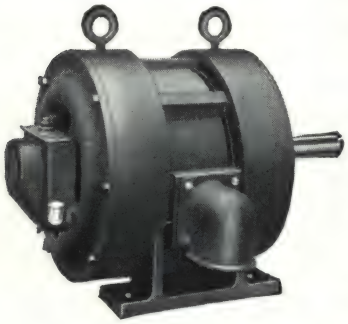
BOSTON, MASS., 920 Oliver Building
BUFFALO, N. Y., 524 Ellicott Square Building
CHICAGO, ILL., 1902 Straus Building
CINCINNATI, OHIO, 502 Chamber of Commerce Building
CLEVELAND, OHIO, 212 Euclid E. 79th St. Building
DETROIT, MICH., 1904 Dime Bank Building
ERIE, PA., 12th and Cranberry Streets
NEW YORK, N. Y., 205 East 42nd Street
PHILADELPHIA, PA., 1600 Arch Street
PITTSBURGH, PA., 2002 Farmers Bank Building

Products

MOTORS, GENERATORS and MOTOR GENERATOR SETS for all electric light and power generation and utility station purposes; ARC WELDERS; HIGH CYCLE EQUIPMENT.

A-C. Motors

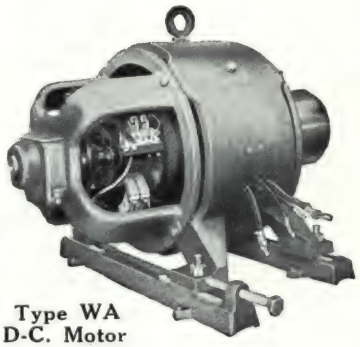
Built in all sizes and types to meet exacting requirements of the many different kinds of application. Includes normal and high torque short circuit type induction, multi-speed short circuit type induction, slip ring induction, both constant and varying speed, and synchronous motors of all types for both power and power factor correction purposes. Also a complete line of low speed short circuit induction motors for direct connection to fans, blowers, and other ventilating equipments.



Type S Induction Motor

D-C. Motors

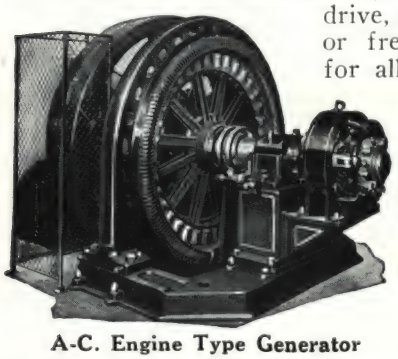
Built in all sizes and types including low speed motors for direct connection. Can be furnished either in the constant or variable speed types to meet particular requirements of the application. All direct-current motors are built of the rolled steel welded type with full inter-poles.



Type WA
D-C. Motor

A-C. Generators

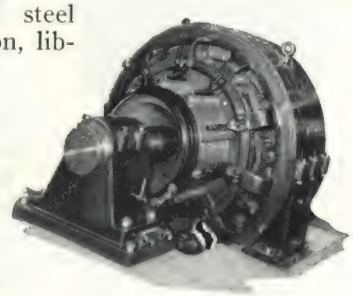
Furnished for either belted, coupled, or engine-type drive, in all phases, voltages, or frequencies as required, for all types of drives and class of service. Can be furnished with direct connected, belted or motor-generator set exciters. All generators furnished complete with necessary field rheostats and field discharge resistances.



A-C. Engine Type Generator

D-C. Generators

Furnished in either 2-wire or 3-wire type, standard 115, 230 or 115/230 volts. Burke 3-wire generators are of the internal third winding type using only one slip ring. All direct current generators are of the rolled steel welded frame construction, liberally designed and ruggedly built, and all engine-type machines have full compensating winding to give close voltage regulation and insure against flicker. All engine type machines have frames split horizontally for easy erection.



D-C. Generator

Motor Generator Sets

Motor generator sets are furnished in all sizes to meet any requirements of current supply as to voltage, phase and frequency, and generators of the same general type and design as specified under the heading of direct current generators for either 2 or 3-wire service.

High Cycle Motor Generator Sets

Are for generating power at high frequency, standardized at 180 cycles for the operation of high speed portable tools.

The sets are specially designed for close inherent regulation and thus insure the most satisfactory tool operation with minimum maintenance.

Arc Welders

Are built in both single and double operator type for either belted, electric motor or gas engine drive. Are of rolled steel welded construction, self-excited, have single lever for control of welding current, giving the same characteristics of welding arc throughout the welding range and striking the arc is always the same regardless of the setting.

Arc Welder

The design and construction of these sets is such that the units are compact, of moderate size and weight, easily portable but extremely rugged to withstand rigorous service.

DIEHL MANUFACTURING COMPANY

ELECTRICAL DIVISION OF THE SINGER MANUFACTURING COMPANY

Manufacturers of Electric Motors, Generators and Fans

ELIZABETHPORT, N. J.

For District Offices and Representatives, see our Fan pages

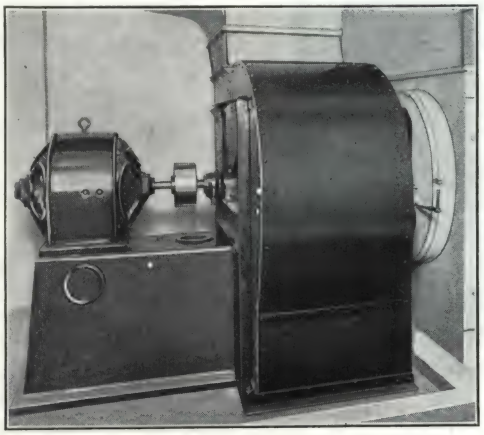
For Diehl Exhaust Fans, Desk and Bracket Fans, Ceiling Fans, etc., see Manufacturers' Index

Slow Speed Direct-current Ventilating Fan Motors for Direct Coupling to Centrifugal Housed Fans—Adjustable Speed and Constant Speed

General Data—These motors have been designed to meet the standardization rules of the N.E.M.A. on direct-current motors for direct coupling to centrifugal housed fans for heating and ventilating systems.

Every detail of design and construction has been co-ordinated to produce motors which are exceptionally smooth and quiet in operation since noises produced by the ventilating apparatus may be readily transmitted to various parts of the building in which installed. Armatures carefully balanced to reduce vibration. Magnetic hums and brush noises are kept to a minimum. Navy specification phosphor bronze sleeve bearings, of unusually sturdy proportions, are abundantly lubricated by brass oil rings of special grooved construction. Particular attention has also been given to the quality of the slot and winding insulation.

The ratings listed on this sheet permit the selection of motors for driving centrifugal fans having maximum speeds between the limits of 140 and 1000 r.p.m.



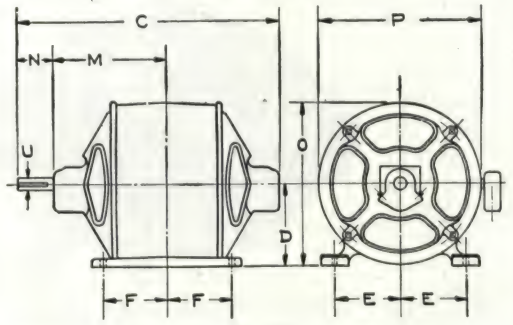
Mounting—The mounting of the apparatus upon the foundation is most important. The apparatus should not be mounted directly upon the foundation or steel work. It is good practice to mount the apparatus on plank frames, each in turn resting on cork or lead mats.

Where such frames and mats are used, the frames should be bolted to the foundations and the apparatus fastened to the frames by lag screws. Foundation bolts passing through the frame and into the foundation defeat the purpose of the plank frame, for any vibration in the apparatus will be transmitted along the bolts to the foundation.

If it is necessary to use foundation bolts extending through the frame to the foundation, the vibration in the bolts can be reduced by placing them in pipe sleeves, and by using heavy lead washers under the usual steel washers under the nut of the holding down bolt.

DIMENSION TABLE

Units in Inches



Frame size	Approx. net wt., lb.	C	D	E	F	M	*N	O	P	U
Types LA or LB										
4	178	20 1/16	5 5/8	4 1/16	4 3/4	8 3/16	3 1/16	11 1/8	11	1
6	283	21 1/2	6 3/4	5 1/16	5 1/4	9 3/16	3 1/8	13 3/8	13 1/4	1 1/16
8	317	22 5/8	7 3/4	5 1/16	5 1/4	9 11/16	3 1/4	15 1/4	15	1 1/16
10	507	29 15/16	9	5 1/16	5 1/2	11 3/32	6	17 7/8	17 3/4	1 1/16
12	690	30 1/4	9 7/8	7 7/8	6 5/8	12 5/8	6	19 1/16	19 5/8	1 1/16
14	895	32 1/8	11 1/2	7 1/2	6 5/8	13 1/16	6	22 5/8	22 1/4	1 1/16
16	1194	37 1/16	12 5/8	8 1/4	7 5/8	14 15/16	7 3/16	25 1/16	24 7/8	1 5/16
18	1420	39 3/8	13 1/2	9	8 1/4	15 11/16	8	26 3/4	26 1/2	2 3/16
20	2075	45 5/8	13 7/8	9 5/8	9 5/8	18 5/8	9	27 5/8	27 1/2	2 1/16
21	2375	50 1/2	15 3/8	12	12	20 3/8	9 1/4	30 1/2	30 1/4	2 5/8
22	2815	51	16 1/4	12	12	19 13/16	11 3/8	32 1/4	32	2 11/16
Type K										
10	2450	41	14 3/4	12	6 1/4	16	5	29 3/8	27 3/4	2 11/16
11	2850	40 7/16	17 7/8	14 1/4	6 3/4	15 7/8	6	34 1/4	31 1/4	3
11M	3100	42 5/8	17 7/8	14 1/4	6 3/4	16 15/16	6	34 1/4	31 1/4	3
12	3850	43 1/2	20	15	7 1/2	16 1/2	6 1/4	38 1/4	36	3
12M	4200	49 3/4	20	15	8	20 1/16	9	38 1/4	36	3 15/16
15	5900	47 1/2	23 1/2	19 1/2	8 3/4	23 3/4	9	47	44 1/2	3 15/16

*Shaft extensions can be furnished in lengths to meet individual requirements.

The above dimensions are approximate and are not approved for construction purposes.

FRAME SIZES* AND RATINGS

Constant Speed Motors

Types LB, LA and K — 115 or 230 Volts — Shunt Wound

Rated speed, r.p.m.	Horsepower											
	1/3	3/4	1	1 1/2	2	3	5	7 1/2	10	15	20	25
140	LB10	LB12	LB14	LB16	LB16	LB18	LB21	LB22	K11	K11M	K12	K12M
170	LB10	LB12	LB12	LB14	LB16	LB18	LB21	LB21	K10	K11	K11M	K12
200	LB10	LB12	LB12	LB12	LB14	LB16	LB20	LB21	LA22	K11	K11M	K12
240	LB 8	LB10	LB10	LB12	LB14	LB16	LB18	LB20	LB22	K10	K11	K11M
280	LB 8	LB10	LB10	LB12	LB12	LB14	LB18	LB20	LB21	LA22	K11	K11
340	LB 8	LB 8	LB10	LB12	LB12	LB14	LB16	LB18	LB20	LB21	K10	K10
420	LB 6	LB 6	LB 8	LB10	LB10	LB12	LB14	LB16	LB18	LB20	LB21	K10
480	LB 6	LB 6	LB 8	LB10	LB10	LB12	LB14	LB16	LB18	LB20	LA21	LA22
575	LB 6	LB 6	LB 6	LB 8	LB10	LB12	LB14	LB16	LB16	LA18	LA20	LA21
680	LB 4	LB 6	LB 6	LB 8	LB10	LB12	LB14	LB14	LB16	LB18	LB20	LA21

These motors are for direct connection but may be used for belted service, in which case belt tightening bases will be furnished. Dimensions of bases will be furnished upon application.

Motors may be used for adjustable speed service up to 150% rated speed by field control.

In no case must the horsepower at maximum speed exceed the rated horsepower.

Adjustable Speed Motors

Types LA and K — 115 or 230 Volts — Shunt Wound

Fan speeds, r.p.m.		Horsepower at maximum fan speed											
Max.	†Min.	1/2	3/4	1	1 1/2	2	3	5	7 1/2	10	15	20	25
140-170	94	LA12	LA16	LA16	LA18	LA13	LA21	K10	K11	K11M	K12	K12M	K15
170-200	112	LA12	LA14	LA14	LA16	LA18	LA20	LA22	K11	K11	K12	K12	K15
200-240	133	LA12	LA12	LA14	LA16	LA18	LA20	LA21	K10	K11	K11M	K12	K12M
240-280	160	LA10	LA12	LA12	LA14	LA16	LA18	LA20	LA22	K10	K11	K12	K12
280-340	187	LA10	LA12	LA12	LA14	LA16	LA18	LA20	LA21	LA22	K11	K11M	K12
340-420	227	LA10	LA10	LA10	LA12	LA14	LA16	LA18	LA20	LA22	K10	K11	K11M
420-480	280	LA 8	LA10	LA10	LA12	LA12	LA14	LA18	LA20	LA21	K10	K11	K11
480-580	320	LA 8	LA 8	LA10	LA12	LA12	LA14	LA16	LA18	LA20	LA22	K10	K10
580-680	380	LA 6	LA 8	LA 8	LA10	LA10	LA12	LA16	LA18	LA18	LA21	LA22	K10
680-840	455	LA 6	LA 6	LA 8	LA10	LA10	LA12	LA14	LA16	LA18	LA20	LA21	LA22
840-1000	575	LA 4	LA 6	LA 6	LA 8	LA10	LA10	LA14	LA14	LA16	LA18	LA20	LA21

*40° C., open type, sleeve bearing.

†Minimum speeds are normal full load speeds on fan load.

Speed range is obtained by field control to maximum speeds shown. For speeds lower than minimum shown, on fan load, use armature control.

These motors will develop full rated capacities at maximum speeds shown. At full field speed they will develop two-thirds of rated capacity without exceeding 50° C temperature rise. The motors are intended for direct connection but may be used for belted service, in which case belt tightening bases will be furnished. Dimensions of bases will be furnished on application.

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

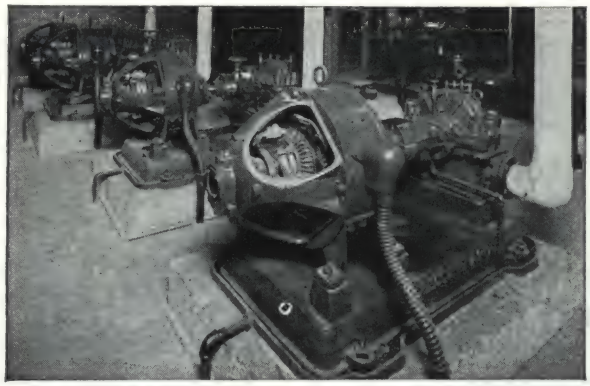
For Branch Offices see our Lighting Catalogue. For References to Other Products, see Index to Manufacturers

MOTORS AND CONTROL

The building architect has a responsibility to fulfill in his selection or recommendation of electric motors and control. Tenants appreciate good, consistent water pressure, dependable ventilation facilities and other conveniences which reliable motor-driven appliances make possible. On the other hand, they are quick to realize poor service which might arise from inferior equipment.

Motors

Westinghouse motors for the building industry are fortified by an organization which has designed, manufactured and served motors since the dawn of the motorizing idea. The Westinghouse Company co-operates with the building equipment manufacturer to the fullest extent in supplying the motor which is scientifically built for the requirements.

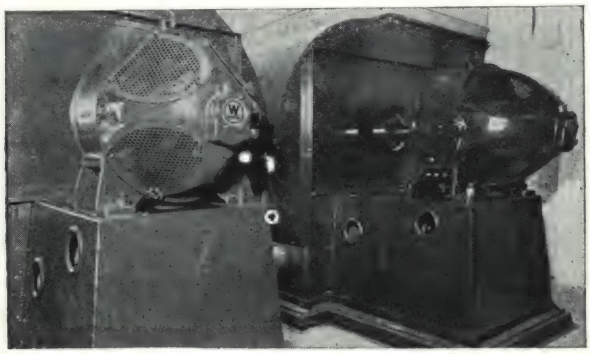


Type SK Motors Driving Circulating Pumps

Standard Westinghouse general purpose motors are equipped with Sealed Sleeve bearings. These provide a cushioning film of oil which resists shocks and vibrations. The oil is sealed in and dust is sealed out. These factors contribute materially to the service economy of the motors.

The basis for a dependable motor is a sturdy frame construction. In Westinghouse direct-current motors the frame is of rolled steel—strong and light; the feet are drop forged, lessening the possibility of breakage. In the alternating-current motors, a tough, forged-steel "bridge" ties both ends of the motor into a rigid unit, invincible against shocks and jars and resisting any "weaving" of the punchings, thus prolonging the life of the windings.

A unique method of manufacture is employed to avoid dead air spaces down in the heart of the motor insulation. Hot spots are eliminated, thus adding to the life and to the investment value of a Westinghouse motor.



Type SK Motors, Coupled Direct, Driving Ventilating Fans

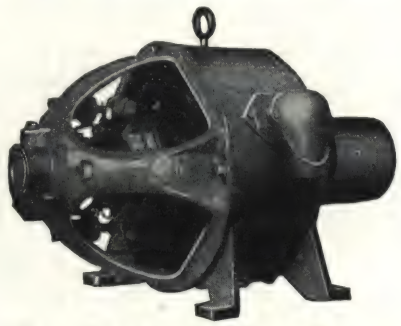
The insulating compound which is forced into the innermost recesses of Westinghouse motor coils resists moisture, mild acids, oil and abrasive dust. After two treatments and baking operations coils are left flexible.

To prevent undue deterioration due to heat, a motor must be carefully ventilated. It is not enough that a large volume of air be drawn into motor; it must be directed to the proper winding slots. Westinghouse engineers introduced in this country the principle of *directed air circulation.*

These factors contribute materially to the service economy of the pump or fan, and to added years of dependable ventilation and pumping facilities.

Selection of Motors—In selecting the motor and control, there are many factors to be considered, among which are: Maximum horsepower required, available speeds, speed variation desired, voltage available, space available, cost of reduced speed, and cost of equipment.

Direct-current Motors, Type SK—Are classed as shunt, compound or series, depending upon the field windings. The shunt motor is best adapted for the usual drives found in buildings. Adjustable speed can be obtained very economically over a wide range, up to 4 to 1, by field control and further by a simple yet flexible armature control A still greater flexibility can be obtained, when necessary, by using variable voltage control, which is used universally for direct traction elevator drive.



Type SK Motor for Direct-Current Applications, Equipped with Pulley for Belt Drive

Direct - current motors are particularly desirable for low speed direct drive. They are used extensively in buildings where space is valuable and appearance is a factor. These motors operate at relatively high efficiency at all speeds.

Practically any full-load speed can be obtained on d-c. motors, but speeds corresponding to those of the a-c. motors are standard and should be selected, if possible, especially for the higher speed belt drives.

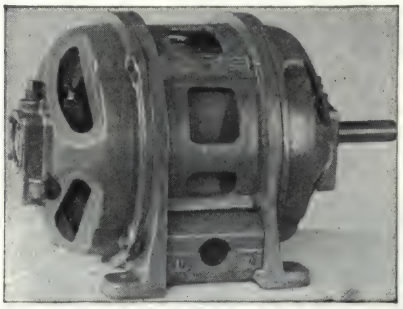
Direct current is available in many localities where buildings, requiring adjustable speed, are situated. In other sections, it is frequently economical to install motor generators to secure efficient low speed operation, particularly where operation at low speed is over an extended portion of the operating time.

Alternating-current Motors—Are particularly adapted to constant speed service, but adjustable speed can also be secured, if desired. The common types of alternating-current motors are: (1) squirrel-cage induction, Type CS; (2) wound-rotor induction, Type CW; (3) single-phase induction, Types CAH and AR; (4) synchronous, Type HR.

Continued on next page

The squirrel cage induction motor Type CS runs at practically constant speed throughout its entire load range. The speed is fixed by the number of poles for which the motor is wound and by the frequency of the alternating current.

More than one speed with squirrel cage motors can be obtained economically only by winding the motor with different pole combinations. Two or four-pole combinations can be obtained economically in the higher speeds but this naturally makes a larger and more expensive, as well as less efficient motor, and is only desirable where control in wide steps is permissible.



Type CS Linestart Motor
Designed for starting on full line voltage

Wound-rotor or slip-ring motors Type CW can be operated at any one of a number of speeds by inserting resistance in the rotor circuit with, of course, a sacrifice in efficiency. This is a simple and economical method of obtaining control where the required speed reduction is required in small steps or where the speed reduction is for short periods.

Slip-ring motors are also used where it is necessary to keep the starting current at a minimum, or where high starting torque is required.

Synchronous motors Type HR are designed to operate either at 100% power factor or at a leading power factor (usually 80% power factor) and thus correct for the lagging power factor of induction motors. Synchronous motors are inherently suitable for low speed direct drive. They have high efficiency, although usually, the horsepower required by fans and pumps in buildings is too small for economical synchronous motor design.

Motor Control

Whatever the application, there is a Westinghouse control, matched to the motor requirements. The complete line of control equipment includes every type from the simple, manually operated starter to the complicated remote, automatic control.

The principal types of motor control are: (1) manual; (2) magnetic.

Manual control is inexpensive, generally simple to operate, but it must be located in an accessible place. Magnetic control offers the principal advantages of remote control from push button stations, automatic acceleration and maximum reliability.

Class 10-700 Auto Starter
For manually starting squirrel cage motors at reduced voltage

Both types of control are built in the open and enclosed types. The enclosed type is not only becoming more popular on account of its safety features, but is required in many parts of the country.

All manually operated starters should have overload and low voltage protection, so that in case of overload or low line voltages, the motors will be automatically disconnected from the line until the operator starts them again. Thermal type overload relays provide more reliable protection to motors than older forms of relays, since they more closely follow the heating of the motor. Magnetic starters should have the same protection as manual starters, except that for drives such as fans, blowers and centrifugal pumps, and particularly when using automatic control devices, low voltage release is preferable. Starters with low voltage release will disconnect the motor upon failure of power and will automatically restart the motor upon return of power. Magnetic starters for low voltage release are arranged for 2-wire control, and those for low voltage protection are arranged for 3-wire control. This designation is used because of the number of operating wires required by the push button or master switch.

Direct-current Control—This may be divided into the following classes:

(1) Starters used to bring the motor up to full speed by gradually cutting out resistance in series with the armature. The motor then runs at constant speed.

(2) Starters similar to No. 1, except constructed so that speed adjustment can be secured by:

(a) Resistance in series with the armature.
(b) Resistance (rheostat) in the field circuit.
(c) Combination of a and b.

Manual Starter Class 7010
For starting constant speed direct-current motors

Both types are obtainable for manual or magnetic operation in a variety of forms, including the indicating preset speed regulator. Frequently, the reduced speed setting is made manually and the control automatically reduces to this speed as required.

It is good practice and usually required, to have a disconnecting device ahead of the control and this should be a fused knife safety switch for small units and automatic circuit breakers for large units or feeder lines. These are often combined with the starter as one control unit.

Alternating-current Control—This may be divided into the following classes.

(1) Full voltage squirrel cage motor starters which connect the motor directly to the line. Magnetic starters of this type are called *Linestarters*. Practically all squirrel cage motors can be thrown across the line, but the size of the motor is usually limited by local conditions and by the rules of the power company. Motors with low starting currents that meet National Electric Light Association recommendations are called *Linestart* motors.

Small Linestarter Class 11-200-H
For push button control and protection of squirrel cage motors

(2) Reduced voltage squirrel cage motor starters which connect the motor first to low voltage, obtained from an autotransformer or series resistance and, after the motor is nearly up to speed, connect it to line voltage. Such a starter reduces both the starting current and the starting torque but the resulting torques are ample for starting fans and centrifugal pumps.

(3) Wound-rotor motor starters and speed regulators which connect the motor primary to the line and the secondary to the control resistance. These usually consist of a magnetic primary contactor with a hand operated secondary faceplate or drum.

Continued on next page

FLEXARC WELDERS

Westinghouse offers a complete line of arc welding equipment, designed under the guidance of the pioneers in the field of structural steel arc welding. Experience

A 200 Amp. Engine Driven FlexArc Welder Built for Field Service

taught them the need for such features in a welding machine as: separate excitation; single dial control; easy portability and sturdy, weather-proof construction. Westinghouse welders are built in various types to meet every welding requirement.

The FlexArc line of Westinghouse welders embodies a new *non-surge welding circuit,* affording welding speeds and an effective range of application impracticable in ordinary welding practice. This principle places at the disposal of the operator a machine which enables him to do his work with greater speed, to obtain neater results and to save in the consumption of electrode and power.

The flexibility of these welders is shown by the fact that the operator can weld thin material—then change electrodes and turn *one* dial for the welding of a piece of heavy steel. In the shop or out in the wind —welding in a downward or overhead position—at every step of welding current adjustment, he can start and maintain the arc with utmost ease.

FlexArc welders are supplied in the 200 and 300-ampere a-c. driven sets, the gas engine driven sets and the dual drive (motor and gas engine) sets.

We will gladly send you a copy of S. P. 1879, "The Arc Welding of Structural Steel," upon request.

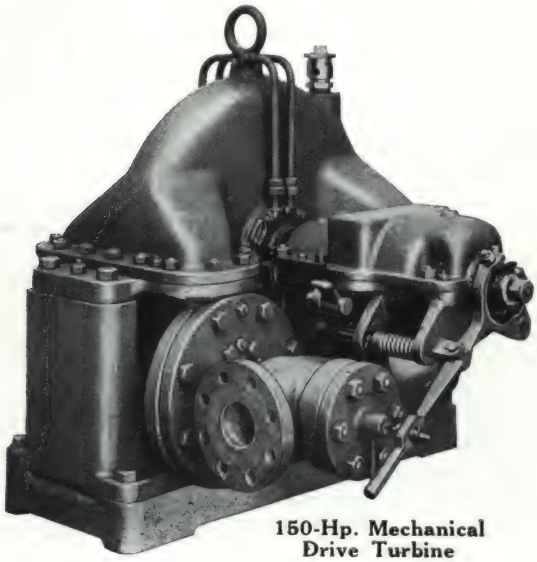
A 200 Amp. Engine Driven Flexarc Welder Built for FlexArc Ease of Current Adjustment

SMALL TURBINE GENERATOR UNITS

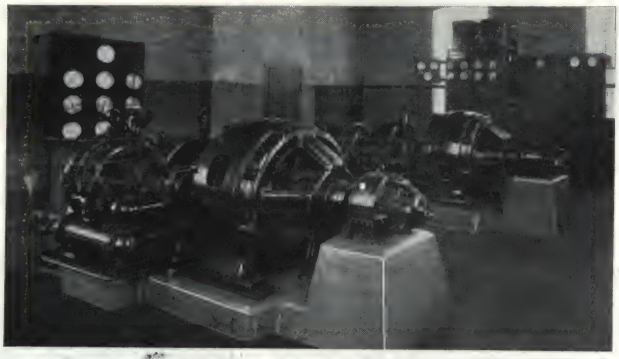
The Westinghouse Company builds a diversified line of steam turbines for both mechanical drive and electrical generation, together with a complete line of surface, jet and barometric condensers and their auxiliary equipment. This apparatus offers the important advantages of compactness, simplicity of construction, low maintenance cost, high efficiency and minimum amount of attention.

Because this Company builds both the steam and electrical ends of all turbines, unified responsibility is assured.

Mechanical drive turbines are especially adapted for driving centrifugal pumps, and fans and other rotary apparatus either direct-connected or through the medium of Westinghouse reduction gears.



150-Hp. Mechanical Drive Turbine



Two 150-KW. Westinghouse Turbine-generator Units Installed in the Powerhouse of a School

Steam turbine generator sets are built for either alternating or direct-current operation. These compact well-built units range in capacity from ½ kw. upward and can be arranged for either condensing or non-condensing service.

Incorporated in the design of these turbine generators are special and exclusive features such as: water-sealed glands, center-line supports, positive acting emergency governor, etc., which are of particular benefit in minimizing maintenance costs.

Westinghouse geared-turbine generator units serve a broad field of general power plant application, both as main units and as auxiliary units.

PEET & POWERS, INC.

"Lister Bruston" Automatic Electric Generating Plants

SOLE AGENTS IN UNITED STATES FOR R. A. LISTER & CO., LTD.

70 East 45th Street, NEW YORK, N. Y.

Products

ELECTRIC GENERATING PLANTS with full automatic or manual control, driven by gasoline or Diesel engines.

Also Gasoline and Diesel Engines for all purposes and pumping equipment.

Uses

Electric light and power service for country houses, shooting lodges, hotels, clubs, or small communities having no other source of supply.

Standby Plants

For buildings which are already supplied by Public Service. These units can be supplied to start themselves automatically when Public Service fails, or to be started manually.

Automatic and Special Control

Both gasoline and Diesel plants, except in 50 kw. and larger, can be supplied with automatic starting and remote control or with special characteristics to meet special conditions.

Alternating or Direct Current

Plants of all capacities as required for a-c. or d-c.

Engineering Service

Engineering service in assisting in selecting and laying out the most suitable equipment for electric and water systems is provided, free of charge, by competent engineers. We are also equipped to furnish experienced and reliable men for the construction work in the installation and wiring.

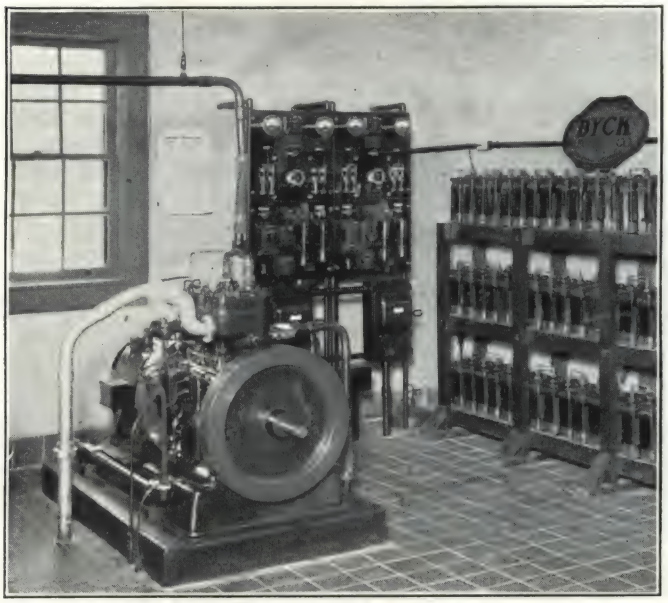
General Specifications

GASOLINE ENGINE DRIVEN PLANTS

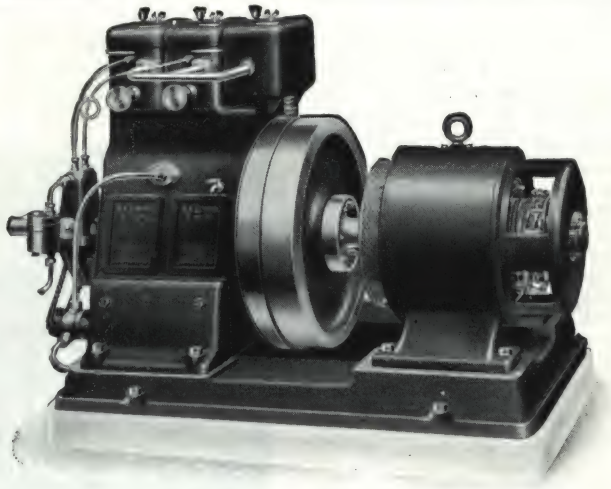
Kilowatts	R.p.m.
1	1000
1½	700
2¼ to 11	450 to 600
30 to 50	1200

DIESEL ENGINE DRIVEN PLANTS

Kilowatts	R.p.m.
2½	600
5 and 12	1000
25	1000
25 to 300	275 to 450



10 Kw. Powerhouse, 110 Volts D-c.



12 Kw. Diesel Unit 1100 R.p.m.

SPECIFICATIONS OF HIGH SPEED DIESEL PLANTS

Kilowatts	2½	5	12	27
Engine cylinders	1	1	2	4
Revs. per min	600	1000	1100	1100

SPECIFICATIONS 110-VOLTS FULL AUTOMATIC GASOLINE PLANTS

Kilowatts (continuous)	1	1½	2¼	3½	5	7½	11
Engine cylinders	1	1	1	1	2	2	2
Size of c. i. base	2'6"x1'6"	2'9"x2'0"	4'6"x2'6"	4'6"x2'6"	5'2"x2'8"	5'2"x2'8"	5'2"x2'8"
Wt. without battery, lbs. packed	794	1232	2940	3135	4135	4450	5632
Battery, ampere-hours	53	53	80	80	106	160	187
Wt. of battery, lbs. packed	2000	2000	2214	2214	2322	3024	3500
Length of battery rack	8'0"	8'0"	8'0"	8'0"	8'0"	12'6"	12'6"

Typical Installations

Mrs. E. F. Hutton, Paul Smiths, N. Y.
J. A. Fisher, Paul Smiths, N. Y.
J. Pierpont Morgan, Raquette, N. Y.
Raquette Boys' Camp, Raquette, N. Y.
North Point Inn, Raquette, N. Y.
Rogers Rock Club, Lake George, N. Y.
Mrs. Myles Standish, Millbrook, N. Y.
Julius Forstmann, Branch, N. Y.
Masonic Home, Utica, N. Y.
Geo. Foster Peabody, Saratoga, N. Y.
Mrs. J. E. Berwind, Bridghampton, N. Y.
Wilton Lloyd Smith, Huntington, N. Y.
E. Parmalee Prentice, Williamstown, Mass.
A. C. White, Litchfield, Conn.
M. M. Van Beuren, Newport, R. I.
Geo. G. Barber, Wolfboro, N. H.
Henry Lockhart, Jr., Easton, Md.
Okeetee Club, Switzerland, S. C.
H. N. Torry, Savannah, Ga.
L. M. Williams, Fredericksburg, Va.
R. H. McCurdy, Yamassee, S. C.
Mrs. G. S. Elder, Chattanooga, Tenn.
C. Ledyard Blair, Bermuda, B. W. I.
J. S. Frelinghuysen, Rice Hope, S. C.
Herbert Neal, Easton, Md.
D. W. Gurnett, Plymouth, Mass.
W. T. Carrington, Greenwich, Conn.
H. S. Shonnard, Georgetown, S. C.
Point O'Woods Assn., Point O'Woods, N. Y.
H. K. Hudson, Delta Plantation, S. C.
F. W. Fabyan, Buzzards Bay, Mass.
Ogden Reid, Munden, Va.
J. P. Knapp, Knotts Island, N. C.
W. F. B. Berger, Denver, Colo.
R. McCarrell, Washington, Pa.
Geo. D. Widener, Santee, S. C.
R. V. Plase, St. Simon's Island, Ga.
R. G. Elbert, Airy Hall, S. C.

THE ELECTRIC STORAGE BATTERY COMPANY

World's Largest Manufacturers of Storage Batteries for Every Purpose

GENERAL OFFICES AND WORKS
Allegheny Avenue and Nineteenth Street, PHILADELPHIA, PA.

BRANCHES

ATLANTA, GA., 210 Walker Street, S. W.
BOSTON, MASS., 100 Ashford Street
CHICAGO, ILL., 613 Marquette Building
CINCINNATI, OHIO, 1142 Sycamore Street
CLEVELAND, OHIO, Chester Avenue and E. 24th Street
DENVER, COLO., 1420-24 Wazee Street
DETROIT, MICH., 8051 W. Chicago Boulevard
KANSAS CITY, MO., 129 Belmont Boulevard
MINNEAPOLIS, MINN., 3 No. 15th Street
NEW YORK, N. Y., 23-31 W. 43rd Street
PHILADELPHIA, PA., 1955 W. Hunting Park Avenue
PITTSBURGH, PA., Union Trust Building
ROCHESTER, N. Y., 642 Plymouth Avenue, So.
ST. LOUIS, MO., 1058 So. Vandeventer Avenue
SAN FRANCISCO, CAL., 6150 Third Street
SEATTLE, WASH., 1041 Railroad Avenue, So.
WASHINGTON, D. C., 1823 L Street, N. W.
EXPORT SALES DEPT., 23-31 W. 43rd Street, NEW YORK, N. Y.
IN CANADA, EXIDE BATTERIES OF CANADA, LTD., TORONTO, ONT.

Exide BATTERIES

Product

STORAGE BATTERIES for Emergency Light and Power Systems and all other storage battery applications.

Purpose of Emergency Lighting or Power

Is to continue to furnish instantly and automatically an adequate lighting or power supply for human safety or monetary saving upon any interruption in the normal supply.

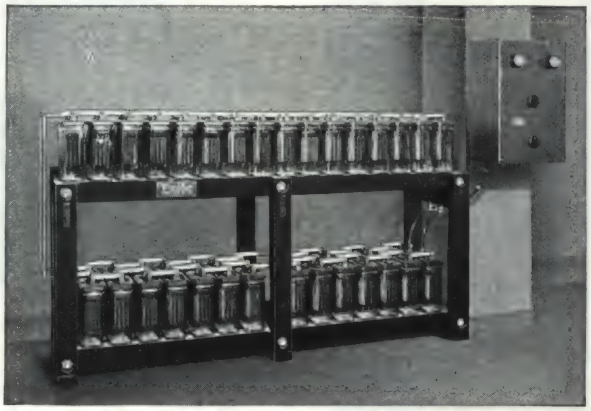
Uses

An emergency lighting battery is a necessary form of protection in every public building where groups of people gather for either work or recreation—especially after dark, as for example in:

Schools and colleges	Churches
Hospitals	Museums
Theaters	Art galleries
Dance halls	Gymnasiums
Banks	Office buildings
Apartments	Swimming pools
Institutions	Skating rinks
Department stores	Railroad stations
Hotels	Mines
Clubrooms	Industrial plants
	Powerhouses
	Markets

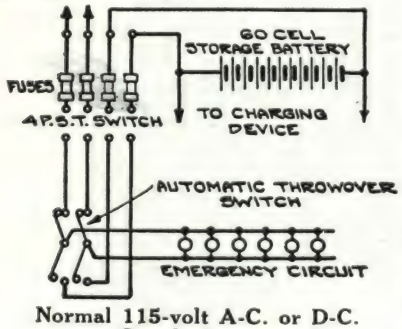
and any other building where lighting failure may endanger life, property or material.

Many industries may effect an economy either through saving of materials in the process of manufacture or saving of man hours by installation of an emergency power battery. Typical industries are glass and steel plants, bakeries, foundries, etc.



Typical 60-cell Exide Emergency Lighting Battery Installation

Method of Operation



Normal 115-volt A-C. or D-C. Supply 2-wire

The circuits to be protected normally operate from and are connected through an automatic transfer switch to the regular power supply. The emergency power supply, i.e., the storage battery, is connected to the other side of the switch.

Therefore transfer from the regular supply to the battery is automatic and instantaneous, should the regular supply fail for any reason. The battery then carries the load for the predetermined period (1½ to 5 hours) unless the regular power supply is restored and the automatic switch returns the emergency circuit to the regular supply.

The battery is maintained in a fully charged state automatically and it is therefore ready for instant dependable service.

Description

Experience has proved that over a period of years the most dependable as well as economical source of emergency power supply is a storage battery. This power, when derived from an Exide battery of proper size, is always dependable and sufficient to carry the full emergency load for the predetermined period. Furthermore, it is always available for instantaneous service.

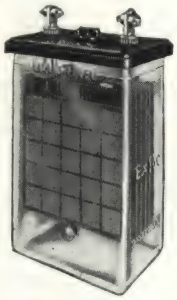
Exide batteries can be supplied in a wide range of capacities to suit any requirement.

Emergency lighting or power systems, generally speaking, consist of:

(a) The emergency circuit
(b) A storage battery
(c) Automatic control equipment
(d) Automatic charging device

(a) The emergency circuit may consist of the entire electrical load or any part thereof, such as those circuits where power is essential during a regular power failure.

(b) For service over a period of years far beyond the average, the most economical battery for emergency light and power service is the Exide Chloride Battery. The superiority of this type of battery is largely due to its specially designed Manchester positive plates and box negative plates.



Cell of Exide Chloride Battery

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Cross Section of Manchester Positive Plate Showing Button Construction

The Manchester plate is constructed of an extremely heavy cast lead-antimony alloy grid, into which are pressed small "buttons" of lead. These "buttons" of lead give a tremendous reserve of active material. The negative plates, built to equal the life of the positive plates, retain their active material in perforated alloy boxes.

Where low first cost is of primary importance the Exide Pasted Plate type offers a reliable comparatively long life battery. These plates are of the same careful construction, characteristic of all Exide batteries and will give many years of trouble-free service.

Both the Exide Chloride and Pasted Plate types have been designed for high discharge rates at good voltage characteristics. They are of the sealed glass jar construction designed for a minimum of acid spray and creepage, thus no battery room is necessary. Low gravity electrolyte makes for a longer life while to insure a quality product each cell receives a complete test and inspection before shipment, which is made with the cells assembled, sealed and charged ready for use.

(c and d) The control and charging equipment required for use in connection with any emergency lighting battery is necessarily determined by the size of the battery. It consists of the automatic switch mentioned above, together with a means of keeping the battery fully charged automatically at all times and a means of charging the battery in a short period of time.

Selection of Equipment

The size of battery and control equipment is determined by the watt load and the predetermined protection period. The laws of Pennsylvania require an emergency protection for a minimum of 1½ hours. From the table below you may readily select the catalogue number of the equipment to meet the requirements.

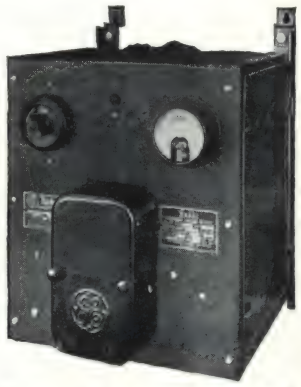
Example—Assuming there are 25 fifty-watt lamps, 30 one hundred-watt lamps, 2 two hundred-watt lamps in the emergency circuits, the total wattage of this load would be 4650 watts. Should the protection period be 1½ hours we note by reference to the column "Watts for 1½ hr." the nearest figure above 4650 is 5350, and therefore equipment No. 7125350M, including a 60-cell EMGO-7 battery will meet the requirements.

Engineering and Operating Assistance

The Electric Storage Battery Company will be glad to assist in the engineering of any installation, and is prepared to offer assistance and advice with relation to any unusual problems without charge or obligation.

The company maintains a staff of competent operating engineers who, on request, will make such inspections of installations as may be necessary to obtain the best possible operating conditions and resultant long life of our batteries.

Branch offices are maintained in 17 cities and operating departments in 19 cities throughout the United States.



View of Automatic Control Panel, Switch and Charger

Installation and Cost

The entire system has been designed for ease of installation, thereby reducing labor charges to a minimum. The long life of the battery and durability of the control equipment make for an unusually economical equipment

Specifications for Emergency Lighting Equipment

Note: The following is a suggested form of general specifications. It may be completed to cover any desired equipment by filling in the blanks.

The contractor shall furnish and install in satisfactory operating condition a complete Exide Emergency Lighting Equipment, consisting of a storage battery together with suitable control apparatus and battery charging equipment, all designed for operating in connection with a lighting circuit which will be normally operated from a ..... volt ..... phase ..... cycle ..... wire circuit.

Storage Battery—The storage battery shall consist of .... cells*, type ...., as manufactured by The Electric Storage Battery Company, of the sealed glass jar type having its elements suspended from a moulded double flanged cover, the cover to be sealed acidtight to the jar. The joints between terminal posts and cover shall be sealed acidtight by means of a cupped lead washer and an alloy seal nut, both being sealed by means of No-ox-id grease.

When fully charged and at a temperature of 70° F., the electrolyte being at the proper level and of a specific gravity of from 1.200 to 1.220, the capacity shall be sufficient to supply a rated lamp or power load of .... watts for a period of .... hours, with a final voltage at its terminals of not less than .... volts. There shall be furnished one battery thermometer and one syringe type hydrometer, also suitable wood racks (†) of standard design for supporting the cells in two tiers.

(*—60 cells are furnished for normal 115-volt circuits.)

(†—Omit when racks are not desired.)

Control Apparatus—An automatic switch shall be provided which will transfer the emergency circuit from the normal supply circuit to the battery circuit upon the failure of the normal source of supply, and automatically reconnect the emergency circuit to the normal supply circuit when normal service is restored. Suitable switching apparatus shall be included for the hand control of the emergency lighting circuit. Suitable fuses shall be included for the protection of the various circuits. All equipment included in the load circuit shall have a safe carrying capacity of not less than .... watts.

The necessary meters shall be included for checking the operation during charge. Suitable terminals and lugs shall be provided for connection to all external circuits. (If the control apparatus is to be mounted on a panel and assembled in an enclosing case, the terminal connections should be front-of-board type.)

Charging Apparatus—Suitable charging apparatus shall be provided of a capacity to charge the battery in .... hours following an emergency discharge and designed for operation from the normal supply circuit. Provision shall be included for automatically maintaining the battery in a fully charged condition.

All Requirements Met—*These equipments meet the requirements of the National Board of Fire Underwriters as well as local regulations.*

TOTAL EMERGENCY LOAD IN WATTS FOR PERIODS OF 1½, 2 AND 3 HOURS

Operating Voltage: 2-wire, 1-phase, 60-cycle, 115 Volts a-c. to 115 Volts d-c.

Type battery	Equip. No.	Watts for 1½ hr.	Equip. No.	Watts for 2 hr.	Equip. No.	Watts for 3 hr.	Approx. shipping wt., excl. rack	Dimensions of standard racks, ft.—in. Hgt.	W'th.	Lgth.
Chloride Exide Batteries (60 Cells)										
DMGO-3	32900M	900	32750M	750	32575M	575	2240	4–7	1–11	7–1
5	361780M	1780	361500M	1500	361150M	1150	2560	4–7	1–11	7–1
7	362680M	2680	362240M	2240	361725M	1725	3760	4–7	1–11	8–7
9	363560M	3560	362990M	2990	362300M	2300	4060	4–7	1–11	10–0
EMGO-7	7125350M	5350	7124480M	4480	7123450M	3450	5635	4–11	2–3	10–2
9	7127125M	7125	7125980M	5980	7124600M	4600	6285	4–11	2–3	10–2
11	7128900M	8900	7127475M	7475	.....	.....	.....	5–1	2–3	15–2
Final volts		101		102		103				
Exide Batteries (60 Cells)										
BTO-3	32415E	415	32360E	360	32265E	265	640	4–0	11	7–4
BTE-5	32600E	600	32520E	550	32390E	415	880	3–9	15	5–6
BTE-7	321040E	1040	32775E	820	32580E	620	940	3–9	15	5–6
KZHG-7	321300E	1300	321040E	1040	32780E	780	940	3–9	15	5–6
KXE-5	361820E	1820	361480E	1480	361100E	1100	1470	4–1	1–10	4–8
KXF-7	362740E	2740	362220E	2220	361640E	1640	2585	4–4	1–11	7–1
9	363650E	3650	362960E	2960	362180E	2180	3155	4–4	1–11	10–0
11	764560E	4560	763700E	3700	762740E	2740	3400	4–4	1–11	10–0
KXF-13	7125480E	5480	7124440E	4440	7123280E	3280	3650	4–4	1–11	10–0
15	7126380E	6380	7125180E	5180	7123820E	3820	4150	4–4	1–11	11–11
EOGO-9	7127920E	7920	7126350E	6350	7124780E	4780	5025	4–11	2–3	10–2
Final volts	(Type BT)	100		100		102				
Final volts	(other types)	101		102		103				

Data on intermediate or larger sizes or to meet special requirements such as d-c. to d-c., 3 or 4-wire, 2 and 3-phase, etc., furnished upon request.

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue. For References to Other Products, see Index to Manufacturers

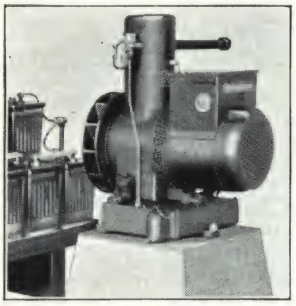
WESTINGHOUSE ELECTRIC SERVICE PLANTS

Westinghouse Electric Service Plants are complete, self-contained electric generating units made to furnish electric light and power where central station service is not available. A few of the applications are given below to show the possible uses for individual light and power plants:

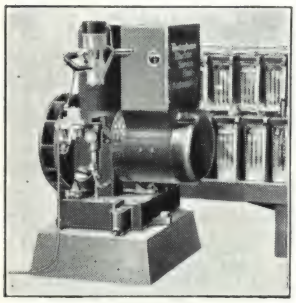
Airports	Churches	Quarries
Amusement parks	Docks	Ranches
Banks	Dredges	Roadside stands
Barges	Farms of all kinds	Schools
Boats and ships	Halls	Stores
Small camps	Hospitals	Theaters
Construction camps	Hotels	Gas and oil wells
Lumber camps	Mines	Wharves
Carnivals	Pumping stations	

These Electric Service Plants are noted for their simplicity of construction and ease of operation and are built in a variety of sizes and capacities to meet the requirements of various application. They are well known for their durability, economy of operation, and efficiency of performance, and will pay for themselves in a very short time.

There are four general classes of electric service plants: the semi-automatic battery-charging type, the combination battery type, the non-battery type and the automatic non-battery type. The semi-automatic battery charging and the hand cranked plants can be operated on gasoline, kerosene, natural or artificial gas or alcohol. All automatic plants can be operated on gasoline, natural or artificial gas. A special gas device is provided for natural or artificial gas.



Type E-31

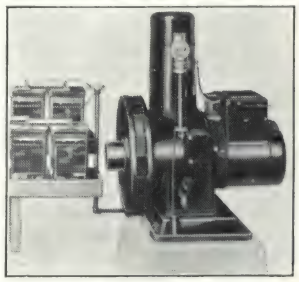


Type E-36

Types

Type E-31—This model is suitable where the peak load is about 1000 to 1250 watts and a small amount of current is required over a long period of time. Current is supplied from a set of batteries which are charged by the engine generator. An indicator cell is included with each set of batteries and indicates the state of charge of the batteries at all times. The plant automatically stops when they have been fully charged or it can be stopped by a convenient push button.

Type E-36—The E-36 electric service plant combines in a single unit the services of battery with automatic engine generator. Where automatic devices are used, such as electric refrigerators and water systems, and where it is desired to have 1000 to 1200 watts available this model will meet these requirements satisfactorily.



Type E-60

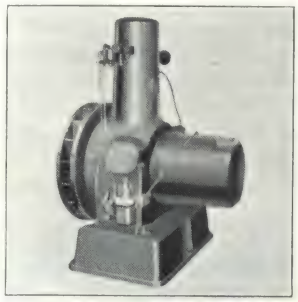
Type E-60—Here's an electric service plant that meets the requirements of large dairy farms and ranches and the larger rural homes where the peak load is about 2000 watts.

Mechanical power up to 3 hp. is obtainable by means of a flywheel pulley.

Where current is needed within the range of this plant, there is not another model that will meet this demand so easily and efficiently.

Type E-83—Where 110-volt service is desirable or where 2500 to 4500 watts comprise the peak load, the E-83 model is the ideal plant to use.

Large farms, ranches, rural homes, airports, churches, etc., find in this source of power enough to take care of their water system, tool shed, electric appliances, and lighting requirements.



Type E-88

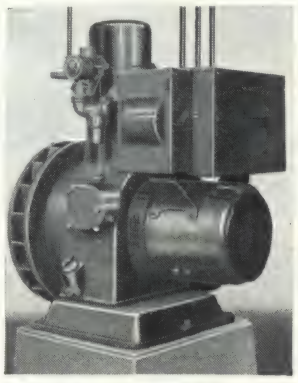
Type E-88—Here is an electric service plant that can be used for either portable or stationary service.

No battery is required, the plant furnishing 2000 watts at 115 volts through cranking manually.

A convenient push button makes stopping easy.

May be used to good advantage for standby and emergency service should there be a partial or complete failure of the regular source of current.

Type AC-188—This unit is designed for all places where it is desirable or necessary to have an emergency source of current should the Central Station service fail. It is rated 2 kw. 115 volt.



Type AC-188

No storage battery is required. This type automatically furnishes electricity when the normal supply fails and likewise stops when the regular current returns. It is especially adapted for the following places, many of which are required by state laws to have emergency lighting units: schools, theaters, banks, hospitals, factories, churches, jails, asylums, apartment houses, airports, subway, etc.

Type DC-188 is of similar design to the AC-188. It is used where Central Station service cannot be obtained and where the normal supply is furnished by an individual d-c. unit.

SPECIFICATIONS

Type	Operation	Generator	Service, volts	Engine size, hp.	Battery capacity, watthours	Engine generator dim. in.			Speed, rpm.	Oil cap., qt.	Fuel capacity
						Length	Width	Height			
E-31	Semi-automatic	750	32	1½	2880-7680	23½	17	28½	1250	2	2-gal. (tank in base)
E-35	Automatic	750	32	1½	2880-7680	23½	19¼	28½	1250	2	2-gal. (tank in base)
E-36	Automatic	750	32	1½	2800-7680	23½	19¼	28½	1250	10	5 or 55-gal. (tank)
E-38	Automatic	750	32	1½	2800-7680	23½	19¼	28½	1250	10	Natural or artificial gas
E-60	Semi-automatic	1500	32	3	3840-7680	29¾	19½	35	1200	4	2-gal. (tank in base)
E-83	Semi-automatic	2000	110	3½	10080-26880	29¾	19½	37½	1200	4	6-gal. (tank in base)
E-88	Manual	2000	115 d-c.	3½	No batteries	29¾	19½	37½	1200	4	6-gal. (tank in base)
A-C. 188	Automatic	2000	110-115 d-c.	3½	{12-volt starting}	30⅜	19½	35	1200	4	55-gal. (tank)
D-C. 188	Automatic	2000	110-115 d-c.	3½	{ battery }	30⅜	19½	35	1200	4	Natural or artificial gas

GENERAL ELECTRIC COMPANY

GENERAL OFFICE

1 River Road, SCHENECTADY, N. Y.

SALES OFFICES (ADDRESS NEAREST OFFICE)

AKRON, OHIO, 159 South Main Street
AMARILLO, TEX., 806 South Grant Street
ATLANTA, GA., 187 Spring Street, Northwest
BALTIMORE, MD., 39 West Lexington Street
BINGHAMTON, N. Y., 19 Chenango Street
BIRMINGHAM, ALA., 2031 First Avenue, North
BLUEFIELD, W. VA., 307 Federal Street
BOSTON, MASS., 140 Federal Street
BUFFALO, N. Y., 39 East Genesee Street
BUTTE, MONT., 20 West Granite Street
CANTON, OHIO, 700 Tuscarawas Street, West
CHARLESTON, W. VA., 304 Capitol Street
CHARLOTTE, N. C., 200 South Tryon Street
CHATTANOOGA, TENN., 536 Market Street
CHICAGO, ILL., 230 South Clark Street
CINCINNATI, OHIO, 215 West Third Street
CLEVELAND, OHIO, 925 Euclid Avenue
COLUMBUS, OHIO, 17 South High Street
DALLAS, TEX., 1801 North Lamar Street
DAVENPORT, IOWA, 511 Pershing Avenue
DAYTON, OHIO, 25 North Main Street
DENVER, COLO., 650 Seventeenth Street
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DETROIT, MICH., 700 Antoinette Street
DULUTH, MINN., 14 West Superior Street
EL PASO, TEX., 109 North Oregon Street
ERIE, PA., 10 East Twelfth Street
FORT WAYNE, IND., 1635 Broadway
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GRAND RAPIDS, MICH., 148 Monroe Avenue, North West
HARTFORD, CONN., 18 Asylum Street
HOUSTON, TEX., 1016 Walker Avenue
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JACKSON, MICH., 212 Michigan Avenue, West
JACKSONVILLE, FLA., 11 East Forsyth Street
KANSAS CITY, MO., 1004 Baltimore Avenue
KNOXVILLE, TENN., 602 South Gay Street
LOS ANGELES, CALIF., 5201 Santa Fe Avenue
LOUISVILLE, KY., 455 South Fourth Street
MEMPHIS, TENN., 8 North Third Street
MIAMI, FLA., 25 Southeast Second Street
MILWAUKEE, WIS., 940 West St. Paul Avenue
MINNEAPOLIS, MINN., 107 South Fifth Street
NASHVILLE, TENN., 234 Third Avenue, North
NEWARK, N. J., 20 Washington Place
NEW HAVEN, CONN., 129 Church Street
NEW ORLEANS, LA., 837 Gravier Street
NEW YORK, N. Y., 120 Broadway
NIAGARA FALLS, N. Y., 201 Falls Street
OKLAHOMA CITY, OKLA., 15 North Robinson Street
OMAHA, NEB., 409 South Seventeenth Street
PHILADELPHIA, PA., 1405 Locust Street
PHOENIX, ARIZ., 11 West Jefferson Street
PINE BLUFF, ARK., 501 Main Street
PITTSBURGH, PA., 535 Smithfield Street
PORTLAND, ORE., 329 Alder Street
PROVIDENCE, R. I., 76 Westminster Street
RICHMOND, VA., 700 East Franklin Street
ROANOKE, VA., 202 South Jefferson Street
ROCHESTER, N. Y., 89 East Avenue
ST. LOUIS, MO., 112 North Fourth Street
SALT LAKE CITY, UTAH, 200 South Main Street
SAN ANTONIO, TEX., 201 Villita Street
SAN FRANCISCO, CALIF., 235 Montgomery Street
SCHENECTADY, N. Y., 1 River Road
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SHREVEPORT, LA., 513 Marshal Street
SPOKANE, WASH., 421 Riverside Avenue
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SYRACUSE, N. Y., 113 South Salina Street
TACOMA, WASH., 1019 Pacific Avenue
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TULSA, OKLA., 409 South Boston Street
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WASHINGTON, D. C., 800 Fifteenth Street, North West
WATERBURY, CONN., 195 Grand Street
WHEELING, W. VA., 40 Fourteenth Street
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YOUNGSTOWN, OHIO, 16 Central Square

FOR CANADIAN BUSINESS REFER TO CANADIAN GENERAL ELECTRIC COMPANY, LTD., TORONTO
FOR HAWAIIAN BUSINESS REFER TO W. A. RAMSAY, LTD., HONOLULU

Motor Dealers and Lamp Agencies in All Large Cities and Towns

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Special service divisions are also maintained at the following works of the Company: Erie, Pa.; Ft. Wayne, Ind.; Oakland, Calif.; Pittsfield, Mass.; Schenectady, N. Y., and West Lynn, Mass., River Works and West Lynn Works

BROADCASTING STATIONS

WGY, Schenectady, N. Y. KOA, Denver, Colo. KGO, Oakland, Cal.

Distributors for the General Electric Company Outside of the United States and Canada

INTERNATIONAL GENERAL ELECTRIC COMPANY, INC.

NEW YORK, N. Y., 120 Broadway — General Sales Offices, SCHENECTADY, N. Y.

Foreign Offices and Associated Companies in Principal Cities of the World

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For Floodlighting Projectors, Electric Refrigerators, and Wiring Devices, see Manufacturers' Index

ASSOCIATED COMPANIES ALSO LISTED IN SWEET'S ARCHITECTURAL CATALOGUES

EDISON GENERAL ELECTRIC APPLIANCE COMPANY, INC.

BAILEY METER COMPANY

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Electric Heating Equipment for Homes
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X-Ray Apparatus Including Coolidge Tubes
CHICAGO, ILL.

WIRELESS SPECIALTY APPARATUS COMPANY
Radio Apparatus and Supplies
JAMAICA PLAIN, BOSTON, MASS.

Continued on next page

GENERAL ELECTRIC SERVICE TO THE ARCHITECTURAL PROFESSION

The GENERAL ELECTRIC COMPANY offers an engineering service to architects for the co-ordination of elements manufactured by it to meet given needs or demands for the building trade. The services of its experts are available for any problem that may develop, or for data on special apparatus and materials. On the opposite page is a list of branch offices located at the most important centers of the country. Here expert service and information may be quickly obtained.

Electric Service

The distribution center of a building is that point from which the light and power feeders radiate to the different parts of the building. The center may be a substation taking in electric energy from a utility, or it may be a private plant, or it may be a combination of both.

The simplest distribution center may consist of a switchboard with incoming service and feeder panels. A more complicated equipment is involved if the incoming service is at a voltage higher than would be distributed through the building, so that transformers are required. A still more elaborate equipment is involved where the energy is purchased as alternating current and is to be converted into direct current by synchronous converters or motor-generator sets. The plant may include engine driven direct-current generators, or engine driven alternators, or direct-current or alternating-current turbo-generators. The GENERAL ELECTRIC COMPANY manufactures a complete line of apparatus for all of these services.

Recognizing that the requirements of electrical energy distribution in commercial buildings call for high grade equipment, securing the utmost continuity of service, high operating efficiency, low maintenance expense, and the least possible attendance, the GENERAL ELECTRIC COMPANY has designed its apparatus for such service particularly with this thought in view. Architectural engineers may specify General Electric apparatus for building equipment with a certainty that its design and application are supervised by a corps of engineers who have building service problems in mind and the experience to solve them.

The problem of whether to install direct current or alternating current in a building is one that has to be taken up in each individual instance. In general, it may be said that with the development of variable voltage control for elevators and quiet running alternating-current motors for fans, there is little need for the conversion of alternating to direct current where alternating current is purchased from the utility.

General Electric System

The GENERAL ELECTRIC COMPANY offers a complete, comprehensive electrical system to meet the varied requirements of present-day practices, and not merely a collection of apparatus and material. Some of the elements of the General Electric System are described in this volume.

SUPPLY AND DISTRIBUTION OF ELECTRIC ENERGY IN BUILDINGS

The data presented in this catalogue relate to general problems involved in the supply and distribution of electrical energy for office buildings, banks, hotels, theaters, department stores, hospitals, educational and public buildings, large apartment houses, and similar structures.

Other sections of this catalogue describe apparatus and supplies for the generation and utilization of electrical energy for such structures.

For buildings of the character defined in the first paragraph of this section, electricity is used for:

(1) Lighting.

(2) Power for elevators, pumps, fans, air compressors, ice machines, kitchen and laundry machinery, vacuum cleaners, office appliances, and miscellaneous uses.

(3) Heating.

Sources of Electrical Energy

Electrical energy for buildings is derived as follows:

Purchased Energy from a Public Utility—This may involve one, two, or even three incoming sets of supply mains, according to the degree of protection desired against possible shutdown. It may be concerned with energy purchased as alternating or direct current, or both. Proper and efficient utilization of the energy may require substation equipment for stepping down a voltage too high for interior distribution, or machines designed for conversion from alternating current or direct current.

Electrical Energy Manufactured on the Premises—To use energy obtained from this source necessitates the choice of a system, whether alternating or direct current; the selection of the type of prime mover; and the determination of the number and size of the generating units.

Combined Purchased and Manufactured Energy—Such a source of supply involves the problems of tie-in with emergency sources of energy; throw-over connections, etc.

Electrical Requirements of a Supply and Distribution System

The essential elements of a system of purchased electrical energy are:

(1) The incoming line or lines.

(2) The disconnecting switches, circuit breakers, or other protective devices, and the meters, installed by the utility company or considered as part of the incoming lines.

(3) The interior distribution center occasionally called the substation, involving as the case may be, transformers, switches, circuit breakers, relays, meters, instruments, motor-generators, synchronous converters, exciters, regulators, and their control and protective devices.

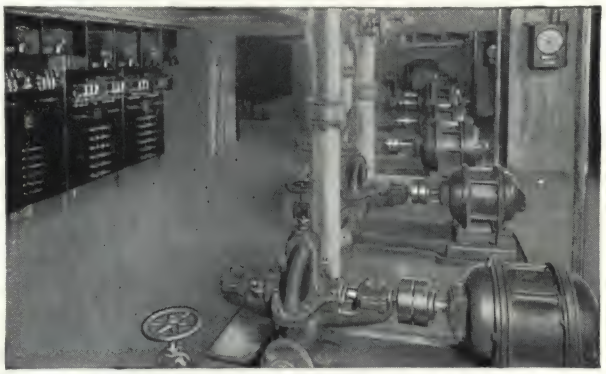
(4) A system of circuits, buses, cables and conduits between the various incoming lines and switches at the distribution center, apparatus at the distribution center and the outgoing feeders.

(5) A number of power and light feeders and their branches, with cables, conduits and devices for their control and protection. Insulated cable for complete lighting and power system, including supply and distribution cables and cable for vertical suspension in high buildings.

(6) Various distribution panels for power and light, at proper locations on the feeders.

(7) The various energy-consuming devices themselves, for light, power and heat, with their respective controlling and protective equipments.

When energy is generated at the premises there is involved in place of (1) and (2) above, or in addition thereto, the generating apparatus with its auxiliaries, and its control and protective equipment. Usually, where energy is generated on the premises, there is less substation apparatus (3).



7 G-E Induction Motors Coupled to 6 House and 1 Fire Pump, Respectively, G-E Control Equipment at Left

Steam Turbine-Generator Sets

Small steam turbine generating sets using either alternating-current generators direct connected to the turbine or direct-current generators connected to the turbine through reducing gears, are a convenient addition to the power plant, or may supplant engine driven generators altogether under special circumstances. The water rate of turbines of this type, operated as they are usually non-condensing and with only moderate pressures and superheat, is higher than that of reciprocating steam engines of corresponding capacities. However, considerations of over-all cost, space, etc., enter into the problem, especially where the exhaust steam is used for heating and the steam consumption of the turbine itself is relatively unimportant.

Built in sizes from 10 K.W. upwards.

A-C. and D-C. Generators

G-E alternators are designed for good over-all efficiency and regulation. For building services, alternators should be equipped with automatic voltage regulators. General Electric direct-current engine driven generators are designed for high

Continued on next page

efficiency and for close maintenance of voltage with varying loads. When applying engine driven generators to lighting and power services in commercial buildings, special attention has to be paid to securing the desired flywheel effect on the engine in order to maintain the most uniform voltage on the lamps. Where the elevator load is a large proportion of the generator capacity, and especially where rheostatic controlled elevators of high starting currents are employed in a building which generates its own power, a problem is introduced that requires special study to receive satisfactory service.

Built in capacities of 15 k.w. and upwards.

Transformers

While low voltage distribution of alternating-current circuits has been the rule in commercial buildings, it is not at all uncommon to bring 2300 volts, 4600 volts, or as high as 13,200 volts into a building and transform on the premises, getting the benefit of low line losses and the best possible power rates.

General Electric is always ready to co-operate to the fullest extent of its facilities to meet emergency requiring short delivery on transformers for which demand is not sufficiently established to justify stocks.

SWITCHGEAR

G-E Switching Equipments

G-E Switching Equipments are manufactured to meet all different classes of requirements. A comprehensive line of standard panels has been developed and this line includes panels to meet all usual demands. When the conditions are such that standard panels cannot be applied, the company's long experience assure the best service in the selection and design of the switchboard to meet the requirements For complete information on any equipment you are invited to consult the nearest G-E Sales Office. Publications giving either descriptive information or detail information on any equipment can be obtained from any G-E Sales Office.

Switchboard of Ebony Asbestos
Showing rectangular instruments and meters

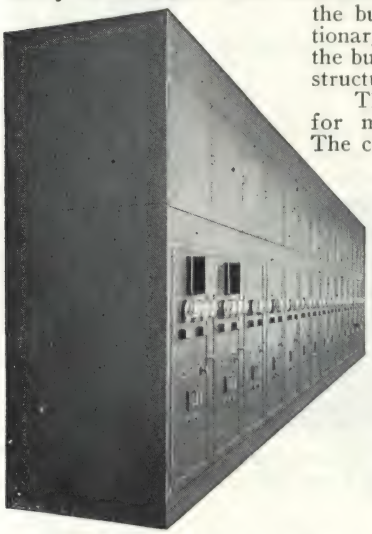
Steel Switchboard, Duplex Type
With rear panels hinged for easy access to front or rear panels (one panel swung open)

Safety Enclosure Type of Switchboard

The safety enclosed removable truck switchboard has features which are reflected in decreased operating expenses and more satisfactory service: Factory built complete, low installation cost, economical operation, continuity of service, safety to attendants and decreased fire risk. Up to 7500 V. the buses are located in the stationary housing and above 7500 V. the buses are located in the superstructure.

The cubicles meet the demand for metal enclosed switchboard. The cubicles are easy to install, a small amount of floor space is required, no special foundations are necessary, all wiring is readily accessible on the back of the front panel, reduced maintenance costs are realized due to the dust and vermin proof construction, complete accessibility of the various parts and shipped ready for installation.

The indoor metal-clad switchgear is a factory-built complete with compact unit construction, removable oil circuit breaker, live parts enclosed and high insulation. The metal-clad incorporates all the desirable features of cell mounted switchgear as well as the safe, economical and improved operating features of removable truck type switchgear.



A-c. Feeder Equipments in Cubicles
Electrically operated oil circuit breakers. (Manually operated can be furnished)

The Stationary Dead Front switchboards with brush contact switches have the following advantages: safety to attendants, ease and economy of installation, and reduction of fire hazard. The switches vary in capacity from 30 to 600 amperes up to 250 V. d-c. and 500 V. a-c.

Open Vertical and Bench Type of Switchboard

These switchboards can be furnished with panels of natural black slate, ebony asbestos or steel and any equipment that is required for either indoor and outdoor installation.

Automatic Switching Equipments

Standard automatic switching equipments are now available for each class of service to which the method of control has been applied.

Automatic supervisory equipments provide for the centralized control and indication of various types of switching equipment.

Automatic telemetering equipments are used to transmit readings of instruments from distant points to a central headquarter.

Typical Stationary Dead Front Switchboard with Brush Contact Switches

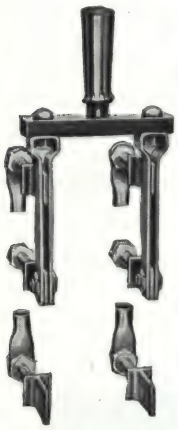
G-E Switchboard Devices

Entire responsibility for the successful performance of a General Electric switchboard assembly is assumed by the company, inasmuch as all of the electrical devices used to make up the complete switchboard are solely of General Electric manufacture.

On the following page are shown a few devices representative of the complete G-E line.

Continued on next page

SWITCHES



100-Amp., Double Pole, Double Throw Knife Switch, Type LP-1

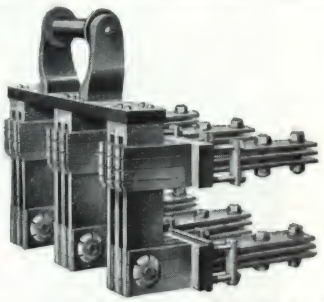
G-E Switches

The complete line of G-E switches for switchboard work includes knife, disconnecting, control and brush contact types.

Knife—G-E knife switches are built in two types: Type LP-1 (30 to 1200 amp. inclusive) and Type LD-22 (1600 to 3000 amp. inclusive).

Type LP-1 switches are available in single, double, triple and 4-pole units, single and double throw, for circuits up to 600 volts a-c. or d-c. The 600 volt sizes are built in single pole, single and double throw units only. Single throw switches up to and including 600 amp., 250 volts d-c. and 500 volts a-c. can be supplied with provision for National Electrical Code standards fuses. Above 250 volts d-c. and 500 volts a-c. (and above 1000 amp. at any voltage) switches should be used as disconnecting devices only, usually connected in series with air circuit breakers. Type LD-22 switches are also available in single, double, triple and 4-pole units, single and double throw, for circuits up to and including 600 volts d-c. or a-c.

Disconnecting—All commercial types of disconnecting switches providing for various current capacities, voltages, mountings, etc., are manufactured. The insulation and normal rating are designed to meet the requirements of the A. I. E. E.



2000-Amp., Triple Pole, Single Throw Knife Switch, Type LD-22

Control—Type CL-1 turn pull control switches are especially adapted for switchboard mounting and are recommended for the control of electrically operated air or oil circuit breakers. The switch is totally enclosed. The contacts of these switches will break currents of 10, 3.5 and 0.5 amp. at 125, 250 and 600 volts d-c., respectively, and currents of 15, 5 and 2 amp. at 110, 220 and 440 volts a-c. Should the mechanism of the device to be operated require heavier currents, the use of a control relay in conjunction with the control switch is recommended.

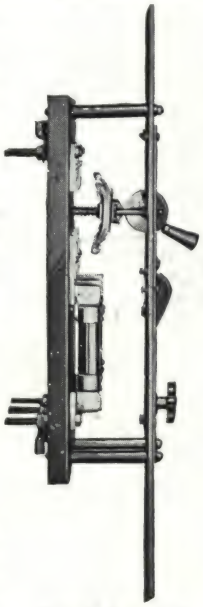
Turn Pull Control Switch with Resistor Type Indicating Lamps

Brush Contact—Brush contact switches are safety enclosed and externally operated for back or front connection.

Back connected brush contact switches are used in connection with dead front switchboards as disconnecting switches or heavy capacity feeder switches.

Front-connected switches are recommended for mounting in individual metal cabinets. The switches, assembled in this manner, are especially useful as feeder switches for individual motors in all industrial applications and for all power and lighting circuits coming within the range of the switch rating.

They can be furnished single, double, triple or 4-pole, in various capacities up to 600 amp. at 250 volts d-c. and a-c., or 500 volts a-c. Any standard size may be supplied with or without fusible cut-outs.



Brush Contact Switch, Type BK-2

G-E Circuit Interrupting Devices

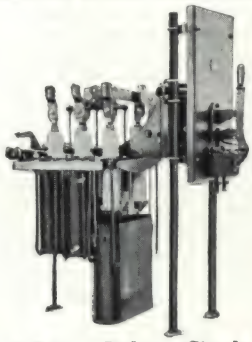
Many means are provided for closing and interrupting an electrical circuit both automatically or manually. We manufacture practically every variety and their selection therefore should be with caution sufficient to insure the correct operation both for the device and the imposition placed upon it.

Fuses—G-E enclosed and renewable enclosed type fuses are manufactured to accord with the National Electrical Code standards. Enclosed fuses 1 to 600 amp. and renewable enclosed fuses 3 to 600 amp. can be furnished for either 250 or 600 volts.

Air Circuit Breakers—G-E air circuit breakers alternating and direct current, are designed to operate on voltages up to 650. The construction is simple and action positive. Furnished in single, double, triple and 4-pole types. Single and double pole breakers may be supplied with individual handles, or with single rigid arm or the non-closable-on-overload, trip-free from the handle type: They may be equipped with instantaneous or time delay overload coils, and with underload, undervoltage, or shunt trip attachments. Large air circuit breakers may be solenoid or motor operated.

Double Pole, Double Coil, Single Arm, Trip-free Air Circuit Breaker, Type CK-8, with Time Attachment on Each Pole

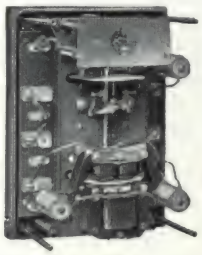
Oil Circuit Breakers—G-E oil circuit breakers include all sizes and styles commonly used, whether for the protection of motor circuits or intricate station networks. They are substantially constructed, thoroughly reliable, and conform with the standards of the A. I. E. E. and N. E. L. A. Furnished single, double and triple pole, for manual, solenoid or motor operation. Tripping may be either automatic or non-automatic. Electrically operated breakers may be adapted for under-voltage or over-voltage protection by the use of relays in the trip coil circuit. For manually operated breaker an undervoltage device is used instead of a relay.



Triple Pole, Single Throw, Oil Circuit Breaker Type FK-132-A, Mounted on Panel Frame

G-E Relays

G-E relays, direct and alternating current, for protection against overcurrent, reverse current, unbalanced current, overvoltage, undervoltage, unbalanced voltage, overpower, underpower, reverse power, reverse phase, reverse polarity and abnormal temperature, are manufactured for all possible applications. Auxiliary, control and signal relays are also available. Relays may be obtained for instantaneous, time-delay or time-limit action. They are simple, durable, accurate and unusually reliable.



Polyphase, Induction, Power-directional Relay, Type IK-104 (Cover Removed)

Time, Overcurrent Relay, Type IAC

Standard Unit, Definite-time, Overcurrent Relay, Type PQ-3

Fittings and Accessories

While G-E switchboards are furnished complete, ready to install, a line of fittings and accessories, is available on special order, including pipe fittings, supports, bus clamps, terminals, contact nuts, etc.

When Specifying

In order to specify correct type of switchboard panels and instruments for each installation, the architect or contractor should consult with the switchboard specialist in the nearest G-E Sales Office.

Continued on next page

G-E MOTORS AND CONTROLS

The motors listed in the following pages are, in general, those used for "general purpose" applications.

When motors are to be "built in," or the problem of proper motor and control selection and application is of a special nature, technical information, prices, etc., are available through our nearest Sales Office.

The selection of an electric motor and control for a given application depends upon the following factors:

Available Power

Whether alternating or direct current, the voltage, and if alternating current, the number of phases, the frequency, and whether a two-, three-, or four-wire system.

Starting Conditions

In many cases the user knows, from past experience, the type and rating of motor required, or frequently the manufacturer of the machine to be driven will supply the desired information. If it is not possible to obtain accurate information as to the size motor, the amount of pull needed to start the load can usually be measured. Since the frequency of starting and the duration of the starting periods, as well as unusual starting current limitations, are vital factors in determining the type and size of control and motor, these factors should be predetermined. Otherwise, a generalization of starting conditions as light, medium, heavy, or extremely can be made. From these premises an estimate as to the proper motor and control can be made. It is desirable where definite information as to the exact requirements is not available, to make working tests before a definite selection for a particular job is decided upon.

Running Conditions

Speeds—Motors are usually selected with as high a standard normal speed as is feasible, because within limits the lower the speed of the motor, the more costly it is to build, and frequently its operating characteristics are not as good as those of higher speed standard motors. However, the increased first cost and inherent losses from mechanical transmission may offset such advantages where the driven machine operates at very low speeds.

Constant vs. Adjustable Speeds—Constant speed motors are the preferable choice in the majority of cases. Adjustable speed motors are higher in first cost and give lower operating constants. In ordinary sizes they are seldom justified unless the quantity or quality of the output of the driven machines will be materially improved.

Voltage and Frequency Range

G-E motors will operate successfully under the following conditions of voltage and frequency variations but not necessarily in accordance with the standards established for operation at normal rating:

Where the variation in voltage does not exceed 10% above or below normal.

Where the frequency variation does not exceed 5% above or below normal.

Where the sum of the voltage and frequency variation does not exceed 10% (provided the variation in frequency does not exceed 5%) above or below normal rating, as stamped on motor nameplate.

The starting and maximum running torque will vary as the square of the voltage; the speed varying directly with the frequency.

All applications for reversing service should be referred to the Company.

Quiet Operation

If motors are required to operate in places where quiet operation is desirable such as libraries, churches, theaters, hospitals, private residences, etc., the Company should be advised in full detail so that proper recommendations may be made and a suitable quiet operating motor furnished.

Secure the Recommendations of G-E Engineer Before Ordering

The Company builds a large number of different forms of motors and controllers to meet the varied requirements of service, either electrical, mechanical, or local. Salesmen and engineers are always glad to assist in selecting the particular type or form of motor to best meet the conditions.

In applying motors either where the location involves unusual physical conditions, or where the machines to be driven require other than standard characteristics, it is respectively suggested that the recommendations of the Company be always secured, as to type and form of motor best adapted to the especial conditions of the application.

General-Purpose, Polyphase, Constant Speed, Induction Motors Squirrel-Cage Type

Motor Defined

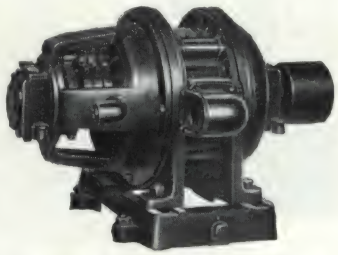
The word "motor" wherever used is intended to cover the machine without accessories, i.e., pulley, base, and starting and controlling device. Any accessories desired must be specifically mentioned.

Polyphase Adjustable Varying Speed Motor

Type M, wound rotor. 50% speed reduction. ¾ to 200 hp. 220, 440, 550 and 2200 volts.

Used largely on applications requiring an adjustable varying speed characteristic; i.e., the speed can be adjusted to any value over a considerable range but once adjusted will vary to a considerable degree with change in the load. To get maximum speed reduction, motor must be operated against rated torque.

Descriptive publications: ¾ to 10 hp., GEA-71. 10 to 200hp., GEA-5.



Alternating-current Slip Ring Motor

Polyphase Constant-speed Motors

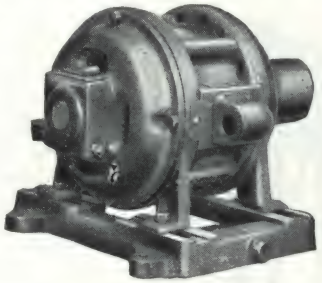
Type M, 3 and 2 phase, wound rotor. ¾ to 1000 hp. 220, 440, 550 and 2200 volts.

Adapted to heavy or frequent starting duty and to applications where low starting current is imperative.

Descriptive publication: GEA-5.

Fractional Horsepower Motors

Three-phase, Type RKT; 2-phase, Type RKQ. Sizes: ⅛, ¼, ⅓, ½ and ¾ hp. Voltages: 110 and 220. Cycles: 60, 50, 40, 30 and 25. Speeds: (60 cycle), 1200 to 3600 r.p.m. Bearings: Waste-packed bronze.



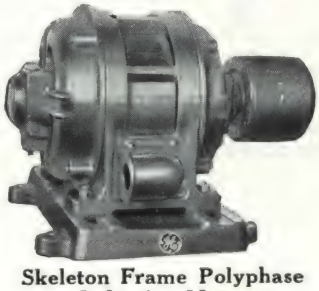
Riveted Frame Polyphase Induction Motor

Riveted Framed Polyphase Induction Motor

Type K, 3 and 2-phase. Sizes ¼ to 15 hp. Voltages: 110, 220, 440 and 550. Cycles: 60, 50, 40 and 25. Speeds (60 cycle): 450 to 3600 r.p.m. Bearings: sleeve or ball. Descriptive publication: GEA-1303.

Skeleton Frame Polyphase Induction Motor

Type K, 3 and 2-phase. Sizes: 15 to 200 hp. Voltages: 220, 440, 550 and 2200. Cycles: 60, 50, 40 and 25. Speeds (60 cycle): 360 to 3600 r.p.m. Bearings: sleeve or ball. Descriptive publication: GEA-6.



Skeleton Frame Polyphase Induction Motor

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MOTOR CONTROLLERS

Illustrations Invariably Show Covers Removed

CR-1038 Enclosed Tumbler Switches

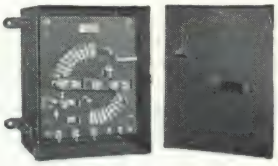
5 hp. and smaller (220 volts, 3-phase). Single, 2 or 3-phase; 550 volts and less. Single-throw; 3 or 4-pole; quick-make and quick-break. Overload protection by thermal cutouts.

2 hp. and less. 2 or 3-pole. 600 volts, maximum. Single throw; quick-make and quick-break.

CR-1034 Standard Hand Compensators for Use with Squirrel Cage Motors

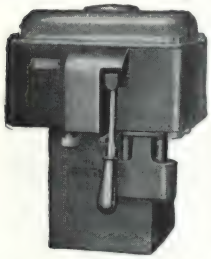
5 hp. and larger. 60 to 25 cycles. 110 to 550 volts. 2 or 3-phase. Undervoltage release: Instantaneous (standard) or time delay (extra). Overload protection; 2-pole thermal relay.

CR-1028 Enclosed Starting Rheostats



For use with wound-rotor induction motors. 15 hp. and smaller. 60 to 25 cycles. 110 to 550 volts. 2 or 3-phase.

CR-1035 Oil Circuit Breakers

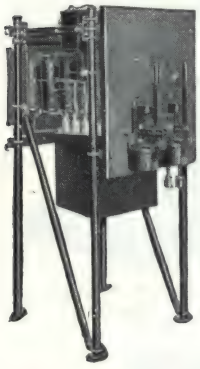


A useful motor switching device which will interrupt abnormally large currents. Overload and undervoltage protection optional.

CR-1203 D-c. Speed Regulating Rheostats

¼ to 50 hp. 115 and 230 volts. For shunt-wound adjustable-speed motors. Starting duty and speed control. Undervoltage protection.

Switchboard Panels

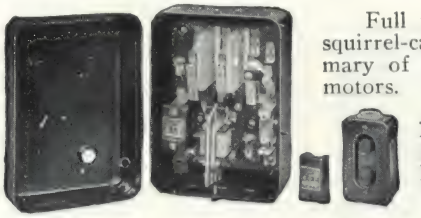


2200 volts and less. Furnished with or without auto-transformer for reduced or full voltage start. Undervoltage and overload protection. High interrupting capacity.

CR-2931 Float Switches

For tank or sump operation. Are suitable for use in the control circuit of a-c. or d-c. magnetic starters.

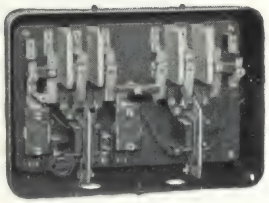
CR-7006 Remote Control Equipment for A-c. Motors



Full voltage start. For all squirrel-cage motors and primary of wound-rotor induction motors.

7½ hp. switch with heater unit removed from right-hand overload relay.

CR-7009 Magnetic Reversing Switches



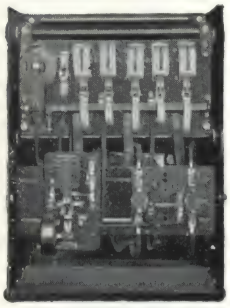
1½ to 60 hp., 110 to 600 volts, 60 to 25 cycles, 1, 2 or 3-phase. Overload and undervoltage protection.

Automatic Synchronous Motor Starters

CR-7061 reduced voltage starter for use with medium and high speed synchronous motors illustrated at the left.

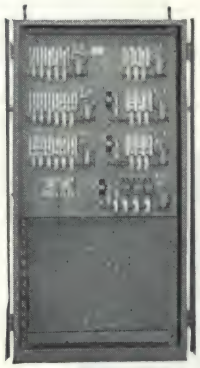
CR-7065 full voltage starter for use with low speed synchronous motors, 700 hp. and smaller, 220 to 2200 volts, 3 phase, 25 to 60 cycles. Overload and undervoltage protection.

CR-7051 Reduced Voltage Starters



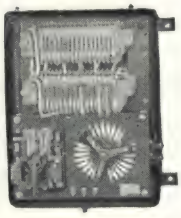
Standard automatic starting compensators. 600 hp. and smaller, 550 volts and less, 60 to 25 cycles, 2 or 3-phase, undervoltage and overload protection. Sizes 50 hp. and smaller, mounted in dust-tight boiler-plate enclosing case are available for use in such places as mills, foundries and refineries.

CR-7761 Remote Speed Indicating Controller for Fan Service



An enclosed controller with push button station for use with varying speed wound-rotor induction motors. 5 to 50 hp., 220 volts, 25 to 60 cycles, 3 phase. Time-limit acceleration. Undervoltage and overload protection.

CR-7765 Controller for A-c. Wound-rotor Induction Motors for Fan Service



Standard enclosed controller. 50 hp. and smaller, 110, 220, 440 and 550 volts, 25 to 60 cycles, 3 phase. Time-limit acceleration. Undervoltage and overload protection.

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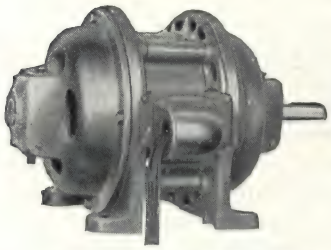
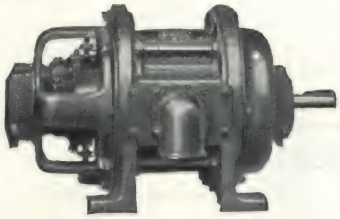
ELEVATOR MOTORS AND CONTROL

A-c. Single-phase or Polyphase Motors. D-c. Constant or Adjustable-speed Motors.



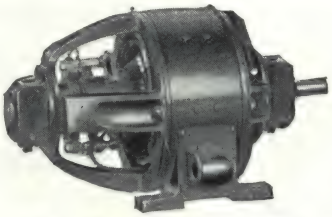
Constant-speed Polyphase Motors, Type KTE

1 to 30 hp., 2 or 3-phase, 220, 440 and 550 volts, 60 cycles



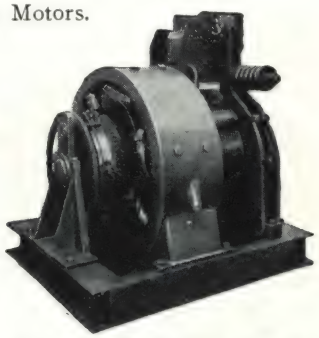
Single-phase Motors, Type SCRE

½ to 10 hp. Constant speed. 60 cycles



D-c. Reversible Elevator Motors, Type BDE and CDE

¾ to 30 hp. 115 and 230 volts. Commutating poles



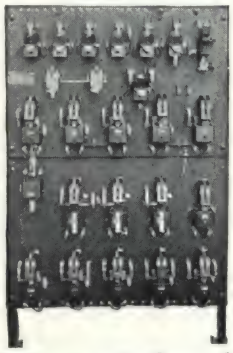
Type GTE Gearless Traction Elevator Motors

For elevator speeds of 500 ft. per minute and over. Meets the exacting requirements of modern high-speed elevator service

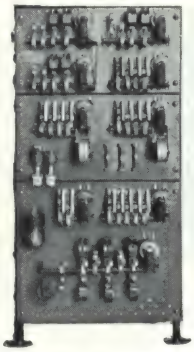
Descriptive publication: GEA-63

High-Speed Elevators—If elevator speeds of 500 ft. per minute or over are selected, a gearless elevator machine is recommended. This type of equipment uses a slow-speed, direct-current motor with a driving sheave mounted on the motor shaft. Two types of control are used for this class of service, the rheostatic type and the variable-voltage type.

The only advantage of rheostatic control over variable voltage control is a somewhat lower first cost.



Full-magnetic Control Panel for a D-c. Elevator Motor with Variable Voltage Control



Full-magnetic Control Panel for a Two-speed A-c. Elevator Motor

With variable voltage control either a-c. or d-c. power supply can be utilized.

Multi-speed Polyphase Motors—For elevators operating at speeds (up to 450 ft. per min.) motors operating at more than one basic speed are often used.

Both have squirrel edge rotors.

Descriptive publication: GEA-405 and GEA-435.

Wound Rotor Polyphase Motors—Are also built. Descriptive publication: GEA-434.

CENTRIFUGAL AIR COMPRESSORS

General Electric can furnish blowers for any volume and pressure to meet the requirements of any pneumatic system.

Advantages—

Constant pressure over a wide variation in volume.

Volume varies according to the requirements in most applications and in others can be adjusted by operating the blast gate.

Power required is lower and varies directly with the volume delivered.

Delivers a steady even flow of air free from pulsations and operates quietly without vibrations.

Superior mechanical construction; one-piece shaft eliminating couplings and belts or gears.

Forced lubrication by gear-type pump geared to shaft.

Low installation and maintenance costs.

Undivided responsibility for the success of the complete unit.

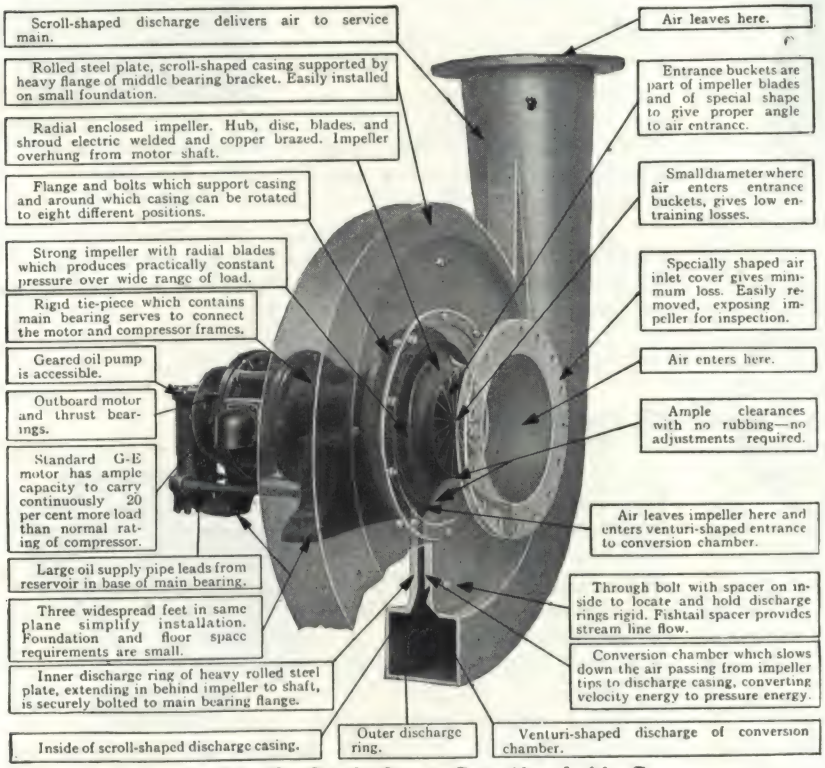
Small floor space with simple foundations.

Accessibility, as complete inspection can be made without removing piping.

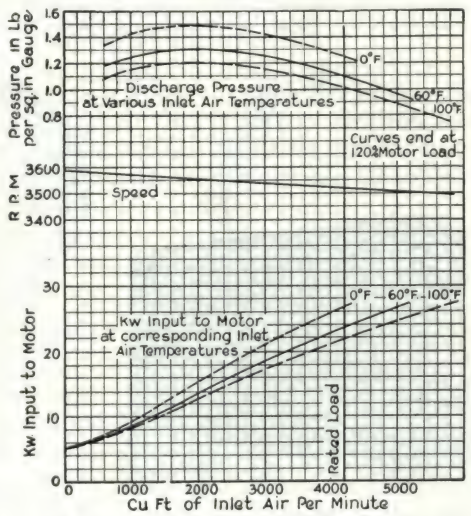
Greater number of positions of discharge opening possible, which positions can be changed by customer to suit individual requirements, saving pipe and labor and making a neater installation.

Operating Characteristics—

Curves made from tests on a listed machine show very fully the characteristics of the G-E centrifugal compressor.



Construction Details, Single Stage Centrifugal Air Compressor



Characteristic Curves of Compressor

Rated at 4200 c.f.m. 1.0 lb. per sq. in. Based on air at 14.7 lb. per sq. in. Abs. Inlet Pressure

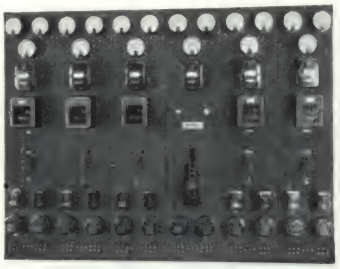
WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue
For References to Other Products, see Index to Manufacturers

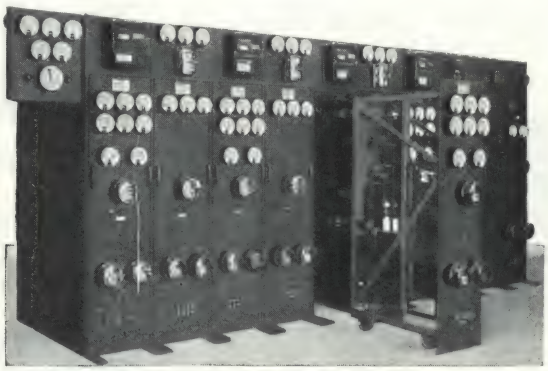
SWITCHBOARDS

Simplicity is the distinguishing characteristic of all Westinghouse Switchboards. Apparatus is arranged on the front of the switchboard for convenience in operation and neat appearance. The arrangement of the apparatus on the rear provides easy access to all connections. This results in the same neat and attractive appearance on the rear of a Westinghouse Switchboard as is to be found on the front. The standard finish is a velvety dull black which is uniform in color and does not reflect light. Any special finish or color may be obtained to harmonize with the architectural color scheme or to match the equipment already installed.



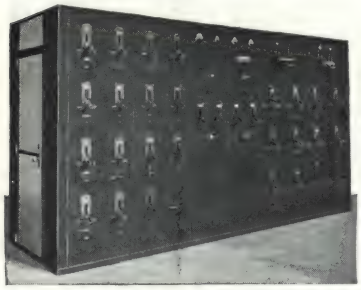
A-C. Automatic Reclosing Equipment Neatly Arranged on a Steel Switchboard

Standard switchboards can be delivered within a very short time. Delivery promises should be obtained through the nearest Westinghouse district sales office, especially so in case of changes or substitution from standard listed equipment.



Typical Westinghouse Horizontal Draw-out Truck-type Switchboard—One Truck Withdrawn

A standard line of truck-type switchboards, in general, is built for the same kinds of service as other switchboards. They carry the same switching equipment as heretofore employed in stationary structures. The units consist of two parts, the stationary housing containing the buses and stationary disconnecting devices, and the movable truck carrying the circuit breaker, instruments, instrument transformers and panel. The trucks may be withdrawn for inspection or adjustment and offer a high degree of reliability and safety.



Low-voltage Distribution Switchboard with Back-of-board Knife Switch

Truck-type switchboards are completely factory assembled and tested, and are suitable for installation in any station requiring practically any breaker rupturing capacity. The equipment is particularly adapted for installation in industrial plants and sub-stations because of its safety features. They are also suitable for the control of the main and auxiliary circuits in central stations where equipment of the utmost reliability is required. Trucks may be easily and quickly installed.

Steel Panels for Switchboards—Because of the many features of advantage contained in the new Westinghouse steel panels, they are fast becoming the standard material for switchboard manufacture.

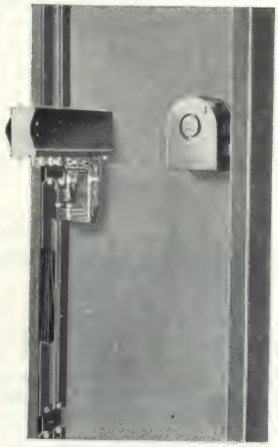
Among these features is low cost. Others are:

Construction—Each panel is formed of ⅛-in. cold rolled stretcher leveled steel plate. Angle sections at the top and bottom and the channel sections at the sides provide the necessary rigid framing. All bends have ¼-in. inside radius. All corners are arc-welded and grounded to give increased strength and neat appearance.

Light Weight — They are 80% lighter than a slate panel of equal size. This feature reduces shipping costs, facilitates handling and allows each panel to be shipped completely equipped with all instruments.

Strength — Greater strength of steel prevents broken and chipped panels.

No Supporting Frame —The formed panel sides act not only as a raceway for vertical wiring, but also eliminate the necessity of a supporting frame.



Rear View of a Steel Switchboard Panel with the New Channel Type Wiring

Appearance—Westinghouse steel panels present a much neater appearance than other materials, because the front surface is not broken up by mounting bolts and sectional panels.

Size—Standard Westinghouse steel panels can be had 64, 76 and 90 in. high, and 12, 16, 20, 24, 28 and 32 in. wide.

CL Carbon Breakers

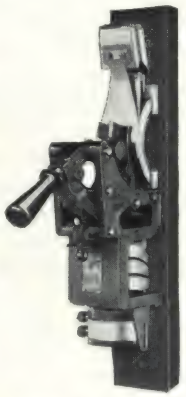
Westinghouse high power laboratory is responsible for the features now contained in CL carbon breakers. Through tests made in this laboratory it was clearly established that the mechanical strength of carbon breakers had to be increased and at the same time preserve compactness and accessibility. Carbon contacts and current circuits also showed the need for redesign to meet new conditions of operation now present in electrified industries and our modern skyscrapers.

In the CL breakers are found such features as the one-piece frame, indestructible carbon contacts, compact construction, insulated handles, unit construction and a finish that retains its newness indefinitely.

Continued on next page

CL breakers are built in sizes from 12½ to 16,000 amperes for voltages up to 600.

The one-piece frame has much greater strength than one of multi-piece because of its integral construction, which makes a considerable reduction in size both in width and in height. For the same reason greater strength permits of a frame design that gives accessibility to the lower main contacts and working parts of the breaker which is not true of the older multi-piece frame. Because of mechanical weaknesses it was impossible to provide openings in the older multi-piece frame large enough to be of value for inspection and maintenance. The one-piece frame provides a foundation on which all parts are solidly held and factory adjustments maintained.



Type CL Carbon Circuit-Breaker

Indestructible carbon contacts on CL breakers assure a contact that will not break. A broken contact often falls into the breaker mechanism thus interfering with its closing action. This new contact fits into a cup which reinforces the carbon sidewalls. By a special process the carbon and its cup are fused together, thus giving a solid unit that will give years of carefree service.

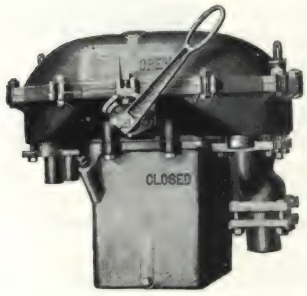
For reasons of simplification, standardization, economy in manufacture and flexibility in application, CL breakers and attachments are built and stocked by a method known as *unit construction,* which makes it possible to draw from stock all parts as assembled units. CL breakers are the only breakers that are capable of assembly on a unit basis, mainly because of the one-piece frame. This allows complete assembly, testing and adjustment before shipment. The result is cheaper and quicker installation with no final adjustment after installation has been made.

The satin finish of CL breakers, while more expensive than a highly polished finish, will not tarnish. It retains its color and velvety luster indefinitely. All other parts are finished in glossy black enamel which gives a very striking appearance—symbolic of high class workmanship and design. In modern new buildings this is an important requisite.

The latest development for the improvement of CL breakers is the new insulated handle, which prevents any possibility of contact with operating levers exposed to circuit voltages. It also adds to the finished appearance of CL breakers.

With the improved CL breaker design the brush pressure may be adjusted without opening the breaker. This is desirable where continuous service is necessary. It is easy to accomplish.

Small Oil Circuit-Breakers



Type FS-11 Subway Breaker

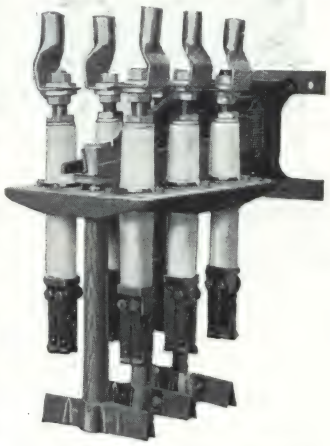
Westinghouse Type F small oil circuit-breakers can be obtained for any conceivable application, whether it be for outdoor pole or frame mounting, indoor wet or dry locations, or for subway mounting.

For outdoor application use Types FO-11, F-1, F-2, FO-22 or FO-24 depending on the application. The FO-24 breaker is for pole or frame mounting in capacities of 400, 600 and 800 amperes, 15,000 volts. The FO-22 breaker is for outdoor, pole, floor or frame mounting, 7500 volts. The F-1 and F-2 breakers can be had in 300 and 200-ampere capacities; 750 and 4500 volts, respectively. The FO-11 breaker is non-automatic, weather-proof, for 200 and 400 amperes, 4500 volts.

For indoor applications specify the F-10, F-11, F-22, F-24 or F-25. The F-10 is particularly adapted for industrial plant use, where dirt, dust and moisture are to be contended with.

F-11, F-22, F-24 and F-25 breakers are for panel mounting or remote control. The F-11 is applicable for 200 amperes, 4500 volts and 400 amperes, 2500 volts. The F-22 breaker is for 400 and 600 amperes, 7500 volts and 800 amperes, 2500 volts. The F-24 and F-25 is for 400, 600 and 800 amperes, 15,000 volts and 1200, 1600 and 2000 amperes, 7500 volts.

For subway application specify the FS-11 or F-2 breaker. The FS-11 is a non-automatic breaker and the F-2 is automatic. Either can be operated submerged if necessary.



Type F-11 Indoor Breaker
(Tank removed)

Switchboard Instruments

Westinghouse can furnish a complete line of switchboard instruments, which, when mounted on a switchboard, present a uniform and pleasing appearance.

The direct-current instruments are made in five sizes, $2\frac{9}{16}$, 3½, $4\frac{3}{8}$, 5½, and 7½ in. in diameter, and are known as Types BX, CX, DX, LX and SX, respectively. These instruments operate on the moving coil permanent-magnet movement, and can be supplied as ammeters, voltmeters, milliammeters and radio-frequency ammeters. Special instruments, such as differential voltmeters, ground detector voltmeters, pyrometer millivoltmeters, temperature speed or frequency meters, can also be furnished.

The alternating-current instruments are made in 3 sizes, $4\frac{3}{8}$, 5½ and 7½ in. in diameter and are known as Types DY, LY and SY, respectively. The Types DY, LY and SY instruments match the direct-current types DX, LX and SX instruments in size and appearance. Except for the ammeter which operates on the moving iron vane principle, these instruments have the dynamometer movement and may be supplied as ammeters, voltmeters, wattmeters, frequency meters and power factor meters.

Type SX, 7½-in. Diam. D-C. Ammeter

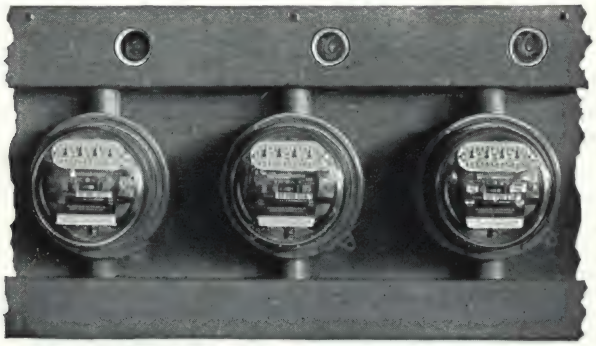
Type SY, 7½-in. Diam. A-C. Voltmeter

Detachable Meters

The new Westinghouse OB Detachable Watthour Meter together with its special mounting panel holds a

Continued on next page

particular interest for architects. The meters are provided with plug terminals to facilitate installing and removing. They plug in like radio tubes. The steel panels provide channels which hold all wiring neatly and compactly. This outfit is the latest in metering, and will meet the most rigorous building requirements.



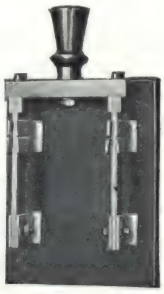
OB Detachable Meters Mounted on Panel

Knife Switches

Type AL Knife Switches—Type AL Knife Switches constitute an entirely new line, designed especially to meet the latest requirements. All switches listed conform to the requirements of the National Electrical Code Standard, and are included in the list of approved fittings, issued by the National Board of Fire Underwriters.

Application — Hand-operated switches are usually limited to 600 volts maximum service, and, when used to break current, quick-break attachments are recommended for switches rated at over 250 volts d-c., and must be provided for 200 amperes or larger at 500 volts d-c. or over, and 800 amperes or larger for 250 volts a-c.

Ratings—Type AL switches are made in approved standard sizes from 30 to 6000 amperes, inclusive.



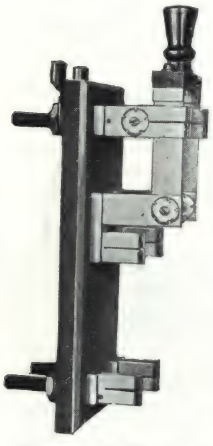
Type AL Knife Switch

Single throw, 2-pole, 200-amp., 250-volt, rear connected, plain break

Switches of 30 to 600-ampere capacity are made with both front and rear connections, non-fusible and fusible, ordinary and quick-break, for 250 volts a-c. and d-c., 500 volts a-c. and 600 volts a-c. and d-c.

Rear-connected switches, plain and quick-break, non-fusible are made in 800 to 6000 amperes d-c. and 4000 amperes a-c. sizes, both 250 and 600 volts.

The fusible switches are made fusible at the hinge end and single throw only.



Type AL Knife Switch

Single throw, 2-pole, 200-amp., 250-volt, rear connected, plain break, fused at bottom

Construction—The AL switches are of the standard and conventional solid blade milled-slot type of construction, and are designed on a basis of 1000 amperes per square inch of sectional area.

Back-of-board Knife Switches—The back-of-board knife switch was designed primarily for steel panel mounting to give the board the dead-front feature, desirable from a safety standpoint.

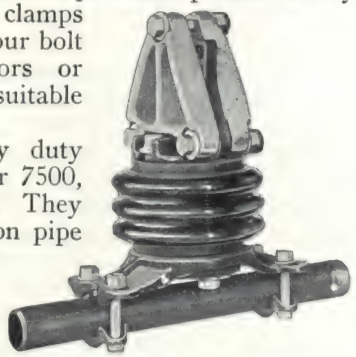
Doors for fuses are interlocked with the switch handle so that the switch must be open before the fuse doors can be opened.

Bus Supports

Westinghouse Type H indoor bus supports have insulators constructed of wet process porcelain which gives a fine textured product impervious to moisture and has maximum strength and insulating qualities. The clamps are of permanent mold aluminum which with the chocolate brown porcelain present a very neat appearance. The clamps may be had in three or four bolt types for flat conductors or fitted with other clamps suitable for round conductors.

Standard and heavy duty supports are available for 7500, 15,000 and 25,000 volts. They can be mounted flat or on pipe in either inverted or upright position.

Other supports are available for outdoor service.

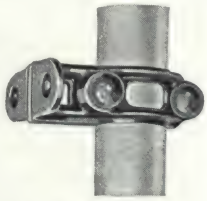


Bus Support

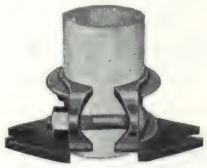
Fittings for Pipe Structures

It is an easy matter to be fully prepared to meet any pipe structure emergency with Westinghouse Pipe Fittings, as the unit parts can be assembled into thousands of different combinations. As a result, a very small investment will give a complete stock for most any use.

Application—When Westinghouse pipe fittings were first designed it was thought that they would be chiefly applicable in the erection of switchboard frames and outdoor pipe substations. However, because of the ease with which they could be handled, application of these fittings quickly expanded until now they are being used in many ways, both by central stations and industrial concerns. In fact, wherever pipe is used Westinghouse Fittings have been found to give excellent results, both from an economical and practical standpoint. Any one can quickly erect or dismantle a pipe structure because the only tools necessary are a single socket wrench, a vise and a pipe cutter. These qualities have made Westinghouse Fittings not only a favorite in permanent construction work, but also are widely used in the erection of temporary structures in building construction.



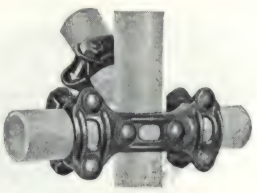
Panel Mounting Bracket



Flange Clamp

In general, the fittings are designed for two standard pipe sizes, namely 1¼ and 2-in., and for a combination of these two sizes as is desirable in extensively braced structures. There are a few fittings in ¾, 1 and 1½-in. sizes used mainly for light switchboard frames, and for clamping insulators to pipe frames.

The fittings are furnished in either a black gloss baked finish for indoor use, or they are galvanized for use on outdoor installations. All carriage bolts for both indoor and outdoor work are hot dipped galvanized.



Adjustable Braces

Through the use of galvanized pipe and fittings, an outdoor structure which will resist the elements for many years without expense for maintenance is secured.

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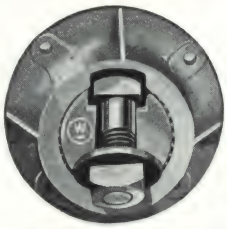
Adjustable Inserts

Westinghouse Adjustable Inserts were designed for use in concrete work where it is desired to mount machinery or other equipment to floors, walls or ceilings.

Distinctive Features—The insert is self-centering when bolted to the form, insuring a maximum adjustment of 5/8-in. in any direction from the center of the insert housing.



Adjustable Insert

The housing and rotatable bolt carrier are of rugged design and equal in holding power to the ultimate tensile strength of bolt.

The shape of the slot in the bolt carrier allows the removal or insertion of the bolt after the insert is embedded in the concrete.

WESTINGHOUSE PANELBOARDS

Type NAB Nofuz Panelboards

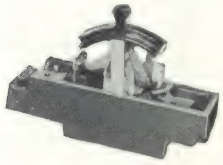
From the earliest days of the panelboard industry, fuses have been almost universally employed for branch circuit protection. These have been developed solely with a view to reduction of fire and accident hazard. Any fusible metal, so employed, has the following inherent defects:

(1) Necessity for replacement on burn-out. (2) Ease of replacement with higher capacity element. (3) Ease of rendering inoperable by tampering. (4) Low inverse time limit for slight overloads.

Type NAB Nofuz Panelboard

The perfection of a new type of circuit-breaker operating on the principle of de-ionization has enabled Westinghouse to place on the market a radically new type of panelboard—a control with neither switches nor fuses in the branch circuits. This circuit-breaker offers the logical solution to fuse objections and, by its construction, automatically adds to circuit protection the functions of a switch.

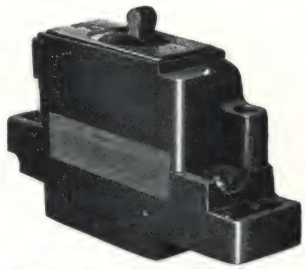
The breaker consists of an enclosed toggle mechanism which may be actuated manually or automatically. Automatic release is secured through the action of a bi-metallic element which engages the tripping latch of the mechanism. The mechanism trips free from the handle and cannot be held against an overload or short circuit condition. The breaker is so calibrated that it will not trip on momentary overloads but will operate before dangerous values are reached. Due to the application of the de-ion principle the rupturing ability exceeds by a vast margin any conditions which may be met in service.



Open View of Nofuz Breaker

The de-ion principle is simple and inexpensive, consisting of a series of steel plates mounted in a plane at 90° to the path of the arc, insulated from each other and the contacts. The arc is driven between the plates either by magnetic means or by the natural flow of the gases, the latter means being sufficient for low voltages. The gases are de-ionized by their passage over the cool surfaces of the plates, an arc voltage is quickly built up and the arc quietly extinguished.

The thermal release element is so designed as to give desirable inverse-time-limit characteristics. For instance, the circuit-breaker will carry 110% of normal rating indefinitely without tripping but will trip within one minute when the current reaches 150% of normal. At higher overloads, the element becomes very short until instantaneous tripping is secured. This feature prevents tripping on momentary overloads but positively protects the branch circuit wire and its insulation before dangerous values are reached.



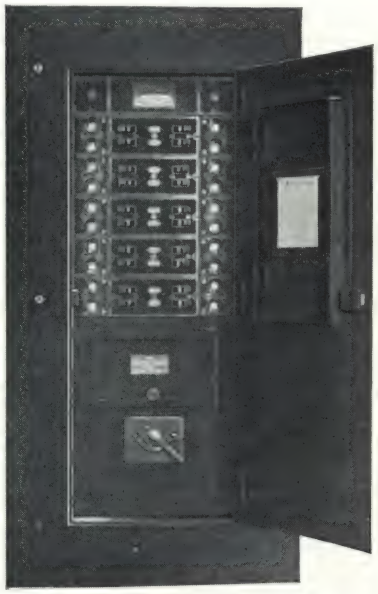
Nofuz Breaker with Cover in Place

Types ST and NST Standardized Panelboards

All Westinghouse unit sections are standardized in dimensions, so that a great flexibility is obtained in application. They are made of a cold-moulded asbestos composition which is both fire and moisture-proof.

The branch circuits of the NST panelboards are provided with a single-pole, 30-ampere, 250-volt, quick-make and quick-break tumbler switch. All insulating parts of the switch are made of Micarta, a Westinghouse product with excellent insulating characteristics. The bakelite handle provides a neat, highly insulated grip for controlling the switch. The switch blades are made of phosphor bronze and have generous contact surfaces. Micarta arc quenchers are provided to quickly quench any arc drawn by opening the switch. The mechanism of the NST switch is positive in its action, and the switch can be operated in case of failure of the spring. The type ST switch is a double-pole, 30-ampere, 250-volt, quick-make and quick-break tumbler switch having the same characteristics as that used in the NST.

The switch unit on the NST and ST panelboards is a black moulded composition block arranged for two double-pole switches or four single-pole switches. It is so designed that when the bakelite cover plate is put in place, each double-pole switch or each pair of single-pole switches is in an individual compartment. In this manner, any trouble which might develop in any section is confined to that one section.



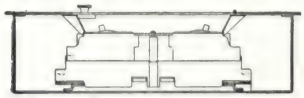
NSTP3BSFD Tumbler Switch Panelboard with Plug Type Circuit Fuses, Fusible Main Brush Switch and Door-in-door Construction

Continued on next page

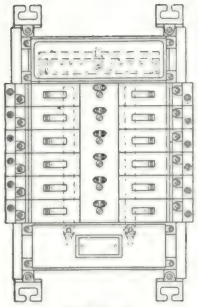
SAFETY-TYPE NO-FUZ PANELBOARDS WITH SINGLE POLE, AUTOMATIC, BRANCH CIRCUIT-BREAKERS

Panel—Sections of moulded asbestos composition.
Branches—*15-amp., single pole, 125-volt, Westinghouse Automatic Circuit-Breakers.
Boxes—Code gauge sheet steel with 4-in. gutters. All boxes 4⅞ in. deep, 20¼ in. wide outside dimensions.
Fronts—Code gauge sheet steel, black finish, flush or surface type.

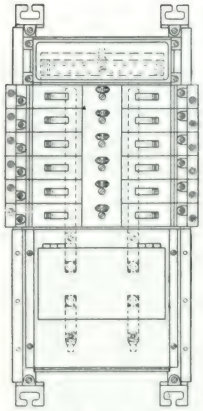
Solid Neutral
NAB3—Single Door



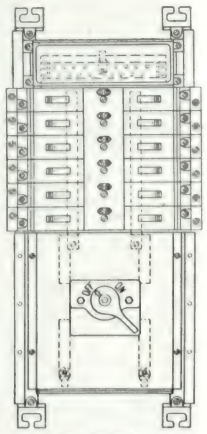
Mains, 125/250-volt, 3-wire
Branches—125-volt, 2-wire



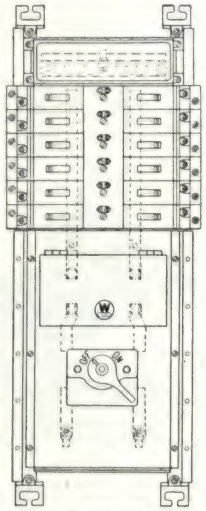
NAB3L



NAB3F



NAB3BS



NAB3BSF

No. of circuits	Main amp.	Panel box and front Cat. No.	Height of box, in.	Approx. shipping wt., lb.	Panel box and front Cat. No.	Height of box, in.	Approx. shipping wt., lb.
		Main Lugs Only			**Unfusible Main Brush Switch**		
2	30	NAB302L	17¼	60	NAB302BS	23¼	85
4	30	NAB304L	17¼	70	NAB304BS	23¼	95
6	60	NAB306L	20¼	80	NAB306BS	26¼	100
8	60	NAB308L	20¼	85	NAB308BS	26¼	105
10	60	NAB310L	23¼	90	NAB310BS	29¼	110
12	60	NAB312L	23¼	100	NAB312BS	29¼	115
14	100	NAB314L	26¼	110	NAB314BS	35¼	120
16	100	NAB316L	26¼	115	NAB316BS	35¼	125
18	100	NAB318L	29¼	125	NAB318BS	38¼	130
20	100	NAB320L	29¼	130	NAB320BS	38¼	135
22	100	NAB322L	32¼	140	NAB322BS	41¼	145
24	100	NAB324L	32¼	145	NAB324BS	41¼	155
26	100	NAB326L	35¼	150	NAB326BS	44¼	165
28	100	NAB328L	35¼	160	NAB328BS	44¼	175
30	100	NAB330L	38¼	170	NAB330BS	47¼	185
32	100	NAB332L	38¼	175	NAB332BS	47¼	195
34	200	NAB334L	44¼	180	NAB334BS	53¼	205
36	200	NAB336L	44¼	185	NAB336BS	53¼	215
38	200	NAB338L	47¼	190	NAB338BS	56¼	225
40	200	NAB340L	47¼	195	NAB340BS	56¼	235
42	200	NAB342L	50¼	200	NAB342BS	59¼	240
44	200	NAB344L	50¼	205	NAB344BS	59¼	245
46	200	NAB346L	53¼	215	NAB346BS	62¼	255
48	200	NAB348L	53¼	225	NAB348BS	62¼	260
50	200	NAB350L	56¼	235	NAB350BS	65¼	270
52	200	NAB352L	56¼	245	NAB352BS	65¼	280
54	200	NAB354L	59¼	255	NAB354BS	68¼	290
56	200	NAB356L	59¼	265	NAB356BS	68¼	300
58	200	NAB358L	62¼	275	NAB358BS	71¼	310
60	200	NAB360L	62¼	285	NAB360BS	71¼	320
62	200	NAB362L	65¼	295	NAB362BS	74¼	330
64	200	NAB364L	65¼	305	NAB364BS	74¼	340
		Main Fuse Connections			**Main Brush Switch Fusible with Safety Interlock Door**		
2	30	NAB302F	20¼	80	NAB302BSF	29¼	95
4	30	NAB304F	20¼	85	NAB304BSF	29¼	105
6	60	NAB306F	23¼	90	NAB306BSF	32¼	115
8	60	NAB308F	23¼	100	NAB308BSF	32¼	120
10	60	NAB310F	26¼	105	NAB310BSF	35¼	130
12	60	NAB312F	26¼	115	NAB312BSF	35¼	135
14	100	NAB314F	32¼	125	NAB314BSF	41¼	140
16	100	NAB316F	32¼	130	NAB316BSF	41¼	150
18	100	NAB318F	35¼	140	NAB318BSF	44¼	160
20	100	NAB320F	35¼	145	NAB320BSF	44¼	165
22	100	NAB322F	38¼	160	NAB322BSF	47¼	180
24	100	NAB324F	38¼	165	NAB324BSF	47¼	190
26	100	NAB326F	41¼	175	NAB326BSF	50¼	200
28	100	NAB328F	41¼	190	NAB328BSF	50¼	210
30	100	NAB330F	44¼	200	NAB330BSF	53¼	220
32	100	NAB332F	44¼	205	NAB332BSF	53¼	230
34	200	NAB334F	53¼	210	NAB334BSF	59¼	240
36	200	NAB336F	53¼	215	NAB336BSF	59¼	250
38	200	NAB338F	56¼	225	NAB338BSF	62¼	260
40	200	NAB340F	56¼	235	NAB340BSF	62¼	270
42	200	NAB342F	59¼	245	NAB342BSF	65¼	280
44	200	NAB344F	59¼	255	NAB344BSF	65¼	290
46	200	NAB346F	62¼	265	NAB346BSF	68¼	300
48	200	NAB348F	62¼	275	NAB348BSF	68¼	310
50	200	NAB350F	65¼	285	NAB350BSF	71¼	320
52	200	NAB352F	65¼	295	NAB352BSF	71¼	330
54	200	NAB354F	68¼	305	NAB354BSF	74¼	340
56	200	NAB356F	68¼	315	NAB356BSF	74¼	350
58	200	NAB358F	71¼	325	NAB358BSF	77¼	360
60	200	NAB360F	71¼	335	NAB360BSF	77¼	370
62	200	NAB362F	74¼	345	NAB362BSF	80¼	380
64	200	NAB364F	74¼	355	NAB364BSF	80¼	390

*Catalogue number covers 15-ampere breakers only. 20, 25 or 30-ampere breakers can also be supplied when specifically mentioned on order. Panels with mixed capacity breakers may be arranged if desired.

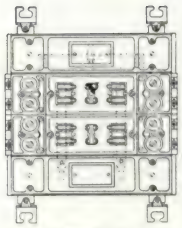
Continued on next page

SAFETY-TYPE PANELBOARDS AND BOXES

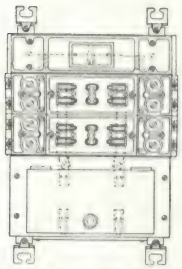
Solid Neutral
NSTP3—Single Door
Mains, 125/250-volt, 3-wire
Branches, 125-volt, 2-wire

Panels—Sections of moulded asbestos composition.
Branches—30-amp., 250-volt, heavy duty tumbler switches with plug fuse connections.
Boxes—Code gauge sheet steel with 4-in. gutters. All boxes 4⅞ in. deep, 20¼ in. wide, outside dimensions.
Fronts—Code gauge sheet steel, black finish, flush or surface type.

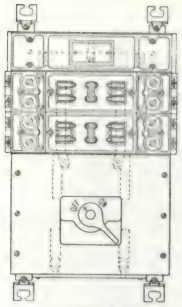
STP3—Single Door
Mains, 125/250-volt, 3-wire
Branches, 125-volt, 2-wire



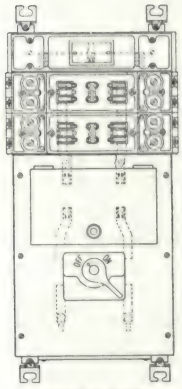
NSTP3L



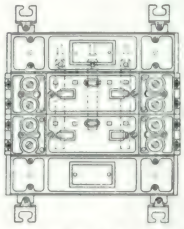
NSTP3F



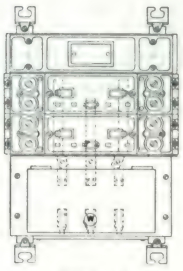
NSTP3BS



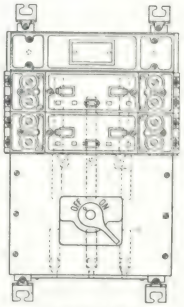
NSTP3BSF



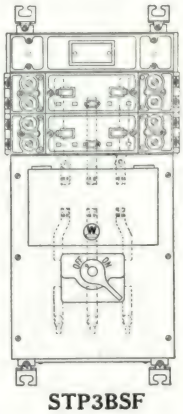
STP3L



STP3F



STP3BS



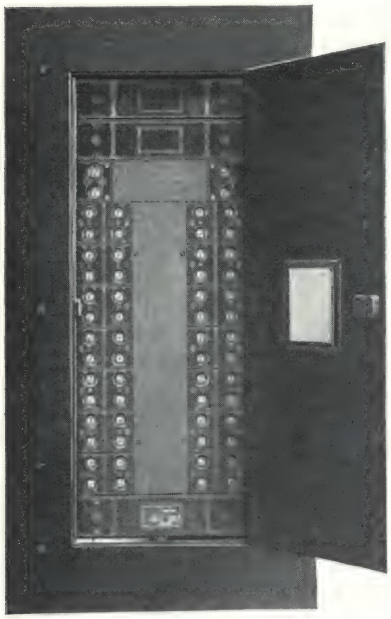
STP3BSF

No. of circuits	Main amp.	Panel box and front Cat. No.	Height of box, in.	Approx. shipping wt., lb.	No. of circuits	Main amp.	Panel box and front Cat. No.	Height of box, in.	Approx. shipping wt., lb.
NSTP3—Single Pole, Single Fuse Branches					STP3—Double Pole, Double Fuse Branches				
Main Lugs Only									
4	30	NSTP304L	17¼	90	4	30	STP304L	20¼	110
8	60	NSTP308L	20¼	105	6	60	STP306L	23¼	120
12	60	NSTP312L	23¼	115	8	60	STP308L	26¼	130
16	100	NSTP316L	26¼	125	10	60	STP310L	29¼	140
20	100	NSTP320L	29¼	135	12	60	STP312L	32¼	150
24	100	NSTP324L	32¼	145	14	100	STP314L	35¼	160
28	100	NSTP328L	35¼	160	16	100	STP316L	38¼	175
32	100	NSTP332L	38¼	170	18	100	STP318L	41¼	185
36	200	NSTP336L	44¼	195	20	100	STP320L	44¼	195
40	200	NSTP340L	47¼	210	22	100	STP322L	47¼	205
44	200	NSTP344L	50¼	220	24	100	STP324L	50¼	215
48	200	NSTP348L	53¼	230	26	100	STP326L	53¼	225
52	200	NSTP352L	56¼	245	28	100	STP328L	56¼	235
56	200	NSTP356L	59¼	255	30	100	STP330L	59¼	250
60	200	NSTP360L	62¼	265	32	100	STP332L	62¼	260
64	200	NSTP364L	65¼	275	34	200	STP334L	65¼	275
Main Fuse Connections									
4	30	NSTP304F	20¼	105	4	30	STP304F	23¼	130
8	60	NSTP308F	23¼	115	6	60	STP306F	26¼	145
12	60	NSTP312F	26¼	125	8	60	STP308F	29¼	155
16	100	NSTP316F	35¼	145	10	60	STP310F	32¼	165
20	100	NSTP320F	38¼	165	12	60	STP312F	35¼	175
24	100	NSTP324F	41¼	180	14	100	STP314F	44¼	190
28	100	NSTP328F	44¼	195	16	100	STP316F	47¼	200
32	100	NSTP332F	47¼	210	18	100	STP318F	50¼	215
36	200	NSTP336F	56¼	240	20	100	STP320F	53¼	225
40	200	NSTP340F	59¼	250	22	100	STP322F	56¼	235
44	200	NSTP344F	62¼	260	24	100	STP324F	59¼	245
48	200	NSTP348F	65¼	270	26	100	STP326F	62¼	255
52	200	NSTP352F	68¼	280	28	100	STP328F	65¼	265
56	200	NSTP356F	71¼	290	30	100	STP330F	68¼	280
60	200	NSTP360F	74¼	300	32	100	STP332F	71¼	290
64	200	NSTP364F	77¼	310	34	200	STP334F	77¼	320
Unfusible Main Brush Switch									
4	30	NSTP304BS	23¼	115	4	30	STP304BS	26¼	135
8	60	NSTP308BS	26¼	125	6	60	STP306BS	29¼	150
12	60	NSTP312BS	29¼	135	8	60	STP308BS	32¼	160
16	100	NSTP316BS	35¼	150	10	60	STP310BS	35¼	170
20	100	NSTP320BS	38¼	160	12	60	STP312BS	38¼	180
24	100	NSTP324BS	41¼	170	14	100	STP314BS	44¼	190
28	100	NSTP328BS	44¼	180	16	100	STP316BS	47¼	200
32	100	NSTP332BS	47¼	190	18	100	STP318BS	50¼	210
36	200	NSTP336BS	53¼	215	20	100	STP320BS	53¼	220
40	200	NSTP340BS	56¼	225	22	100	STP322BS	56¼	230
44	200	NSTP344BS	59¼	240	24	100	STP324BS	59¼	240
48	200	NSTP348BS	62¼	255	26	100	STP326BS	62¼	250
52	200	NSTP352BS	65¼	265	28	100	STP328BS	65¼	260
56	200	NSTP356BS	68¼	275	30	100	STP330BS	68¼	270
60	200	NSTP360BS	71¼	285	32	100	STP332BS	71¼	280
64	200	NSTP364BS	74¼	295	34	200	STP334BS	74¼	290
Main Brush Switch Fusible with Safety Interlock Door									
4	30	NSTP304BSF	29¼	135	4	30	STP304BSF	32¼	145
8	60	NSTP308BSF	32¼	150	6	60	STP306BSF	35¼	155
12	60	NSTP312BSF	35¼	160	8	60	STP308BSF	38¼	165
16	100	NSTP316BSF	41¼	175	10	60	STP310BSF	41¼	175
20	100	NSTP320BSF	44¼	185	12	60	STP312BSF	44¼	185
24	100	NSTP324BSF	47¼	195	14	100	STP314BSF	50¼	200
28	100	NSTP328BSF	50¼	205	16	100	STP316BSF	53¼	210
32	100	NSTP332BSF	53¼	215	18	100	STP318BSF	56¼	220
36	200	NSTP336BSF	62¼	250	20	100	STP320BSF	59¼	230
40	200	NSTP340BSF	65¼	260	22	100	STP322BSF	62¼	240
44	200	NSTP344BSF	68¼	270	24	100	STP324BSF	65¼	250
48	200	NSTP348BSF	71¼	280	26	100	STP326BSF	68¼	260
52	200	NSTP352BSF	74¼	290	28	100	STP328BSF	71¼	270
56	200	NSTP356BSF	77¼	300	30	100	STP330BSF	74¼	280
60	200	NSTP360BSF	80¼	310	32	100	STP332BSF	77¼	290
64	200	NSTP364BSF	83¼	320	34	200	STP334BSF	83¼	305

Continued on next page

Types N2P and 2P Standardized Panelboards

The safety-type N2P and 2P panelboards are built up in sections. The standard section consists of two removable plug fuse end sections, each containing four fuse receptacles, mounted on a common base. The complete section is interchangeable with all other standard unit sections. By the use of a one-unit section which has but four-fuse receptacles it is possible to furnish the N2P single-fuse branch panelboard in multiples of four circuits, and the 2P double-fuse branch panelboard in multiples of two circuits by simply adding additional sections.



NSP3LD Panelboard

Types N2P and 2P embody the latest improvements in panelboards of this type and they are particularly recommended for residences, small stores and similar structures where first cost is often an important consideration.

Westinghouse Simplicity Meter Bar Panelboards

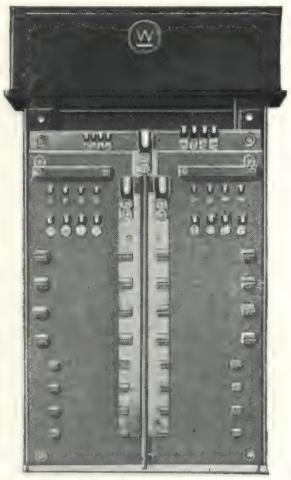
Westinghouse simplicity meter bar panelboards are designed primarily for applications in office buildings and apartment houses where current supplied to tenants is metered separately and where changes in occupancy require frequent rearrangement of the service. The panel consists of a set of vertical meter bars, and one horizontal bus bar for each branch circuit. Each branch circuit bus bar is provided with a sliding bus bar contactor (patent applied for) which makes possible the connecting of any branch circuit, or circuits, to any meter bus bar without the necessity of tools. It is not necessary to remove the front or disconnect the service when making these changes. Westinghouse automatic circuit-breakers replace fuses in branch circuits and for meter protection. Fusible tumbler switches, or fusible only circuits can also be supplied arranged for either single or double branch fusing. Simplicity meter bar panels are available in three different types: without space for meters, with meter space in cabinet, and with space for meters on front.

Oil Immersed Panelboards

Westinghouse oil immersed panelboards are designed primarily for protection of lighting and power circuits in applications where the action of corrosive and explosive chemicals is unusually severe.

Oil Immersed Distribution Panelboard

This panelboard is provided with a supporting cast iron pothead with a suspended panel, the panel having mounted on it the necessary busbars and fuse gaps. The panel is totally immersed in a removable tank filled with oil. When in position, the tank closes against the lower surface of the cast iron pothead thus forming an oil and acid proof joint. The leads are brought through conduit into the cast iron pothead, and then through the bus bars to the fuses. The leads then go from the fuses to the various circuits.

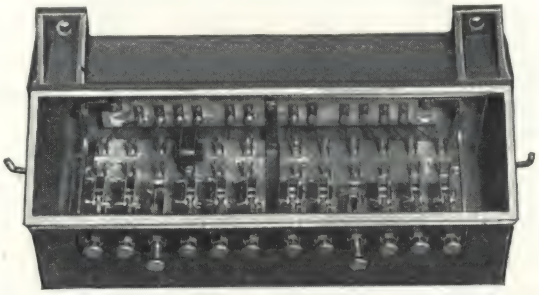


Oil Immersed Distribution Panel with Tank Removed

No vapor can attack the leads because the joint between the cast iron pothead and the tank is vapor and acid tight.

Tankless Oil Immersed Lighting Panelboard

This panelboard consists of a combined cast iron supporting bracket and oil container in which are assembled externally operated 30-ampere, 250-volt, tumbler switches. Access to fuses is obtained by removal of the cover. The fuses and switches are mounted on a slate base and each fuse is equipped with an insulated holder. These panelboards are available with 6 or 12 circuits for single-fuse branches, or 3 and 6 circuits for double-fuse branches.



Oil Immersed Tankless Type Panel with Cover Removed

THEATER SWITCHBOARDS

Multi-pre-set Type—The multi-pre-set theater switchboard is of the all-steel dead front composite construction and combines the switching and dimming equipment in a compact unit which permits localizing all the controls of each circuit. A number of lighting scenes may be set up in advance, thereby giving the operator a variety of effects to be used when desired. With the use of this board the most superb lighting effect may be produced by the operation of a single switch.

Pre-set Selective Type—The pre-set selective theater switchboards are for use in vaudeville theaters and other places where it is desired to set up only two lighting scenes in advance. Before the performance starts, the lighting for two scenes can be set up and after scene one is thrown "on," scene two is waiting. Then, when scene two is thrown "on," scene one is still available for emergency. After all possibility for the need of scene one lighting is past, the lighting for scene three can be set up, using scene one switches and circuits.

One-scene Composite Type—This switchboard is used where it is essential to keep the first cost low, and where it is unnecessary to have more than one scene set up at one time. This type of switchboard is similar in construction to the above boards and differs only in the set-up arrangement. All circuits are manual instead of remote control. Any combination of circuits or colors may be effected by the operation of a single switch.

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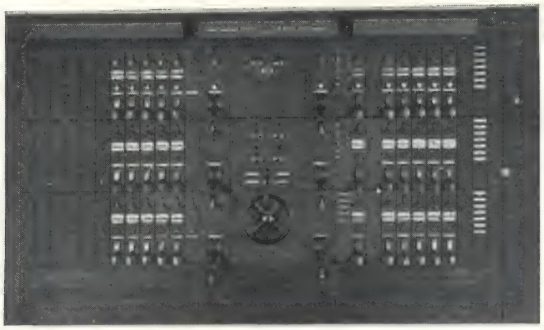


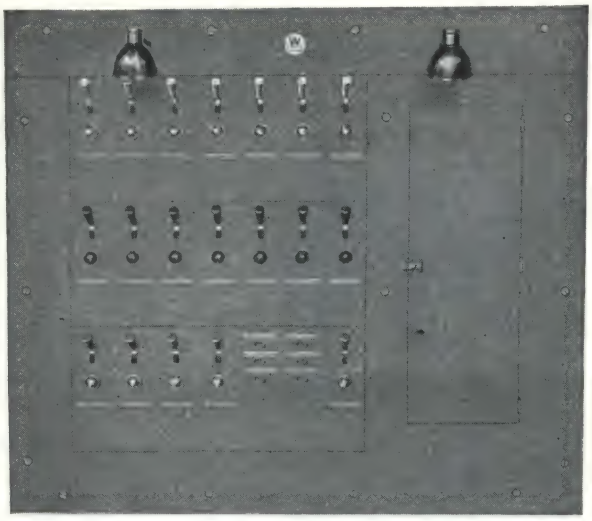
A Five-scene Multi-pre-set Switchboard Installed in the Regent Theater, Grand Rapids, Mich.

Manually Operated Composite Type—Boards of this type are for use in places where it is satisfactory to use the dimmer handles for dimming of the circuits as well as for switching operations, in order to reduce the cost and still have the composite type of construction. Circuit control is obtained either by the operation of the pilot switch controlling the individual circuits or by the use of the dimmer. Color group control of the circuits is obtained by color group operation of the dimmers through the color master dimmer lever or wheel. Grand master operation may be obtained by either switching or dimming.

One-scene Switchboard Installed in Keith's Fordham Theater, New York, N. Y.

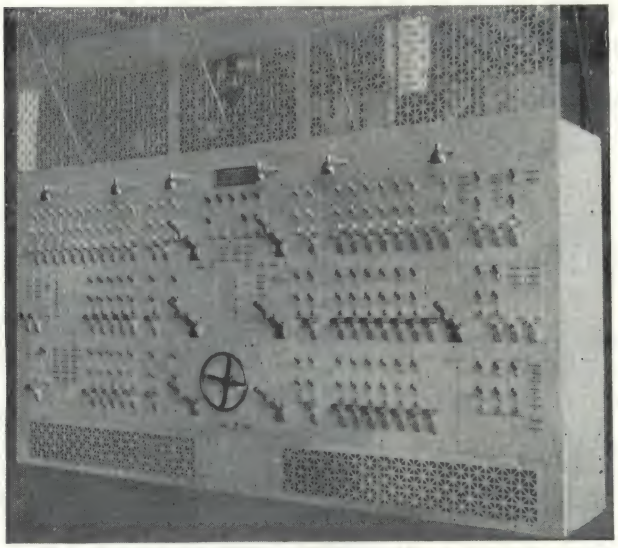
Tumbler Type—These direct control boards can be used in school auditoriums, small motion picture theaters, churches, and other places where the cost of equipment must be kept low.

For complete information see Circular 1702.

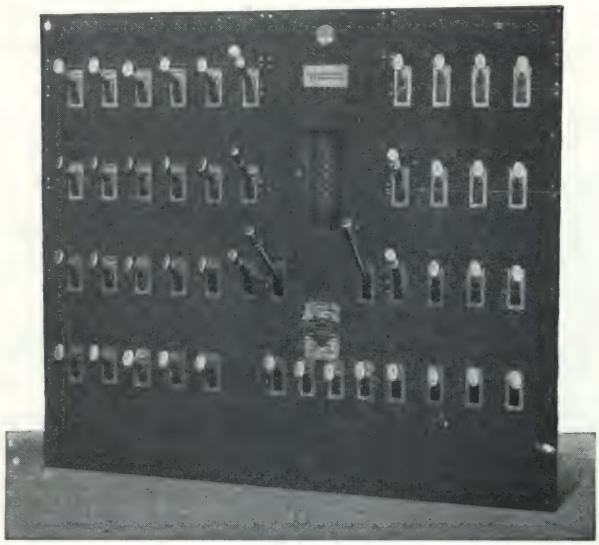


Manual Switchboard with Separate Dimmer Bank Installed in the Flynn Theater, Sawyer, Mich.

Tumbler Type Switchboard Installed in Broadway Theater, Danville, Va.



Pre-set Selective Switchboard Installed in Keith's Theater, Rochester, N. Y.



Manually Interlocked Type Switchboard Installed in Stanley Theater, Hoboken, N. J.

FRANK ADAM ELECTRIC CO.

GENERAL OFFICE AND FACTORY
3650 Windsor Place
ST. LOUIS, MO.
(Mail Address, P. O. Drawer 22)

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REPRESENTATIVE

Products

DISTRIBUTION PANELBOARDS and CABINETS: Dead Face (Safety Type); Live Face.

METER CONTROL PANELBOARDS and CABINETS.

SWITCHBOARDS for light and power: manually operated, Dead and Live Face for all types of buildings; FA Major System of Lighting Control for theaters and auditoriums.

HANGER OUTLETS: for fan, heater, picture illumination, etc.

ADJUSTABLE FLOOR BOXES.

Switches: Knife, Safety Type Brush, Flush Range, Safety Type Switchfuz.

Standardization

Due to the complete standardization of interchangeable units it is possible to manufacture, on a quantity basis, a product of the highest grade materials and workmanship, and to merchandize this at an exceedingly reasonable price. The comprehensiveness of the line adapts it to every need.

Standardization also makes it possible to carry in stock, in various parts of the country, steel cabinets and panelboards ready for immediate delivery.

All products fulfill the specification requirements of the National Electrical Code and bear the approval labels of the Underwriters' Laboratories, Inc., of the National Board of Fire Underwriters.

Experience

FRANK ADAM ELECTRIC CO. are pioneers in the design and manufacture of standardized panelboards and panelboard cabinets.

Continuous specialization over a period of thirty years in the design and manufacture of panelboards and switchboards, *exclusively*, gives assurance of wide experience resulting in a product that for years has been the standard of comparison.

The Company's long established financial responsibility and integrity, coupled with the recognized high standard of quality of the product and its comprehensive adaptability, is a guaranty sufficient to justify unqualified endorsement.

Manufacturing Facilities

The administrative office and manufacturing plant are in St. Louis, Mo., centrally located as to population and served with unexcelled transportation facilities.

The plant, the largest of its kind in the country, consists of a thoroughly modern, fireproof building covering an area of approximately 2½ acres. It has been specially designed and equipped for the most efficient and economical manufacture of the company's particular specialized products.

Distribution Facilities

Unexcelled facilities for prompt, adequate service are assured through the establishment of many branch assembly plants and stock carrying warehouses strategically located in the principal distributing centers of the country.

Engineering Service

The FRANK ADAM ELECTRIC CO. maintains at its Administrative Office a comprehensive Engineering Service, supplemented by competent engineers in charge of all District Offices. Prompt advice or assistance in the selection or design of panelboard and switchboard work is always available to the architect and his consulting engineer.

TECHNICAL DATA—FUSES AND SWITCHES

Branch Circuit Fuse Connections—Fuses for branch circuits are plug type unless cartridge type are specified.

Plug fuse connections are N. E. C. Edison, 30-ampere capacity; single pole for 1-fuse and double pole for 2-fuse equipment.

Cartridge fuse connections are N. E. C. 30-ampere capacity; single pole for 1-fuse and double pole for 2-fuse equipment.

Main Service Fuses—FA Switchfuz is provided where main service fuse connections are required. This new feature disconnects the fuses for replacement, making it safety type. When used with safety main or subfeeder switches the door over fuse connections cannot be opened unless the switch is disconnected.

Branch Circuit Switches—Branch circuit switches are FA 30-ampere, heavy duty, tumbler type switches; single pole for 1-fuse and double pole for 2-fuse equipment.

Switches are assembled in moulded unit sections with N. E. C. fuse connections.

Main Switches—Main switches are FA safety brush type, with a protecting steel cover having interlocking door over main fuse connections.

Continued on next page

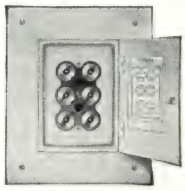
GENERAL TYPES OF PANELBOARD AND CABINET ASSEMBLIES

The panelboards here illustrated are all of the 1-fuse (solid neutral) type. For 2-fuse panelboards see FA current catalogue.

They are all of the Standardized Safety Type.

For numerical designations see diagrams FA current catalogue.

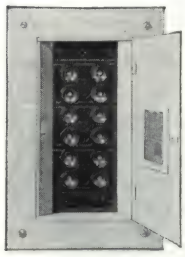
For details of construction, finish, etc. see FA current catalogue.



Type FBX

Type FBX—(F—Fuse; BX—Box) a neat, compact unit with moulded base and gutter type cabinet. Made in 4 and 6-circuit single fuse type only, with 3-wire main lugs.

Use—Smaller residences and commercial installations where the maximum demand is six branch circuits.

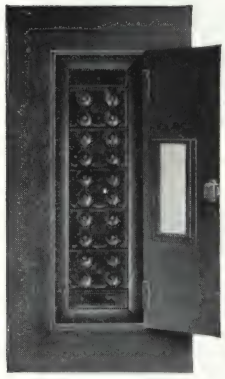


Type NR

Type NR—(N—solid neutral; R—residence). Moulded units are mounted on removable steel backs.

Use—Residences and other small jobs. Adapted to either 2 or 3-wire lighting service.

Note: On account of the small wiring gutter, this type of panelboard and cabinet can only be used when feeds for panel terminate in cabinet; whenever it is necessary to run risers through the cabinet use Type NR3G (1 fuse) or Type R3G (2 fuse).



Type NR3G

Type NR3G—(N—solid neutral; R—residence; 3G—3 in. gutter.)

Use—Larger residences and medium size jobs generally. Adapted to either 2 or 3-wire lighting service.

Note: This type of panelboard is made with main lugs only since they are not of sufficient width to accommodate main switches or subfeeders.

Type N2P3L—(N—solid neutral; 2—2-row; P—plug fuse; 3—3-wire mains; L—lugs only in mains.)

Use—Adapted to use where branch circuits are *not* controlled by branch circuit tumbler switches.

Note: This same panelboard with fuse connections in mains is N2P3SWF.

This same panelboard with brush type main switch and fuse connections in mains is N2P3BSF.

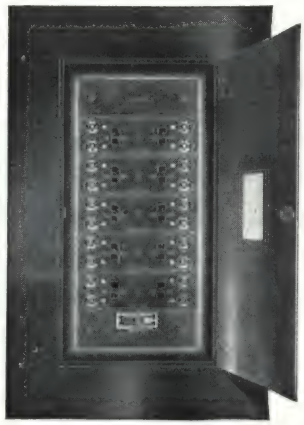
Type LNTP3L—(L—leader type, brown bakelite sections; N—solid neutral; T—branch tumbler switch; P—plug fuse; 3—3 wire mains; L—lugs only in mains.)

Use—Adapted to use where branch circuits are controlled by branch circuit tumbler switches.

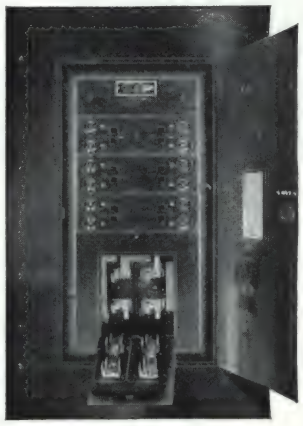
Note: This same panelboard with fuse connections in mains is LNTP3SWF (see illustration).

This same panelboard with brush type main switch and fuse connections in mains is LNTP3BSF.

Door-in-door front furnished when so specified.



Type LNTP3L



Type LNTP3SWF

Type N2P3L

Type NTC3BSFD—(N—solid neutral; T—branch tumbler switch; C—cartridge fuses; 3—3-wire mains; BS—brush type main switch; F—fuse connections in mains; D—door-in-door front.)

Use—Adapted to use where branch circuits are controlled by branch circuit tumbler switches and where cartridge fuses are desired in lieu of plug fuses.

Note: This same panelboard with lugs only in mains is NTC3LD.

This same panelboard with fuse connections in mains only is NTC3SWFD.

Type NTC3BSFD

Continued on next page

FA SWITCHFUZ AND FA FUSLOK (SAFETY TYPE) EQUIPMENT

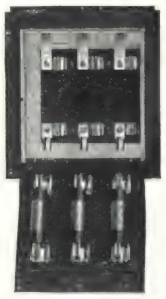
Feeder Panelboards and Cabinets

Two designs of FA Safety type feeder panelboards and cabinets are available, the Switchfuz type and the Fuslok type.

Switchfuz Type—This is the latest development and consists of an assembly of the required number, capacity and type of individual Switchfuz units mounted on a heavy galvanized steel mounting back. Each Switchfuz is a self-contained unit with individual base and protecting steel cover. It is fastened to the mounting back with four screws, thus permitting it to be removed without disconnecting any other unit.

The FA Switchfuz is a combination switch and fuse unit, simple and compact in design and of the dead front safety type construction, so much in demand in electrical control equipment.

The frame is formed from a single piece of galvanized sheet steel. The cover and operating door are also made from one piece of sheet steel.



100-amp. 250-volt 3-pole FA Switchfuz Unit

Inside of the steel frame are two insulating bases, upon which are mounted the contact clips, wire terminals, fuse clips and contact blades. To disconnect the Switchfuz unit, it is only necessary to open the door. The fuses are then dead for replacement.

These Switchfuz units have been listed by the Underwriters' Laboratories, Inc., as operating switches in capacities from 30 to 600 amperes inclusive, 250 volts, a-c., 30 to 400 amperes d-c. and 600 volts, a-c. They have also been listed as disconnect switches in 800 and 1200-ampere capacities, 250 volts, a-c. and d-c.

The panelboards are regularly furnished with code thickness galvanized steel boxes, having ample wiring gutters around all four sides. Inasmuch as all live parts, including the main busbars, are totally enclosed with protecting steel covers, the one-door type of steel front is supplied.

Fuslok Type—This is similar in construction, except that all switches are of the brush contact type with quick-make and quick-break operating mechanism.

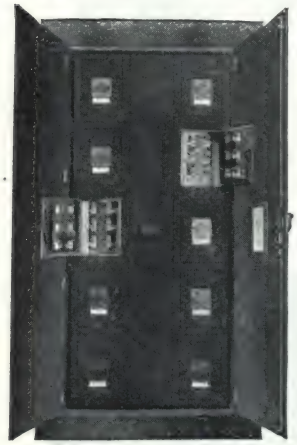
A door in the steel switch cover affords access to the fuses. This door is arranged with interlocking mechanism so that it cannot be opened when the switch is in the "on" position, nor can the switch be closed to the "on" position with the door open.

This type of panelboard is supplied with the same type of steel cabinet described above for the Switchfuz equipment.

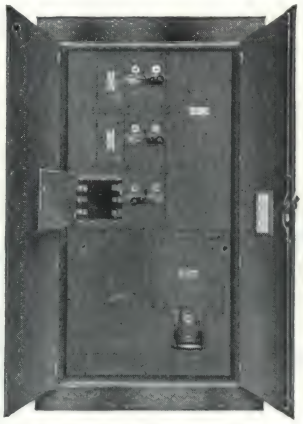
Safety Type and Dead Front Switchboards

These switchboards are available in the Switchfuz type and Fuslok type.

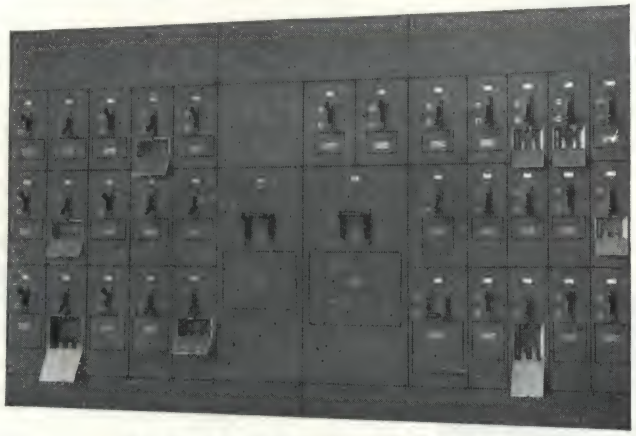
Both types are built up of the same standardized Switchfuz or Fuslok units, mounted on formed steel supports. They are readily removable from the front of the switchboard without affecting any other unit.



FA Switchfuz Safety Type Feeder Panelboard



FA Fuslok Safety Type Feeder Panelboard



FA Fuslok Safety Type Switchboard

The safety type switchboards, in both the Switchfuz and Fuslok type, are completely enclosed in a substantial steel enclosure with doors at rear which open over the busbar and wiring compartment. This safety type switchboard is particularly desirable where the switchboard is set out in the center of a room, since it does not require any other form of enclosure to prevent access to the rear.

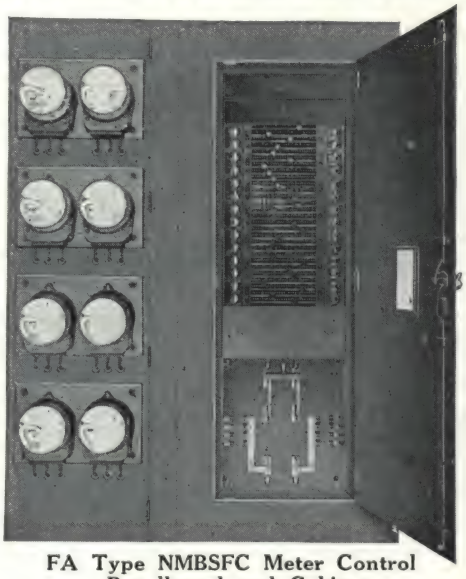
The dead front type is similar in design, except that the doors at the rear are omitted. This construction requires a protecting grille or other form of enclosure to prevent access to the rear of the switchboard.

METER CONTROL PANELBOARDS AND CABINETS

Meter control panelboards and cabinets follow in general the same standards of design and construction as the standard lighting panelboards. Two types of meter control panelboards are manufactured, the Type NMB and the Type NMW. These are of the solid neutral, single-fuse type and to obtain the two-fuse type where grounded neutral condition does not exist, the elimination of the letter "N" designates the two-fuse equipment.

Type NMB—This is the busbar type of meter control panelboard and has a vertical copper bar in the center of the panel for each meter and a horizontal bar for each branch circuit. The connection between the meter bar and branch circuit bar is made with a specially designed connecting device which can be readily moved from one meter bar to another but cannot be removed completely from the panel. This type is recommended because of its simplicity in design and flexibility in operation because any one can change the meter connections without the use of tools.

Type NMW—This is of the wire connecting type and the branch circuits must be connected to their respective meter with wire. Any changes in the metering arrangement require the services of an experienced electrician. The extra labor required to connect Type NMW panelboards will in most cases offset the saving in cost over the Type NMB; therefore, the NMB is recommended.



FA Type NMBSFC Meter Control Panelboard and Cabinet

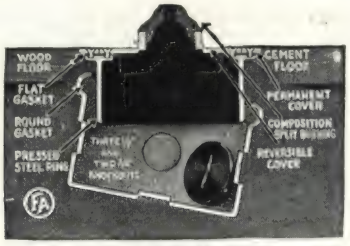
Cabinets—These panelboards are furnished with three types of cabinets. Type GC is the standard gutter type without space for meters; Type SFC has additional box or boxes installed adjacent to the panel box and these boxes are fitted with hinged doors having wood meter boards for mounting meters on face of cabinets; Type SBC is similar in design to SFC except the panel box and meter boxes are increased in depth to permit mounting the meters inside of cabinet under a locked door. Cabinets are designed so that connections between branch circuits and meter busses or wires can be enclosed under separate sealable cover, if desired. An additional charge is made for these protection covers.

Continued on next page

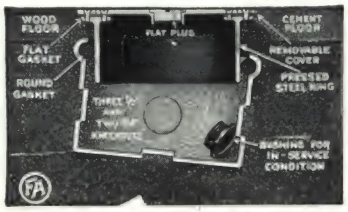
FA FLOOR OUTLETS

FA Adjustable Floor Box Type FB345—This is an adjustable, roomy and watertight unit. The box is of pressed steel with hot galvanized finish to resist corrosion and fitted with a pressed steel adjustable ring which allows for mounting the cover plate properly if the box should be out of alignment. The cover plate is in two parts, a permanent outer ring which is fastened to the adjustable steel ring and the reversible cover which is fitted with a split insulating bushing to protect the wires extending out of the box. No extra fittings are required to place this floor box in service.

FA Type FB5 Floor Box—This type is similar in every way to FB345 except the cover is not reversible and receptacle plugs cannot be disconnected without removing plate. This type was designed particularly for use as an outlet for telephone, annunciator and electric light wires that are permanently connected.



Type FB345 Floor Box



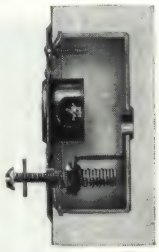
Type FB5 Floor Box

FA HANGER OUTLETS (PATENTED)

Designed especially for fan service but are adaptable as utility outlets for heaters, lights and various electrical appliances. A recent use for this unit has been to provide means for supporting and connecting radio loud speakers.

FA hanger outlets are a convenience in all types of modern buildings where safety and efficiency are desired in fan or other outlet service.

Unsightly wall brackets, standards and temporarily makeshift installations that are at the least dangerous, are eliminated.



Security Type

Hanger outlets are permanent because they are built in at the same time as the rest of the electric service equipment.

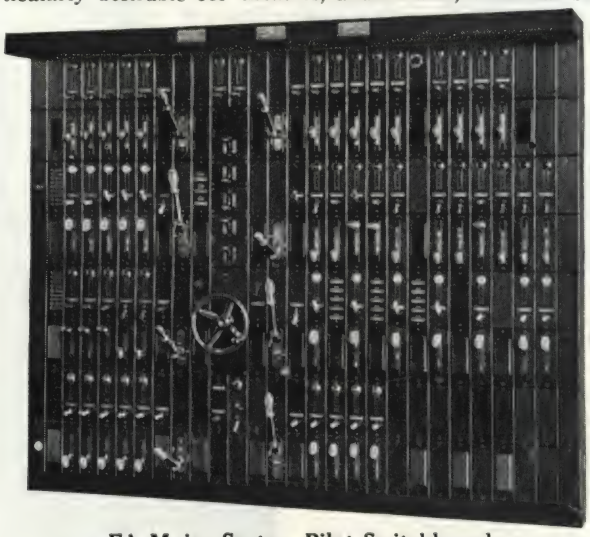
The "Security" is a complete unit furnished with a special 4-in. galvanized steel outlet box.

Type FHSB is a fitting to be used with any of the standardized NEMA outlet boxes and covers.

Both units are adjustable to provide for correct alignment if the box should not be correctly installed.

FA MAJOR PRE-SELECTIVE REMOTE CONTROL SYSTEM FOR AUDITORIUM AND STAGE ILLUMINATION CONTROL

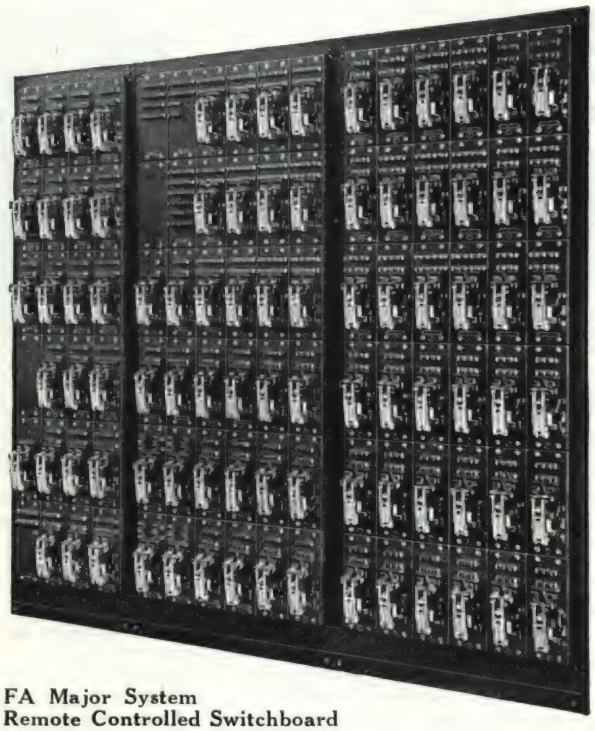
The remote control feature of this system stamps it as particularly desirable for theatres, auditoriums, fraternal buildings and schools where safe, foolproof and positive acting equipment is desired.



FA Major System Pilot Switchboard

In one composite unit on the stage are included the necessary switching and dimming controls and on which a minimum of current is actually handled. This composite unit is known as the Pilot Switchboard.

The second unit of this system upon which the heavy current capacities are opened and closed should be installed in the basement, preferably directly under the pilot switchboard. It is termed the Remote Controlled Switchboard. Types of this system are available for the smallest school as well as the largest and most completely equipped theatre.



FA Major System Remote Controlled Switchboard

This equipment is strictly an engineering proposition and complete details can be obtained from the nearest FA district office.

Bulletin No. 42 the "Control of Lighting in Theatres" will be gladly furnished upon request.

BENJAMIN ELECTRIC MFG. CO.

Panelboards, Wiring Devices, Industrial Signals and Electrical Specialties

GENERAL OFFICES AND FACTORY
DES PLAINES (Chicago Suburb), ILL.

NEW YORK OFFICE, 247 West 17th Street
SAN FRANCISCO OFFICE, 448 Bryant Street
CHICAGO OFFICE, 111 No. Canal Street

For our pages on Industrial Lighting Equipment, see Manufacturers' Index

BENJAMIN TRADE MARK

Benjamin-Starrett Heavy Duty Lighting Panelboards

Easy to Install—(1) Ample space for wiring and the passage of risers is provided by a full 4-in. gutter space on all four sides of panel.

(2) Adjustable trim clamps allow flush mounting of trims when edge of box is behind plaster line, also plumbing of trim when box is out of alignment.

(3) Adjustable panelboard supports allow ¾ in. outward adjustment of panel in box.

All Parts Removable From Front—(1) Switches and fuse receptacles may be removed without disturbing trim or removing panel from box.

Heavy Duty—30 ampere, 250 volt heavy duty tumbler switch.

Furnished in 3 Styles of Cabinets

Safety Type—Door-in-a-door construction; large door gives access to mains and branch fuses, small door gives access to branch switches only. Large door has Yale combination latch and lock; small door, latch only.

Protective Type—Single door construction with dead front protective shield which covers face of panel. Door has Yale combination latch and lock. Panel for fusible main knife switch has two doors; one door to main knife switch, the other door for branch fuses. Panels with fusible mains have small door in protective shield, giving access to main fuses.

Open Front Type—Identical to Safety Type except that a single door gives access to all fuses and switches on face of panel. Door equipped with Yale combination latch and lock.

Types of Mains on One Fuse and Two Fuse Panels

Safety type and protective type panels furnished in the following types. Main lugs only, fusible mains, fusible main brush type switch, and fusible main knife switch.

Open front panels furnished in the following types: main lugs only, fusible mains, fuseless main knife switch, fusible main knife switch.

One Fuse Panels—Polarity type with grounded conductors attached to the solid neutral bar. Single pole heavy duty tumbler switches, 30 ampere, 250 volts. 3 wire mains 125-250 volt.

Safety Type—Type NSPT—tumbler switches arranged for plug fuses.

Type NSCT—tumbler switches arranged for cartridge fuses.

Protective Type—Type NLP—arranged for plug fuses only.

Type NLPT—tumbler switches arranged for plug fuses.

Open Front Type—Type NOC—arranged for cartridge fuses only.

Type NOCT—tumbler switches arranged for cartridge fuses.

Type NOPK—knife switches arranged for plug fuses.

Type NOCK—knife switches arranged for cartridge fuses.

Two Fuse Panels—Arranged for 2 fuses for each two wire branch circuit. Double pole heavy duty tumbler switches, 30 ampere, 250 volt. 2 wire mains 125 volts or 3 wire mains 125-250 volts.

Safety Type—Type SPT—tumbler switches arranged for plug fuses.

Type SCT—tumbler switches arranged for cartridge fuses.

Protective Type—Type LP—arranged for plug fuses only.

Type LPT—tumbler switches arranged for plug fuses.

Open Front Type—Type OC—arranged for cartridge fuses only.

Type OCT—tumbler switches arranged for cartridge fuses.

Type OPK—knife switches arranged for plug fuses.

Type OCK—knife switches arranged for cartridge fuses.

With Main Lugs Only

Type NSPT Safety Panels with Cabinets

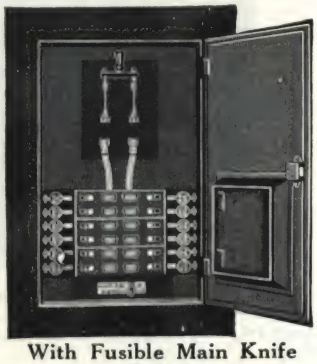
Panels with Main Lugs Only—

3 wire mains.
1 fuse branches.
Door-in-a-door cabinets.
Branches: 2 wire, 30 amperes, 250 volt, heavy duty tumbler switches, plug fuses.
Mains: 125-250 volt. Gutter space 4 in.
Also furnished in circuits from 44 to 60.

Number of Cir.	Panel with cabinet		Capacity of mains, amps.	Box No.	Box dimensions, in.		
	Surface Cat. No.	Flush Cat. No.			Width	Height	Depth
4	52004	52104	30	R-18	24½	18	4½
8	52008	52108	60	R-21	24½	21	4½
12	52012	52112	60	R-24	24½	24	4½
16	52016	52116	100	R-27	24½	27	4½
20	52020	52120	100	R-30	24½	30	4½
24	52024	52124	100	R-33	24½	33	4½
28	52028	52128	100	R-36	24½	36	4½
32	52032	52132	100	R-39	24½	39	4½
36	52036	52136	200	R-42	24½	42	4½
40	52040	52140	200	R-45	24½	45	4½

Panels with Fusible Main Knife Switch—

3 wire mains.
1 fuse branches.
Door-in-a-door cabinets.
Branches: 2 wire, 30 amperes, 250 volt, heavy duty tumbler switches, plug fuses.
Mains: 125-250 volt. Gutter space 4 in.
Also furnished in circuits from 44 to 60.



With Fusible Main Knife Switch

Number of Cir.	Panel with cabinet		Capacity of mains, amps.	Box No.	Box dimensions, in.		
	Surface Cat. No.	Flush Cat. No.			Width	Height	Depth
4	52604	52704	30	R-27	24½	27	4½
8	52608	52708	60	R-33	24½	33	4½
12	52612	52712	60	R-36	24½	36	4½
16	52616	52716	100	R-42	24½	42	4½
20	52620	52720	100	R-45	24½	45	4½
24	52624	52724	100	R-48	24½	48	4½
28	52628	52728	100	R-51	24½	51	4½
32	52632	52732	100	R-54	24½	54	4½
36	52636	52736	200	V-60	24½	60	5¼
40	52640	52740	200	V-63	24½	63	5¼

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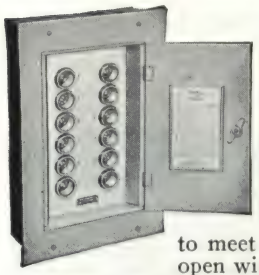
BENJAMIN-STARRETT LIGHTING PANELBOARDS AND CABINETS

Little Sentry Lighting Panelboards



Recommended for residences, apartment buildings, schools, small stores and factories, and similar places having from 4 to 12 branch circuits.

Easily Installed—Trim, barrier, shield and door are all in one piece, thereby reducing the number of parts to be handled when installing. A quarter turn of four screws allows removal of panel as a unit to pull in lead wires. Knockouts at each end of box arranged to meet any conditions required in conduit or open wiring. Ample wiring space of 1½ inches.

Complete Safety—Metal protective shield covers all live parts and assures absolute safety when renewing fuses.

Neat Appearance—One-piece code gauge steel trim makes a neat appearing job. Trim overlaps box 1½ inch on all sides making it suitable for either flush or surface mounting. Trim and shield are aluminum bronze finish.

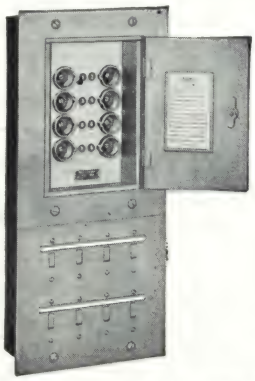
TYPE NP ONE FUSE LITTLE SENTRY PANELS
For 3 Wire Service—Mains: 125-250 Volt
Branches: Arranged for Plug Fuses only

Number of Cir.	Cat. No.	Box dimensions, in.		
		Width	Height	Depth
4	66104	9½	9½	3½
6	66106	9½	11	3½
8	66108	9½	12½	3½
10	66110	9½	14	3½
12	66112	9½	15½	3½

TYPE P TWO FUSE LITTLE SENTRY PANELS
For 2 Wire and 3 Wire Service
Mains: 125-250 Volt 3 Wire, 125 Volt 2 Wire
Branches: Arranged for Plug Fuses only

Number of Cir.	Cat. No.	Box dimensions, in.		
		Width	Height	Depth
4	66204	9½	12½	3½
6	66206	9½	15½	3½
8	66208	9½	18½	3½
10	66210	9½	21½	3½
12	66212	9½	24½	3½

Little Sentry Panel



Arranged for switches in the trim.

For installation in same locations as Type "P" and "NP" Little Sentry, but where individual tumbler switch control of branch circuits is desirable. Space is provided at bottom of panel so that tumbler switches (only) may be installed. Circuit Directory card and card holder over switch knockouts allow proper designation of circuits and switches. Tumbler switches are not furnished. Panels are carried as complete units ready for immediate shipment.

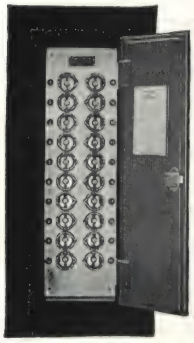
TYPE NEP ONE FUSE LITTLE SENTRY PANELS
Arranged with Switch Plates
For 3 Wire Service—Mains: 125-250 Volt
Branches: Arranged for Plug Fuses only

Number of Cir.	Number Sw. Mtgs.	Cat. No.	Box dimensions, in.		
			Width	Height	Depth
4	4	66304	9½	15½	3½
6	8	66306	9½	20	3½
8	8	66308	9½	21½	3½
10	12	66310	9½	27½	3½
12	12	66312	9½	29	3½

TYPE EP TWO FUSE LITTLE SENTRY PANELS
Arranged with Switch Plates
For 2 Wire and 3 Wire Service
Mains: 125-250 Volt 3 Wire, 125 Volt 2 Wire
Branches: Arranged for Plug Fuses only

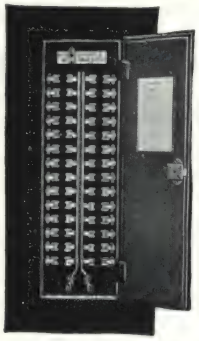
Number of Cir.	Number Sw. Mtgs.	Cat. No.	Box dimensions, in.		
			Width	Height	Depth
4	4	66404	9½	18½	3½
6	8	66406	9½	24½	3½
8	8	66408	9½	27½	3½
10	12	66410	9½	35	3½
12	12	66412	9½	38	3½

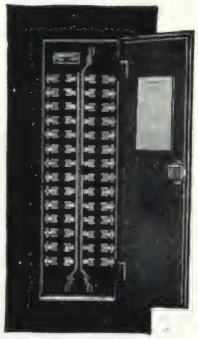
Type G Panelboards with Cabinets



For large residences, store buildings, apartment buildings, churches, factories, hospitals, sanitariums and other similar places requiring from 4 to 20 branch circuits.

Type G Lighting Panelboards embody many of the advantages of construction which have made the Heavy Duty Line so widely known for its ease of installation, durability and low maintenance costs. Such as: adjustable panel supports, protective shield, removable fuse receptacles, full 3-in. wiring gutters, combination Yale latch and lock, adjustable trim clamps, etc.





The various Type G Panelboards listed below are carried in stock completely assembled and packed ready for immediate shipment.

TYPE NPG ONE FUSE PANELS WITH CABINETS
For 3 Wire Service—Mains: 125-250 Volt
Branches: Arranged for Plug Fuses only

Number of Cir.	Panel with cabinet		Gutter space inches	Box dimensions, in.		
	Surface Cat. No.	Flush Cat. No.		Width	Height	Depth
4	60104	60154	3	11½	13½	3¾
6	60106	60156	3	11½	15	3¾
8	60108	60158	3	11½	16½	3¾
10	60110	60160	3	11½	18	3¾
12	60112	60162	3	11½	19½	3¾
14	60114	60164	3	11½	21	3¾
16	60116	60166	3	11½	22½	3¾
18	60118	60168	3	11½	24	3¾
20	60120	60170	3	11½	25½	3¾

TYPE PG TWO FUSE PANELS WITH CABINETS
For 2 Wire and 3 Wire Service
Mains: 125-250 Volt 3 Wire, 125 Volt 2 Wire
Branches: Arranged for Plug Fuses only

Number of Cir.	Panel with cabinet		Gutter space, inches	Box dimensions, in.		
	Surface Cat. No.	Flush Cat. No.		Width	Height	Depth
4	60204	60254	3	11½	16½	3¾
6	60206	60256	3	11½	19½	3¾
8	60208	60258	3	11½	22½	3¾
10	60210	60260	3	11½	25½	3¾
12	60212	60262	3	11½	28½	3¾
14	60214	60264	3	11½	31½	3¾
16	60216	60266	3	11½	34½	3¾
18	60218	60268	3	11½	37½	3¾
20	60220	60270	3	11½	40½	3¾

TYPE NCG ONE FUSE PANELS WITH CABINETS
For 3 Wire Service—Mains: 125-250 Volt
Branches: Arranged for Cartridge Fuses only

Number of Cir.	Panel with cabinet		Gutter space, inches	Box dimensions, in.		
	Surface Cat. No.	Flush Cat. No.		Width	Height	Depth
4	60304	60354	3	13¾	15½	3¾
6	60306	60356	3	13¾	17	3¾
8	60308	60358	3	13¾	18½	3¾
10	60310	60360	3	13¾	20	3¾
12	60312	60362	3	13¾	21½	3¾
14	60314	60364	3	13¾	23	3¾
16	60316	60366	3	13¾	24½	3¾
18	60318	60368	3	13¾	26	3¾
20	60320	60370	3	13¾	27½	3¾

TYPE CG TWO FUSE PANELS WITH CABINETS
For 2 Wire and 3 Wire Service
Mains: 125-250 Volt 3 Wire, 125 Volt 2 Wire
Branches: Arranged for Cartridge Fuses only

Number of Cir.	Panel with cabinet		Gutter space, inches	Box dimensions, in.		
	Surface Cat. No.	Flush Cat. No.		Width	Height	Depth
4	60404	60454	3	13¾	18½	3¾
6	60406	60456	3	13¾	21½	3¾
8	60408	60458	3	13¾	24½	3¾
10	60410	60460	3	13¾	27½	3¾
12	60412	60462	3	13¾	30½	3¾
14	60414	60464	3	13¾	33½	3¾
16	60416	60466	3	13¾	36½	3¾
18	60418	60468	3	13¾	39½	3¾
20	60420	60470	3	13¾	49½	3¾

ESTABLISHED 1907

ELECTRIC APPARATUS COMPANY

Manufacturers of Light and Power Distributing Apparatus

TELEPHONE
MONROE 5276, 5277

702-706 North Halsted Street
CHICAGO, ILL.

DEPENDABLE LIGHT EACO POWER APPARATUS

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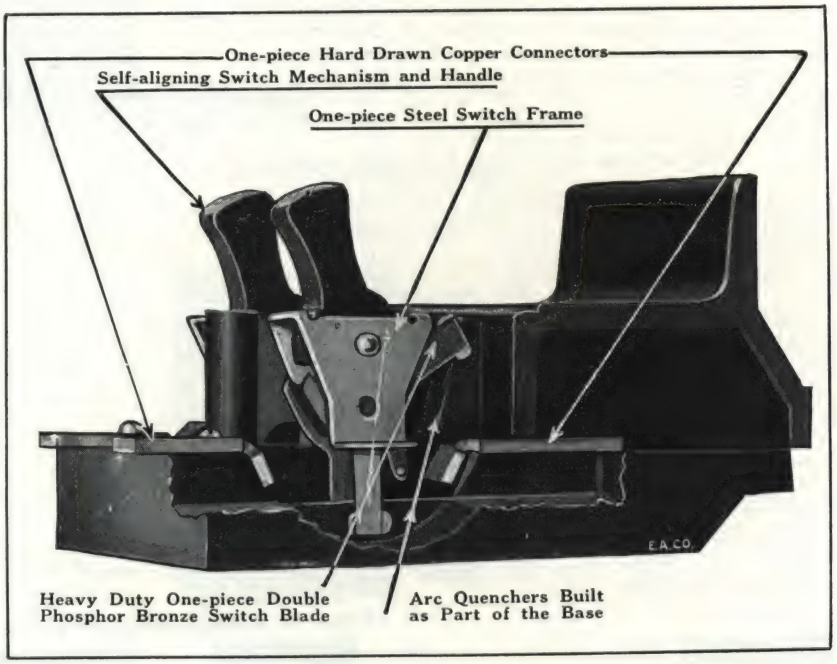
A complete new line of PANELBOARDS and CABINETS developed from our own designs, producing exceptional quality at very low prices. Outstanding in the panelboard field is our TUMBLER SWITCH UNIT.

PANELBOARDS—Light, Power and Metering Type.

Also manufacturers of Switchboards: industrial dead front or open style; theatre —selective remote control or manually operated; Steel Cabinets: junction, weatherproof, stage floor, exit, fire escape and plug boxes; Pull Boxes, Service Heads and all kinds of special equipments.

The Company

ELECTRIC APPARATUS COMPANY is one of the pioneers in the design and manufacture of panelboards and cabinets. It has had 24 years' experience in the manufacture of electric distributing apparatus. The services of its highly trained technical staff are always available to architects and engineers.



DESCRIPTION—TUMBLER SWITCH UNIT

(Illustrated above)

Design—This sturdy, rugged switch unit is of ELECTRIC APPARATUS COMPANY'S exclusive design and manufacture, and has from 8 to 14 parts less than any other switch unit on the market.

Base—The strong, fireproof base is made of cold moulded asbestos composition, impervious to moisture, unaffected by oil, heat or acid and a positive non-conductor of electricity.

Arc Quenchers—The arc quenchers are an integral part of the composition base. This arrangement reduces the number of parts of the switch itself; increases the interrupting capacity; and prevents burning or wearing out.

Accessibility—One of the outstanding features of this switch unit is the complete accessibility of all parts from the front, thereby making the screwdriver the only tool required for adjustment or removal.

Connectors—These, from the switch contacts to the busses and fuses, are made of one-piece, hard, drawn copper, thus eliminating all joints and twists of any description.

Switch Blades—These are made of phosphor bronze and are self-aligning with contacts. Each switch is equipped with two blades, insuring positive contact.

Switch Frame—The entire switch frame is made of one-piece, rustproof steel, and is constructed to permit opening of switch in case of failure of spring.

Switch Handle—This is self-aligning, eliminating binding and insuring positive action.

Switch Plate—Made of one-piece steel or bakelite with recess in boss for reception of card.

Endorsement—The entire switch unit has been approved by the National Board of Fire Underwriters.

TYPE NTP3 SAFETY TYPE PANELBOARDS AND CABINETS

Door-in-door Construction—One-fuse—One-door Construction

Front—Of No. 12 gauge pressed steel, formed with a shallow recess of sufficient depth and size to permit door to fit flush, eliminating the necessity of rebates, cleats or stops welded to the trim. The corners of the recess are rounded and the edges are turned in so as to fit flush on the switch unit base, thus avoiding the possibility of injury from sharp edges or corners.

Door—Has rounded corners and is equipped with a specially designed combination brass lock and key. The key may be removed and the lock used as a spring catch. Directory frame is attached to inside surface of door. Sprayed olive green Duco.

Cabinet—Of standard code steel, is 4½ in. deep with ¾-in. flange. Corners are lapped and electrically welded. Has standard combination knockouts. Finished with sprayed black duco. It may be either flush or surface mounted. Large wiring gutter provides ample wiring space.

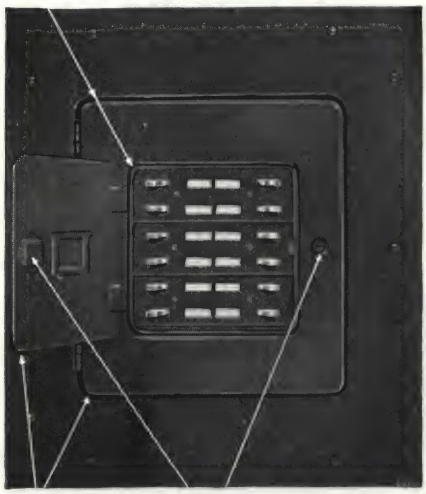
Endorsement—Approved by the National Board of Fire Underwriters.

Continued on next page

SAFETY TYPE PANELBOARDS AND CABINETS

Type NTP3—Single fusing, 3-wire, solid neutral. Single pole, Tumbler switches, Edison plug fuse. Door-in-door construction and one-door construction.

Pressed Steel Fronts with Recess to Allow Door to Fit Flush



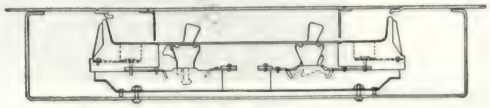
Doors and Trims with Round Corners **Combination Lock and Door Catch**

Note: These panels can be furnished with double plug fusing.

N. E. C.—single or double fusing can also be furnished.

These panels and cabinets may be arranged for subfeeders if desired. Prices quoted on application.

*Flush type cabinets will be furnished unless otherwise ordered.



Type NTP3D

DOOR-IN-DOOR CONSTRUCTION
Mains: 125-250-V.—3-Wire
Branches: 30-Amp. 125-V.

Number of circuits	Box size, in. Wide	High	Deep	Amp. cap. of mains	Combined panel, barriers, box and front* Shipping weight, lb.	Catalogue No.	List price, each
Main Lugs Only							
4	21½	13	4½	30	95	NTP304LD	$ 48.50
8	21½	16	4½	60	105	NTP308LD	58.30
12	21½	19	4½	60	115	NTP312LD	68.00
16	21½	26	4½	100	125	NTP316LD	83.50
20	21½	29	4½	100	135	NTP320LD	93.30
24	21½	32	4½	100	150	NTP324LD	102.70
28	21½	35	4½	100	170	NTP328LD	112.70
32	21½	38	4½	100	190	NTP332LD	122.50
36	23½	43	4½	200	210	NTP336LD	141.80
40	23½	46	4½	200	230	NTP340LD	151.50
44	23½	49	4½	200	250	NTP344LD	167.00
48	23½	52	4½	200	270	NTP348LD	176.70
52	23½	55	4½	200	290	NTP352LD	186.50
56	23½	58	4½	200	310	NTP356LD	202.00
60	23½	61	4½	200	330	NTP360LD	214.50
Main Fuse Connections							
4	21½	20	4½	30	90	NTP304FD	$60.20
8	21½	23	4½	60	100	NTP308FD	71.80
12	21½	26	4½	60	110	NTP312FD	83.50
16	21½	35	4½	100	135	NTP316FD	99.00
20	21½	38	4½	100	155	NTP320FD	109.40
24	21½	41	4½	100	175	NTP324FD	121.80
28	21½	44	4½	100	195	NTP328FD	134.00
32	21½	47	4½	100	215	NTP332FD	145.70
36	23½	52	4½	200	255	NTP336FD	167.00
40	23½	55	4½	200	275	NTP340FD	178.70
44	23½	58	4½	200	295	NTP344FD	198.00
48	23½	61	4½	200	315	NTP348FD	209.70
52	23½	64	4½	200	335	NTP352FD	221.50
56	23½	67	4½	200	355	NTP356FD	233.00
60	23½	70	4½	200	375	NTP360FD	245.00
Main Fusable Switch							
4	21½	26	4½	30	125	NTP304FSD	$ 77.70
8	21½	29	4½	60	140	NTP308FSD	93.30
12	21½	32	4½	60	160	NTP312FSD	104.90
16	21½	41	4½	100	200	NTP316FSD	128.30
20	21½	44	4½	100	220	NTP320FSD	140.00
24	21½	47	4½	100	260	NTP324FSD	151.50
28	21½	50	4½	100	270	NTP328FSD	163.20
32	21½	53	4½	100	280	NTP332FSD	182.50
36	23½	58	4½	200	320	NTP336FSD	215.50
40	23½	61	4½	200	340	NTP340FSD	229.00
44	23½	64	4½	200	360	NTP344FSD	240.80
48	23½	67	4½	200	380	NTP348FSD	251.50
52	23½	70	4½	200	400	NTP352FSD	264.20
56	23½	73	4½	200	420	NTP356FSD	287.70
60	23½	76	4½	200	440	NTP360FSD	293.50

ONE-DOOR CONSTRUCTION
Mains: 125-250-V.—3-Wire
Branches: 30-Amp. 125-V.

Number of circuits	Box size, in. Wide	High	Deep	Amp. cap. of mains	Combined panel, barriers, box and front* Shipping weight, lb.	Catalogue No.	List price, each
Main Lugs Only							
4	21½	13	4½	30	75	NTP304L	$ 33.00
8	21½	16	4½	60	85	NTP308L	38.80
12	21½	19	4½	60	105	NTP312L	48.50
16	21½	26	4½	100	125	NTP316L	71.80
20	21½	29	4½	100	135	NTP320L	81.50
24	21½	32	4½	100	150	NTP324L	91.40
28	21½	35	4½	100	170	NTP328L	100.91
32	21½	38	4½	100	190	NTP332L	110.60
36	23½	43	4½	200	210	NTP336L	130.00
40	23½	46	4½	200	230	NTP340L	139.70
44	23½	49	4½	200	250	NTP344L	155.30
48	23½	52	4½	200	270	NTP348L	165.00
52	23½	55	4½	200	290	NTP352L	174.70
56	23½	58	4½	200	310	NTP356L	188.30
60	23½	61	4½	200	330	NTP360L	204.00
Main Fuse Connections							
4	21½	20	4½	30	90	NTP304F	$ 44.60
8	21½	23	4½	60	100	NTP308F	56.30
12	21½	26	4½	60	110	NTP312F	68.00
16	21½	35	4½	100	135	NTP316F	87.40
20	21½	38	4½	100	155	NTP320F	99.00
24	21½	41	4½	100	175	NTP324F	109.30
28	21½	44	4½	100	195	NTP328F	122.30
32	21½	47	4½	100	215	NTP332F	134.90
36	23½	52	4½	200	255	NTP336F	155.30
40	23½	55	4½	200	275	NTP340F	167.00
44	23½	58	4½	200	295	NTP344F	186.40
48	23½	61	4½	200	315	NTP348F	198.00
52	23½	64	4½	200	335	NTP352F	209.80
56	23½	67	4½	200	355	NTP356F	221.50
60	23½	70	4½	200	375	NTP360F	233.00
Main Fusable Switch							
4	21½	26	4½	30	125	NTP304FS	$ 66.00
8	21½	29	4½	60	140	NTP308FS	81.50
12	21½	32	4½	60	160	NTP312FS	93.30
16	21½	41	4½	100	200	NTP316FS	116.50
20	21½	44	4½	100	220	NTP320FS	128.20
24	21½	47	4½	100	260	NTP324FS	140.00
28	21½	50	4½	100	270	NTP328FS	151.50
32	21½	53	4½	100	280	NTP332FS	161.00
36	23½	58	4½	200	320	NTP336FS	204.00
40	23½	61	4½	200	340	NTP340FS	217.50
44	23½	64	4½	200	360	NTP344FS	229.25
48	23½	67	4½	200	380	NTP348FS	241.00
52	23½	70	4½	200	400	NTP352FS	252.50
56	23½	73	4½	200	420	NTP356FS	266.00
60	23½	76	4½	200	440	NTP360FS	282.00

COMMERCIAL UNIT PANELS AND CABINETS

Type NR-3—Single fusing, 3-wire. One-row construction, solid neutral.

Panels—These are made in sections of cold moulded asbestos composition, a strong fireproof material; having high dielectric strength and resistant to oil, heat, moisture and acid.

Fronts—These are made of code gauge pressed steel with a recess for reception of flush fitting door.

Doors—Have rounded corners, directory frame and are equipped with a dee-ring handle and lock and key.

Flush Type—Finished with olive green Duco.

Surface Type—Finished in black duco.

NR312L

Single pole, Edison plug fuse connection. Mains: 125-250-v. 3-wire. Branches: 30-amp. 125-v.

Cabinets—These are made of code steel with standard combination knockouts and have large wiring gutters providing ample wiring space.

Busbars—Made of hard drawn copper of 98% conductivity, and have abundant current carrying capacity. Busbars are placed in the rear of moulded sections, making panels dead front, and complying with the latest requirements of the National Board of Fire Underwriters.

Note: These panels are equipped with 3-in. gutters up to and including 18 circuits and 4-in. gutters from 18 circuits up to and including 32.

For panels over 32 circuits see Type N2P3 (two-row construction). Main fuses and switches can be furnished on special order.

WM. WURDACK ELECTRIC MFG. CO.

GENERAL OFFICE AND FACTORY
4444 Clayton Avenue, ST. LOUIS, MO.

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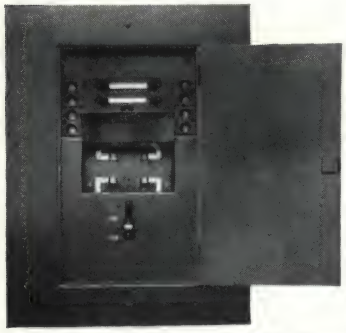
Products

Panelboards; Cabinets, Metering Panels; Distribution Panels; Live Front Switchboards; Dead Front Switchboards; Pre-set, Full Remote Control Stage Switchboards; Modified Remote Control Stage Switchboards and Theatre and Auditorium Lighting Systems.

Also Knife Switches.

Wurdack Sectional Type Panelboards

For the centralized control of current and fusing of main and branch circuits in buildings of all kinds, Wurdack Sectional Type Panelboards are ideal equipment. They are made of moulded asbestos sections, so mounted as to give complete access to all parts from the front, making it unnecessary to ever remove the trim and avoiding marring walls after being installed. All parts are standardized and interchangeable, so that changes can be made easily and inexpensively. These panelboards are offered in a variety of types and styles to meet every need. All switching panels are equipped with Wurdack-made heavy duty tumbler switches, capable of most severe service. The doors and trims are cut from heavy gauge cold rolled sheet steel, with a smooth, flat surface, carefully finished in satin black lacquer. Special finishes and colors are also furnished when desired. The cabinets are made of code-gauge galvanized sheet steel, with convenient knock-outs. Each panelboard is equipped with special toggles which permit perfect alignment of the trim. Catalogue giving complete details and prices sent upon request.



Type NTP Neutral Solid Tumbler Switch Plug Fuse with Main Fuse Brush Switch

Live Front Switchboards

Especially designed to meet the requirements of each individual job. They are constructed, erected, completely assembled and tested, both electrically and mechanically, in our plant before shipment. Shipment is made in clearly marked sections, permitting the board to be re-erected and installed without any unnecessary expense of cutting and fitting on the job, and with a minimum of time and labor. This company builds live front switchboards in all sizes, for all classes of service, and has representative installations throughout the country.

Wurdack Switchboard in the Chicago Daily News

Dead Front Switchboards

Especially applicable in factories, industrial plants, schools, office buildings, small power plants and similar places where an absolutely dead front safety-type switchboard is desired. Live parts of switches are fully enclosed—current carrying busbars are all in the rear.

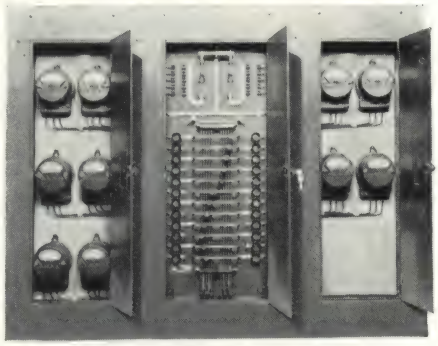
Dead Front Distribution Panels

Makes for absolute safety in the handling of current in places where non-technical persons may have access to the switch handles. It is so constructed as to perform all the functions of the regular type live front distribution panel, but the front is electrically dead.

Dead Front Panelboard

Metering Panels

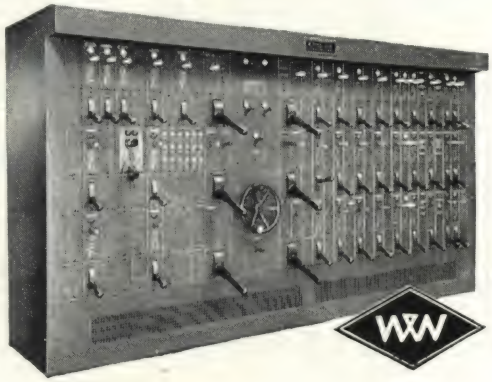
Designed for the flexible control of metering circuits in office buildings, apartment houses, etc. Through their use, any desired combination of rooms, suites, or tenant circuits can be made without altering the wiring, and without the use of any special tools. Furnished with cabinets arranged for face mounting of meters, or without meter space, as desired.



Wurdack Busbar Metering Panel and Cabinet

Wurdack Multi-pre-set Remote Control Theatre and Auditorium Lighting System

Designed for all types of theatres, auditoriums, fraternal buildings, schools, halls and wherever this modern system of graduated lighting control is desired. It consists of a pilot stage switchboard for controlling the system, and a remote control board for handling the heavy current load. Outstanding features are simplicity of design, convenience of arrangement and sturdy construction. Each unit of the system is especially designed and built for the particular job where it is to be installed. Details upon request.



THE HART MANUFACTURING CO.

Manufacturers of Switches, Receptacles and Appliances

HARTFORD, CONN.

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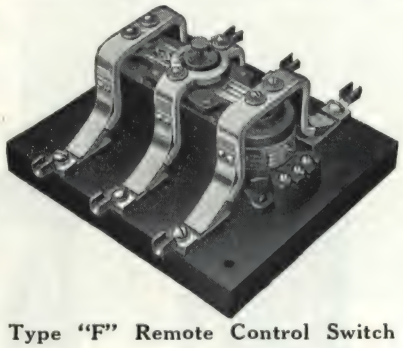
Products

DIAMOND H SWITCHES

"Diamond H" Remote Control Switches for all types of lighting circuits.
"Diamond H" Relays.
"Diamond H" Momentary Contact Switches
"Diamond H" Momentary Contact Toggle Switches.
"Diamond H" Door Bolt Control Switches.
Also "Diamond H" Time and Temperature Control; "Diamond H" Heater Switches.

Remote Control Switches

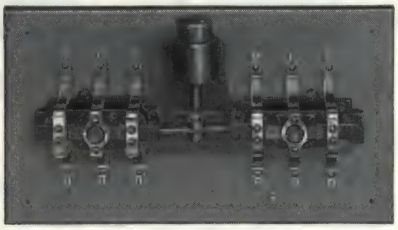
Type "F"—Principally used for controlling large groups of lights in public and private buildings, for floodlighting exteriors and airports, window lighting, electric signs, fire alarm systems, train sheds, etc. Type "F" is also used for controlling motors, such as for elevators, pumps, vacuum cleaners or individual machines or printing presses. Used extensively with auxiliary switches, tank switches, pressure gauges, thermostats, time clocks, momentary contact switches, etc., to control small motors which can be thrown directly on the line.



Type "F" Remote Control Switch

Type "G"—A double-throw combination of two Type "F" remote control switches and relay that affords a ready solution for the control of any load or lighting circuit where two different sources of supply are available and where current interruption would form a hazard.

Control is always connected to emergency service, operation being fully automatic. This type of switch automatically throws from main to emergency circuit and back again. Finds particular use in theaters, hospitals, public buildings, etc., for important lights, such as exits, aisles, stairways, corridors, operating rooms where lights must not fail.

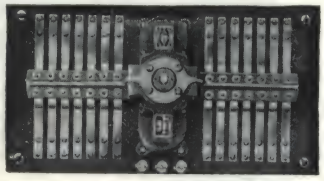


Type "G" Remote Control Switch

Type "H" Multicircuit—This Type "H" switch is suitable for many uses, among which are burglar alarm circuits, call systems, and master control of many lighting circuits.

Construction is similar to that of Type "F" switch previously described.

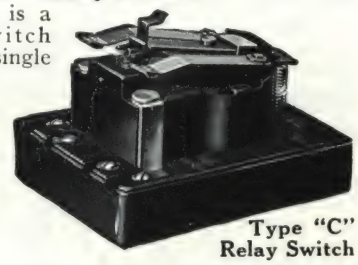
Consists of a number of single-pole circuits mounted on a Type "F" frame with a special brush carrier.



Type "H" Multicircuit Remote Control Switch

Type "C" Relay Switch

This is a relay switch made in single and double pole. It is designed primarily for use in connection with the control of heating units, but can also be used for a number of remote control purposes in public and private buildings.

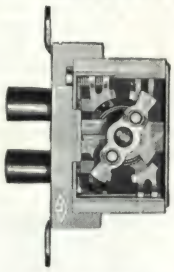


Type "C" Relay Switch

This switch consists of an iron clad solenoid with one opening and closing coil and mechanical locking devices. Made in single pole for 30 amperes, 125 volts; 20 amperes, 250 volts; for either alternating or direct current.

Momentary Contact Switch

This is a special push button switch for use in connection with remote control switches. It is so arranged that a snap contact is made by pressing either of the buttons and a quick break is obtained when the button is released. Both buttons can not be pressed at the same time.



Momentary Contact Switch

These switches are furnished with or without wall plates and fit all standard boxes.

Momentary Contact Toggle Switch

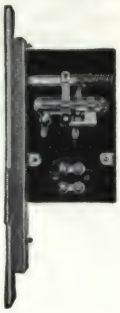
The toggle switch performs the same function as the switch above. They are of simple and rugged construction and are made of the finest materials. It is necessary to use indicating plate "On" and "Off" with this switch to show position of the Remote Control Switch.

Illustration shows polished nickel indicating plate, but can be furnished in Bakelite with indicating switch handle.

Momentary Contact Toggle Switch

Door Bolt Control Switch

This switch is designed for use in hotel bedrooms and theatre dressing rooms to automatically extinguish lights left burning when the occupant is out. By locking the door from the outside the switch automatically extinguishes the lights. When the door is unlocked the lights are turned on. Savings are effected in cost of current ordinarily wasted.



Service

Each job calls for special adaptation of these switches. Our Engineering Department offers its services to architects and engineers.

Literature

Bulletin No. 10 is complete with information about *remote control switches, relays* and *momentary contact switches.*

Bulletin No. 14 gives complete information about Door Bolt Control Switches with wiring plans and installation for both wood and metal trim.

BULL DOG ELECTRIC PRODUCTS CO.

Manufacturers of Electrical Controlling Devices

DETROIT, MICH.

IN CANADA: BULL DOG ELECTRIC PRODUCTS OF CANADA, LIMITED, TORONTO

Products

BULL DOG SAFETY SWITCHES, "FUSENTERS" and "SAFTOFUSE," BULL DOG UNIT-VERSAL LIGHTING PANELBOARDS and CABINETS, BULL DOG "SAFTOFUSE" POWER and LIGHT FEEDER PANELS, BULL DOG UNIT-VERSAL METERING PANELS, BULL DOG SWITCHBOARDS, theatre and industrial type.

BULL DOG "BUSS-DUCT," "TROLLEY-DUCT," "PRO-DUCT."

TRADE-MARK

Underwriters' Approval

Bull Dog Electrical Apparatus is approved and listed by the Underwriters' Laboratories, Inc., under rules and requirements of the National Board of Fire Underwriters.

Also approved by Associated Factories Mutual Fire Insurance Companies.

Bull Dog Safety Switches

Underwriters' approval, Classification "A." Also approval of the Associated Factory Mutual Fire Insurance Companies. Manufactured in all types and ratings from 30 to 1200-ampere capacities, 125, 250 and 600 volts.

The following features of design and construction are characteristic of Bull Dog Safety Switches:

(1) Blade and Crossbar Construction—No screws, rivets, clamps or other similar devices are used to attach the blades to the crossbar. In Bull Dog Safety Switches the insulated steel crossbar passes through holes formed in the blades, which are doubly insulated at this point with horn fiber bushings, "cold flowed" into the blade holes. It is not possible for any one blade to remain in contact after the handle is pulled to the off position. This is a very important feature.

(2) Both Quick-make and Quick-break—Quick and positive make is just as important as quick-break. The quick-make acts as an additional safety feature in that the switch cannot accidentally be thrown "on" because of the conscious effort required to compress the quick-make spring.

(3) Springs Are of the Compression Type—The opening and closing of the switch is not dependent on springs. They merely accelerate the action. The switch could be operated if spring broke or were removed.

(4) Type "A" Switch Jaws—Are of machine made, built-up type, best adapted for heavy duty industrial work. Hard drawn tempered clips are driven into foot blocks, accurately milled. They are then soldered and pinned. This eliminates joints and consequent heating. Also makes possible the use of a harder copper than in the Type "C" or bent-up type.

(5) Safety Interlock—Prevents access to switch by other than authorized persons but is of such simple nature that qualified electricians will find it easy to inspect the switch in any position.

(6) Switch Handles of Bull Dog Type "A" Switches—Are of malleable type—effective and durable.

(7) Cabinets—Are of ample size making it easy to wire up and install the switches in a minimum of time at low cost, and allowing for the expansion of gases when operating the switches under heavy overloads.

Endorsements—Bull Dog Safety Switches are standard equipment of many of the largest industrial plants, including steel mills and automobile factories and are used whenever severe conditions are to be met.

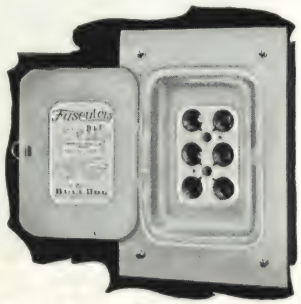
Specifications—All safety switches shall be Bull Dog Quick-make and Quick-break and bear Underwriters' Classification "A" for fire and safety.

Bull Dog Safety Switch Cabinet Closed

Bull Dog Safety "Fusenters"

The Bull Dog Safety "Fusenter" line is complete from 4 to 12 circuits and represents the latest development in design and construction.

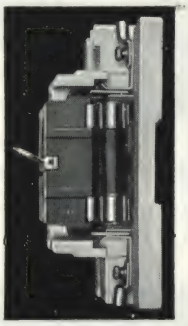
Cabinets are of "Luminized" finish, making them ornamental objects so that they may be installed in kitchens, hallways or any prominent place in homes or other buildings, thus avoiding the necessity of going into dark basements and inaccessible places for fuse replacements. Bull Dog Safety "Fusenters" harmonize with the finest surroundings.



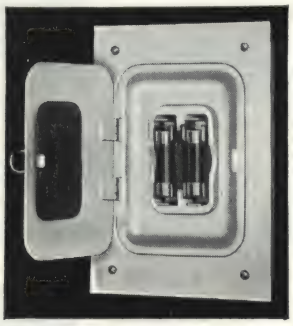
Bull Dog Safety "Fusenter"

Specifications—Contractors shall furnish Bull Dog Safety "Fusenters" with Luminized finish at various points throughout the building, as designated by the architect, for the number of circuits prescribed by the National Electrical Code.

Bull Dog "SaftoFuse" for Electric Ranges, Etc.



Sectional View Bull Dog "SaftoFuse" in "On" Position



Flush Type Bull Dog 60A "SaftoFuse" in "Off" Position

Bull Dog "Pro-Duct"

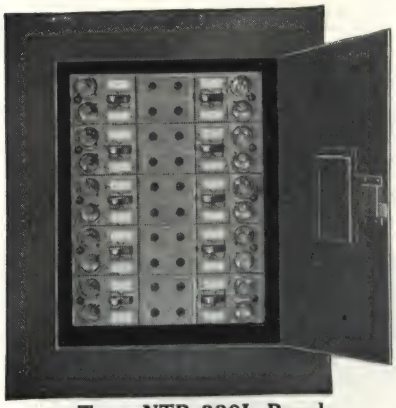
An enclosed metal raceway or trough for conveying electric wires or cables, designed to afford ample protection against damage to the wire and cables, at the same time having them instantly accessible at all points throughout their entire length, so that splicing, tapping or other changes can be made to the wiring, or additional cables run through in the quickest and easiest manner.

Bull Dog "Pro-Duct"

Continued on next page

Bull Dog "Unit-Versal" Lighting Panelboards

Bull Dog "Unit-Versal" Panelboards represent a complete standardized line of panelboards from 4 to 60 circuits, of various types as enumerated below.



Type NTP 320L Panel
20 circuits—plug fusible

Type NTP-4-circuit Unit

Bull Dog Panel Boxes—Made of code gauge galvanized steel. These boxes are of three-piece construction, the ends being removable. These ends are die made and are interchangeable and replaceable. Each end is provided with 70 conduit knockouts. Bull Dog Panel Boxes are carried in stock by various jobbers throughout the country.

Branch Circuits—Branch circuits for Bull Dog "Unit-Versal" Panelboards are composed of standardized units made of high grade moulded insulating material of a uniform width of 11 in., which, installed in Bull Dog Panel Boxes 19 in. wide, allows a 4-in. wiring gutter all around panel.

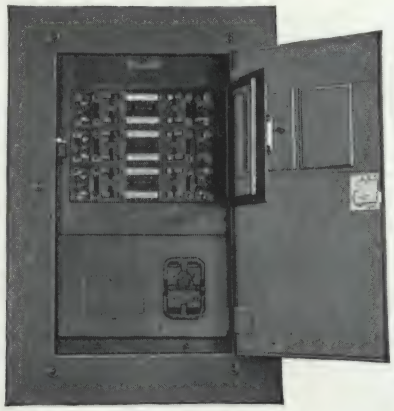
Bull Dog Branch Circuit Panel Units are composed of plug fuse connections only or toggle switches with either plug fuse or cartridge fuse connections.

Types of Mains—Type of mains used with Bull Dog "Unit-Versal" Panels are main lugs, main fuse connections or fusible main switches.

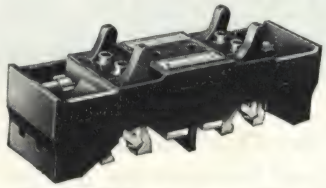
Main fuse connections are the Bull Dog "SaftoFuse."

Main switches, 30 and 60 amperes are Bull Dog toggle type.

Main switches, 100 amperes and larger are brush type switches.



Type NTCD Panel



Type NTC—4-circuit Unit

Standard Types—The following types are included in the standardized line of Bull Dog "Unit-Versal" Panelboards:

Types "RP" and "NRP"—Branches: Plug fuse connections only. Mains: lugs only.

Types "2P" and "N2P"—Branches: Plug fuse connections only. Mains: Main lugs, main fuse connections or main fusible switches.

Types "TP" and "NTP"—Branches: Toggle switches with plug fuse connections. Mains: Main lugs, main fuse connections or main fusible switches.

Types "TPD" and "NTPD"—Branches: Same as above. Inner door type. Mains: Same as above. Inner door type.

Types "TCD" and "NTCD"—Branches: Toggle switches with cartridge fuse connections. Mains: Main lugs, main fuse connections or main fusible switches.

The "SaftoFuse" as used in the mains of Bull Dog Panelboards is a "Combined Switch and Cut Out," so designed that fuses must necessarily be disconnected from the line before they can be touched.

Main Fuse Only Panelboards in which the fuses may be touched while they are "alive" do not conform to the U. S. Bureau of Standards Safety Code.

Bull Dog "SaftoFuse" Power and Light Feeder Panelboards

The United States Bureau of Standards Electrical Safety Rules, Handbook No. 7 Rule 324 (b) reads as follows:

"Switch ahead of the Fuse . . . Switches shall be so placed or arranged that opening them will disconnect the Fuses from all sources of electrical energy . . . ."

The Bull Dog "SaftoFuse" accomplishes this purpose in the safest, simplest and most complete manner. It is a "combination switch and cut-out"—a fusible safety switch, double break. Fuses cannot be touched while they are alive.

Standard "SaftoFuse" Fusible Switch Unit

Bull Dog "SaftoFuse" panels are made up of standard units *11 in. wide* installed in cabinet boxes *19 in wide* which provides *4-in. wiring gutters* on both sides. These units are interchangeable. The various types may be connected together on the same busbar.

Cabinets should be ordered with space for additional circuits. Units for these additional circuits may later be secured, of the size and type required, and installed in the cabinet without disturbing the other units on the panel. *It is not necessary to order spare circuits with the original panel, only spare space for spare circuits.*

Blank Filler Units
Made in varying widths to cover unused busbar space pending installation of future circuits

Fig. 1

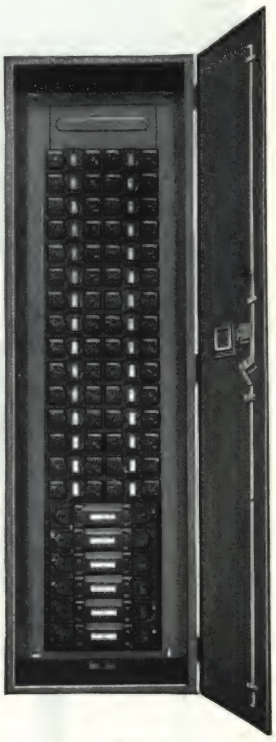


Fig. 2

"SaftoFuse" Power and Light Feeder Panelboard Convertible, Interchangeable Cabinet

At first merely the cabinet with busbars and main lugs as shown in Fig. 1 need be purchased, and later, when circuit requirements are known, "SaftoFuse" (fusible switch) Units can then be installed on the busbars until the complement of circuits is secured as shown in Fig. 2. Pending the installation of all circuits, blank filler units cover the unused portion of busbars

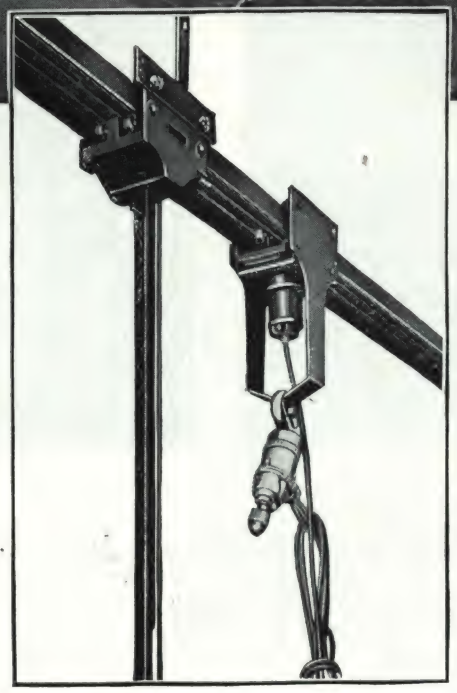
Continued on next page

Bull Dog A M P Systems—"Trolley-Duct"

A M P

Apparatus for Mass Production

Bull Dog "Trolley-Duct" is a flexible system of electrical control for portable electric tools as used on moving assembly lines in automobile and other mass production plants.



"Trolley-Duct" consists essentially of heavy steel channel inverted—the top part of which constitutes the track for the trolley carriage. In the channel, busbars properly insulated are installed. The current is taken from the busbars by means of collector wheels mounted in the trolley carriages and conveyed through fuses to the cord connecting the individual portable tools.

The insert shows a close-up of two types of trolley carriages, the semipermanent balancer type at right and the portable type at left, which can be instantly removed and attached to any other section of the "Trolley-Duct."

Write for detailed information and specifications.

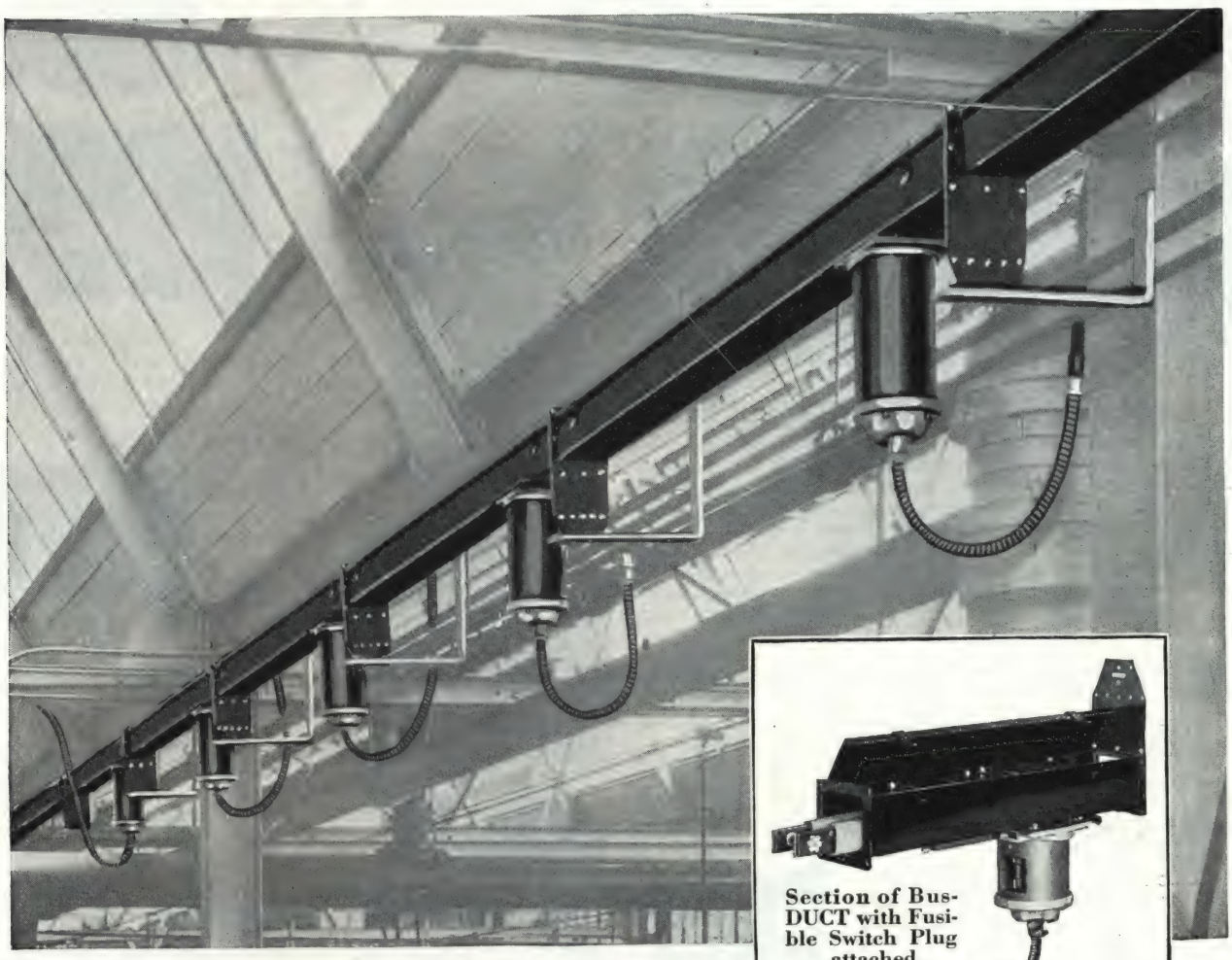
Continued on next page

Bull Dog A M P Systems—"Bus-Duct"

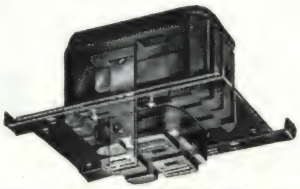
A M P

Apparatus for Mass Production

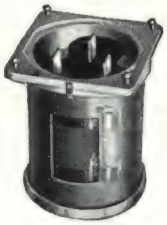
Bull Dog "Bus-Duct" is a flexible electrical distribution system for modern industrial plants employing mass production methods where frequent changes in location of machines, motors and sometimes whole departments are made on short notice.



Section of Bus-DUCT with Fusible Switch Plug attached.



Phantom view of bakelite Receptacle showing busbars and contacts into which Fusible Plug fits.



View of Fusible Switch Plug showing the Blades.

Bull Dog "Bus-Duct" consists essentially of busbars installed in enclosed duct, having bakelite receptacles at regular intervals throughout the length of the duct for the reception of fusible switch plugs which in turn are connected to the motor or machine they control, by flexible cable or conduit. When the location of motor or machine is changed, the fusible switch plug is simply detached and "plugged in" to a receptacle at the motor's or machine's new location.

Write for detailed information and specifications.

THE TRUMBULL ELECTRIC MFG. CO.

PLAINVILLE, CONN.

BRANCH PANELBOARD AND SWITCHBOARD FACTORIES

LUDLOW, KY. A. G. ELECTRIC MFG. CO. DIVISION: LOS ANGELES, CAL.; SEATTLE, WASH.

SALES OFFICES

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CHICAGO, ILL., 2001 West Pershing Road
Detroit Branch, 415 Brainard Street
ATLANTA, GA.
SAN FRANCISCO, CAL., 432 Fourth Street
BOSTON, MASS., 1002 Statler Building

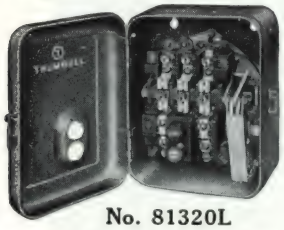
THE "CIRCLE T" LINE

TYPE "A" INDUSTRIAL SWITCHES; TYPE "C" SWITCHES; MOTOR CONTROL SWITCHES; ENTRANCE SWITCHES; MAGNETIC and MANUALLY-OPERATED MOTOR STARTING SWITCHES; METER SERVICE SWITCHES; TUMBLER SWITCHES; OPEN KNIFE SWITCHES; SPECIAL SWITCHES.

PANELBOARDS; SWITCHBOARDS; BUSS-WA (the copper bar distribution system); FLEX-A-POWER (the convenience outlet for power in industry); CONTROLITE (the theatre control board).

Also other devices—all listed in Catalogue No. 14.

Magnetic Motor Starting Switches



No. 81320L

Compact magnetic switches for local or remote control with time limit overload protection and undervoltage protection. Furnished with either self-resetting or hand-reset relays ranging from 1 to 40 amp. on the "M-15" Type and equipped with local control push button stations as a part of the switch, or separate push button stations for remote control switches.

On the "M-7½" switches, heater units from ½ to 20 amp. provide overload protection with hand reset thermostatic trip on the local control and automatic reset thermostatic trip on the remote control switches.

Thermostatic trip is reset by the start button after an interval of two minutes for heater units to cool when the switch has opened on an overload. Interchangeable heater units or relays are easily removable from the front.

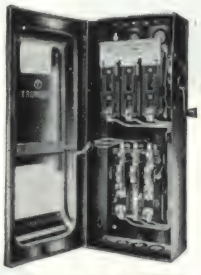
Moving contacts bridge the gap between the line and load side of the switch through stationary contacts in each leg. A moulded composition barrier, between contacts, shields each from the other so that maximum loads can be broken without the possibility of a flashover.

H.P. RATINGS FOR MAGNETIC MOTOR STARTING SWITCHES

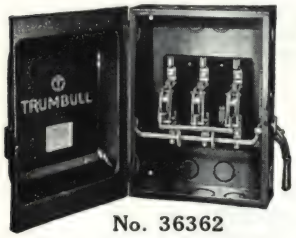
	Type "M-7½" (20 amp.)				Type "M-15" (30 amp.)			
Volts, a-c.	115	230	460	575	115	230	460	575
Polyphase	3	5	7½	7½	5	10	15	15
Single phase	1½	3	5	5	3	5	7½	7½

Magnetic Combination Switches—Types "M-7½" and "M-15"

A combination of a magnetic switch for either local, remote, or automatic control, combined with a manually operated fusible or no fuse disconnect switch in one box. Listed as standard by the Underwriters' Laboratories, Inc., for a manually operated disconnect switch ahead of a magnetic switch with thermal overload protection. Both switches are capable of breaking the stalled rotor current of motors for which rated and may be readily removed from the box for wiring by loosening the mounting screws. Ratings for 20 and 30 amp. are same as above.



No. 81321LNR6



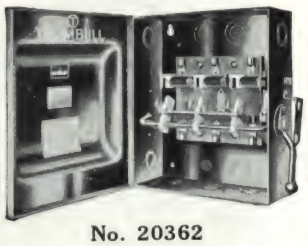
No. 36362

Type "A" Safety Switches

Supplied either single or double throw, in fusible or no fuse types and will break full load at listed ratings.

These quick positive make and quick break switches have an interlocking safety cover. Switches are made of milled foot block construction with built-up contact jaws sweated and pinned into the foot blocks on the larger sizes and swedged into the foot blocks on the smaller sizes. Rated 2, 3 and 4 poles, 30 to 2400 amp. at 230 and 575 v. a-c. and 250 and 600 v. d-c.

Type "C" Switches



No. 20362

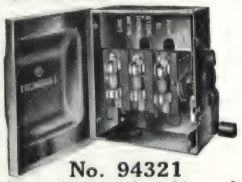
Externally operated, single throw, quick positive make and quick break switches in no fuse and fusible types.

High class punched clip construction is used, giving maximum electrical and mechanical strength for this type of design.

The box cover, however, does not have the safety interlocking feature of the Type "A" line.

These switches are available 2 to 5 poles, inclusive, in 230 v. a-c. and 250 v. d-c. ratings, and 3 and 4 poles at 575 v. a-c.

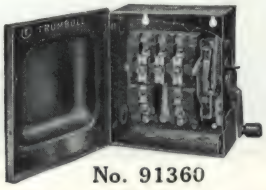
Rotor Movement (Type "R.M.") Switches



No. 94321

A revolutionary design in safety switch construction in both fusible and no fuse types. Has double break blade construction with rotor movement. This design results in a very compact switch for breaking full rated loads. When switch is opened, blades are thrown into deep, narrow slots in the base, cooling and snuffing out the arc. In 2, 3 or 4-pole switches for 30 and 60 amp. and 250 or 600 v. in either drawn steel or cast iron boxes. Also available in 2-position motor starting types with the fuses shunted in the starting position.

Thermostatic Manual (Type "T.M.") Motor Starting Switches



No. 91360

These switches provide thermal protection against overload or damage due to phase failure. Externally operated by simple "on" and "off" movement of the handle. Overload in any phase trips the entire switch. To reset, just throw the switch "on" after the thermal element has cooled. Handle returns to "off" when switch trips from an overload.

Switches will break stalled rotor current at listed ratings. Ampere capacity regulated by interchangeable heater units, ½ to 20 amp. Maximum rating 7½ hp. at 575 volts, polyphase.

Contacts are "Circle T" double break blade construction that reduces arcing to about 1/20 of that formed by the conventional single break type.

Meter Service and Entrance Switches

The single phase meter service switches are furnished with either *accessible* or *sealable* service fuses with or without test blades. On the accessible fuse type, switch must be in "off" position before access can be had to fuses. The polyphase meter service and entrance switches are furnished either with accessible or sealable fuses, with or without test connections on the accessible fuse type and with test connections only on the sealable fuse type.

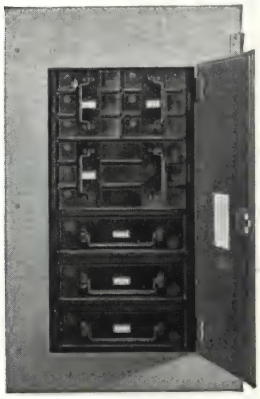
No. 26322

These polyphase switches are rated 30-600 amp. 3, 4 and 5 poles at 230 and 575 v. a-c.

30-amp. switches are on porcelain bases. Above 30 amp. slate bases are used.

Continued on next page

Safe-ConverTi-Fuse Panels



As its name implies Trumbull Safe-ConverTi-Fuse has been developed to provide a safe and economical method for changing the size of branch circuit fuses—to provide a flexible dead front distribution panel to facilitate fuse replacements, repairs or extensions to the line.

The exclusive construction features of the "Circle T" Safe-ConverTi-Fuse allows for instantaneous disconnecting through removal of the "cap" which in itself contains the fuses. When it is re-inserted by a 180° change of position the circuit is "off" and in addition, all parts are completely covered and protected.

A standardized distribution panel for power and lighting to replace a multiplicity of special panels previously required.

Residence Panelboards, 4 to 12 Circuits, Single or Double Fusing

"Circle T" Residence Panelboards are designed for use with residence and apartment house wiring systems for single or double fusing, from 4 to 12 circuits. They are small in size and of the safety type for flush or surface mounting.

Removable shield encloses all live parts.

No. 3206
Six circuits

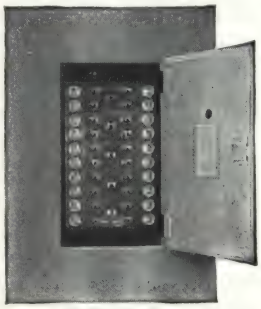
Unit Panelboards

Serious consideration has been given to the fact that a panelboard with its enclosing steel cabinet should give at least twenty to twenty-five years of continuous service.

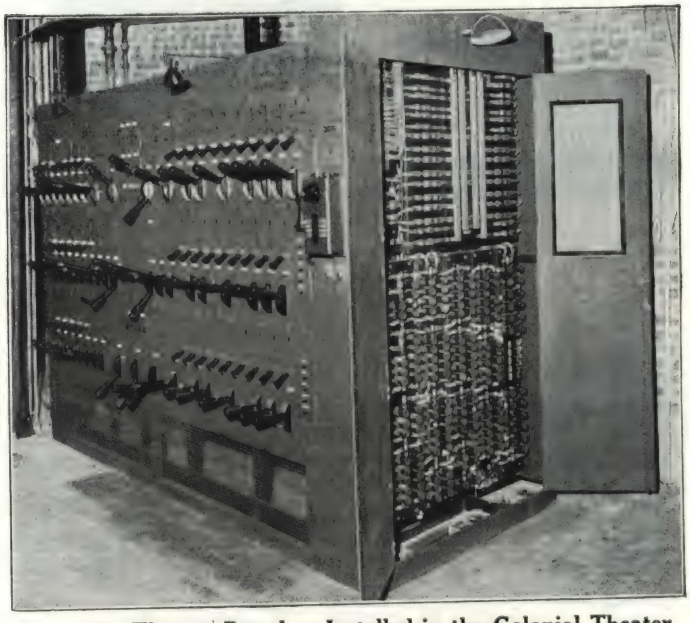
With the many changes in the electrical system and wiring codes along with the advance of the art, flexibility of distribution equipment is increasingly important.

To install "Circle T" Unit Panelboards is to insure the electrical distribution system against undue financial depreciation.

Standardization and Simplification—"Circle T" Standard Panels in any regular combination of circuits and mains which fit in boxes not over 61½ in. high require only 15 different stock sizes.



NTP 320
Safety type



Controlite Theater Board as Installed in the Colonial Theater, Hartford, Conn.

Buss-Wa—The Copper Bar System for Power and Light Distribution

Buss-Wa is a copper bar system replacing wire and conduit. It has flexibility enough to meet all distribution requirements whether standard or special. Whatever the problem of power or lighting distribution, Buss-Wa will solve it.

The illustration shows how the enclosed and insulated copper bars are run from a power plant or a transformer bank either underground or overhead (weatherproofed) to a main switchboard or a section of Buss-Wa, for any required distribution of power and light feeders.

In office buildings, hotels, apartments, municipal buildings, etc., a riser Buss-Wa lighting system supplies the distribution panels from basement to roof. A power system installed in the elevator shaft will supply the elevator and any other power requirements. Used in industrial plants for power feeders, light feeders, safety switch, main switchboard or transformer bank distribution. Buss-Wa Systems can be installed in horizontal or vertical runs, risers, drops, inclines or offsets. They can be suspended in air from a roof truss, follow a ceiling, pass through a wall, up through a floor or laid in concrete. Adaptable for both indoor and outdoor service.

Maintenance problems are practically eliminated, costs are reduced, time saved and accidents minimized.

Flex-A-Power

Flex-A-Power as an individual installation or served from Buss-Wa is the convenience outlet for power in industry.

Particularly adaptable for branch runs and provides the only *flexible* system of convenient power outlets.

"Controlite"

"Controlite" is a combined switchboard and interlocking dimmer bank designed to give ideal theater lighting control at small cost. Long study of theater lighting problems has shown that good lighting effects can only be obtained by providing ease of dimmer and switchboard operation.

"Controlite" is also easy to provide for refinements, commonly required, such as slow motion cross control, advance set-up and partial remote control.

Advantages—"Controlite" is the most compact light controller we know of. It is a complete switchboard and a complete dimmer bank, combined.

Dimmer handles and circuit switch handles are adjacent to each other, and within easy reach of the operator.

Control of light in the entire theater (stage and house) can be obtained by moving a single handle or slow-motion wheel. Any circuit or group of circuits can be operated in unison with others or independently of others.

"Controlite" is built and shipped by "Circle T" a complete self-contained unit. Upon arrival on the job it is only necessary to connect line and load wires.

WESTINGHOUSE ELECTRIC & MFG. CO.

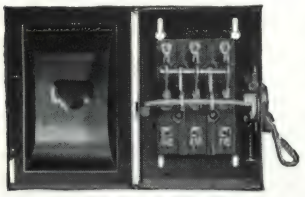
EAST PITTSBURGH, PA.

For Branch Offices, see our Lighting Catalogue. For References to Other Products, see Index to Manufacturers

WESTINGHOUSE SAFETY SWITCHES

Porcelain Base Type WK-45, 30 Amperes, 3 Poles, Single-Throw Only, Quick-make and Quick-break

These switches—fusible, solid neutral or non-fusible—are applicable for industrial and general purpose disconnecting use up to 30 amperes, 230 volts. They are equipped with a rugged quick-make and quick-break mechanism. Switch blades and jaws are mounted on porcelain bases with black japan finishes. The switches are mounted in a small compact box which allows ample wiring space and can be furnished with an interlocking cover.

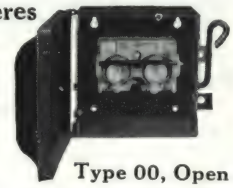


Type WK-45, Open
30 amps., 3 poles, 250 volts

Over-all dimensions: length 9½ in.; width 8⅜ in.; depth 5$\frac{1}{16}$ in.

Porcelain Base, Type 00, 30 Amperes

These switches—fusible, solid neutral or non-fusible—are applicable for industrial and meter service installations up to 30 amperes, 250 volts.

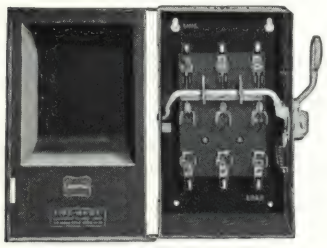


Type 00, Open
30 amps., 2 poles, 125 volts

Over-all dimensions: length 5⅝ in.; width 7½ in.; depth 4½ in.

General Purpose, Type WK-97, 30 to 200 Amperes

These switches—fusible, solid neutral and non-fusible—are inexpensive, enclosed, externally operated safety switches. They have a reliable quick-make and quick-break, and are also equipped with the diamond pointed jaw and extended blade construction that assures a clean contact. These switches have a lock-off feature for independent locking by two persons. High grade Vermont slate bases, free from metallic veins, are used.



Type WK-97, Open
60 amps., 3 poles, 230 volts

In WK-97, 600-volt switches, up to 200 amperes, each blade is equipped with an individual arc quencher. These devices, while mounted individually, operate on the same principle and perform as efficiently as the arc quencher on WK-55 switches.

Over-all dimensions: 30 amperes—length 9⅛ in., width 6⅝ in., depth 5$\frac{11}{32}$ in. 200 amperes—30$\frac{15}{32}$ in., width 13$\frac{5}{32}$ in., depth 8$\frac{29}{32}$ in.

Heavy Duty Industrial Type WK-55, 30 to 800 Amperes

Full-safety switches—fusible only—withstands the most severe service in buildings and industrial plants.

The exclusive double-door design is the principal safeguard to the operator. The inner door through which fuses are changed is interlocked with the operating handle so that it can be opened only when switch is off and all fuse parts are dead. Outer door over the entire switch is padlocked and can be opened by an authorized inspector without interrupting operation.

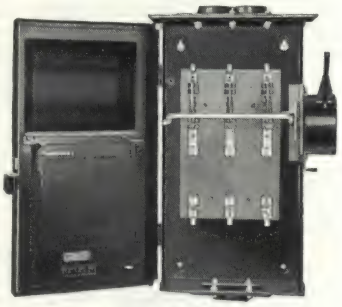
The switch jaws have the diamond-pointed feature that prevents the arc that may be formed on opening an overloaded circuit from burning or pitting the contact surface.

In all unfused and in the 575 and 250-volt steel mill fused sizes, an arc quencher absorbs the energy of the arc so rapidly that it is extinguished instantaneously.

Over-all dimensions: 30 amperes—length 16⅜ in.; width 5$\frac{13}{16}$ in.; depth 5$\frac{13}{16}$ in. 800 amperes—length 46 in.; width 25½ in.; depth 12$\frac{3}{16}$ in.

WK-55 Weather-proof Switch

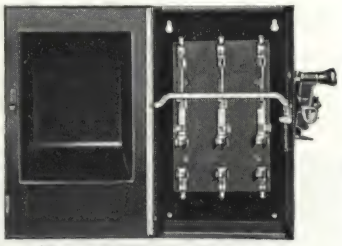
Has all the features of the WK-55 line and in addition has the following: a drip cover of special cadmium-plated steel which permits water to drip clear of the switch; cast iron cadmium plated fittings are provided in addition to the drip cover, the top fitting having two threaded openings and the bottom fitting one threaded opening, insuring watertight joints for conduit; box and doors of cadmium plated steel; hardware and handle assembly parts cadmium plated; copper parts tin plated; base of durable, non-moisture absorbing ebony asbestos board of high dielectric strength.



Type WK-55
100 amps., 3 poles, 230 volts
Weather-proof

Enclosed Type WK-66, 30 to 1200 Amperes

These are safety switches—fusible, solid neutral and non-fusible—for use in industrial plants where an interlocking type of switch is desired. They have a positive quick-make and quick-break mechanism contained in the external handle, leaving the cabinet entirely clear. The diamond pointed jaw and extended blade construction is used. In the WK-66, 575-volt switches, up to 200 amperes, each blade is equipped with an individual arc quencher.



Type WK-66, Open
60 amps., 3 poles, 230 volts

Over-all dimensions: 30 amperes—length 12¾ in.; width 8⅞ in.; depth 5$\frac{9}{16}$ in. 1200 amperes—length 55⅛ in.; width 36¼ in.; depth 12$\frac{13}{16}$ in.

Motor Watchman (WK-16)

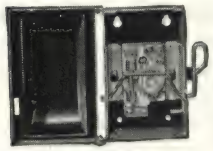
Motor Watchman

For controlling motors up to 10 hp., is very adaptable for heavy overload applications. The Built-in-Watchman assures positive motor overload protection. There are no thermal elements to renew. Trip mechanism is easily reset by moving the handle to extreme "off" position and then to "on." Switch is front operated and compact. Contacts are of special non-brazing alloy. Toggle type operating mechanism.

Continued on next page

Midget Motor Starting Switch Type WK-11, ¼ Hp.

For use in starting single-phase motors up to and including ¼ hp. and protect the motor while starting and while running, by means of a plug type thermal cutout. This allows heavy starting current and temporary overloads but opens the circuit in case the overload is prolonged to a point where the motor is endangered.



Type WK-11
¼ hp., 2 poles, 110 volts

The WK-11 motor starting switch is easy to wire and assemble. A full turn of the two mounting screws permits the unit to be slipped out of the box for wiring.

Over-all dimensions: length 6⅜ in.; width 5 7/16 in.; depth 3 11/16 in.

Motor Starting Switch Type WK-12, 2 and 3 Hp.

These are single-phase enclosed externally operated, 2-wire, 2-blade switches, with plug cutout protection. The plug cutouts cannot be removed when the switch is in the "on" position.

Type WK-12
3 hp., 2 poles, 230 volts

Over-all dimensions: length 6 in.; width 7 5/16 in.; depth 4 3/16 in.

Motor Starters, Types WK-10 and WK-20, 1, 2, 3 and 5 Hp.

Type WK-10
2 hp.

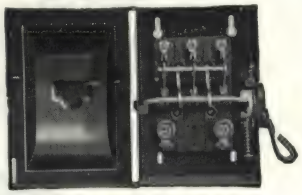
Used to furnish protection to operator and motor on single, two and three-phase motors, using 110, 220 and 440-volt service. The WK-10 is suitable for motors up to 2 hp., 440 volts, and the WK-20 up to 5 hp., 550 volts.

Motor protection is provided by thermal cutouts. They resemble plug fuses but have left-hand threads.

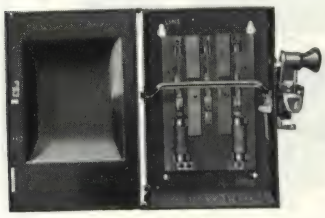
Over-all dimensions: WK-10—length 7⅝ in.; width 4⅝ in.; depth 3⅜ in. WK-20—Length 9⅜ in.; width 6¾ in.; depth 4⅜ in.

Motor Starting Switch WK-15, 2, 5 and 7½ Hp.

Used to throw alternating-current motors up to 7½ hp. directly across the line. It is a knife blade, externally operated switch with quick-make and quick-break for three-phase. Switch door cannot be opened until the switch is in the "off" position and door must be closed before the switch can be thrown on. The WK-15 starting switch has a porcelain base, black japanned, and is equipped with the diamond pointed jaws and extended blades that assure clean contact area. It is furnished either with receptacles for plug type or cartridge type cutouts. Over-all dimensions: length 9½ in.; width 8⅜ in.; depth 5 1/16 in.



Type WK-15
5 hp., 3 poles, 220 volts



Type WK-22
5½ hp., 3 poles, 220 volts

Motor Starters, Heavy Duty Type WK-22, 5, 7½ and 10 Hp.

Of the knife switch externally operated type construction and with quick-make and quick-break mechanism contained in the external handle.

They are for heavy duty service and for use where there are heavy momentary overloads. Used with two or three-phase motors 220 or 550-volt service. Motor protection in the WK-22 is provided by cartridge type thermal cutouts. For 600-volt circuits they have arc quenchers. Over-all dimensions; length 12¾ in.; width 11⅛ in.; depth 5 9/16 in.

Type WK-50 Meter Service Breaker
30 amps., 2 poles, 125 volts

WK-50 Meter Service Breaker

Designed to eliminate main fuses and accompanying troubles. Its calibration cannot be altered or its action blocked so as to prevent its opening.

The breaker has a longer time element than fuses, withstanding temporary overloads but opening the line before any damage can be done. It is as easily reclosed as a toggle switch. Easily wired, compact and front operated.

Universal Meter Service Switch, Type WK-57, 30 Amperes

Designed to meet requirements of central stations and power companies and embodies the principles of safety, convenience and economy.

It embodies all points of a standardized meter service switch—namely: external operation which prevents theft of current, service cut-out, meter connection block, lock off for service suspension, meter testing device and other features—making it ideal for central stations.

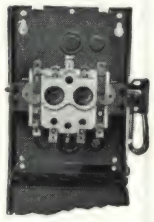
Type WK-57
30 amps., 125 volts, 2 circuits

The switch is externally operated by means of a convenient handle, leaving no possibility of contact with live parts, which are enclosed in the steel cabinet. This switch is made in the 30-ampere size and for plug fuses only. There are several arrangements providing the different main and branch circuit combinations, including two or three-wire branch circuits; including up to two branch circuits, single fused or double fused; others provide for up to four branch circuits, single fused.

Over-all dimensions: Large size—length 13¾ in.; width 8 3/16 in.; depth 4½ in. Small size—length 10⅛ in.; width 8 3/16 in.; depth 4⅜ in.

Accessible Fuse Standardized Meter Switches, Type WK-65, 30, 60, 100 Amperes

The accessible fuse Type WK-65 polyphase, single-phase or direct-current standardized meter service switches are designed so that the fuses are accessible when the switch is in the "off" position and the fuses are dead. This arrangement allows the power company to seal the meter connections, the main fuses still being accessible to the customer. The sliding door may be sealed. Testing arrangements provide so that meter can be tested without interrupting service.



Type WK-65
60 amps., 3 poles 250 volts

Over-all dimensions: 30 amperes—length 10⅛ in.; width 8 1/16 in.; depth 4⅞ in. 100 amperes—length 17 5/16 in.; width 14¾ in.; depth 7⅛ in.

Switch Catalogue

Our Catalogue 226 gives complete information and listing of the various types of Westinghouse Safety Switches and will be sent free on request.

BUSSMANN MANUFACTURING CO.

Manufacturers of Electric Fuses

ST. LOUIS, MO.

DEALERS AND DISTRIBUTERS IN EVERY PRINCIPAL CITY

Data for the Specification Writer

Poor fusing can be a source of tremendous irritation and wastefulness, hence we have issued a specification book, A. I. A. File No. 31 d 6, which contains necessary information for the proper specification of fuses. In this book the architect and specifying engineer will find: information as to proper fusing for all types and sizes of buildings; information to guide him in determining whether renewable or non-renewable fuses should be used; complete information on plug fuses; simplified specifications that are readily accepted, thus eliminating those that are lengthy and confusing.

TRADE-MARK

Refer to Your Files

If you do not find this book entitled "Necessary Information for the Proper Specification of Fuses" in your files, send for a copy.

Brief Specification

Specify outright by name "Buss" and be protected, or specify:

Fuses shall be renewable, approved by Underwriters' Laboratories, Inc., and equipped with Super-Lag links of standard dimensions. The 3 to 60-ampere sizes shall have not more than 5 parts, including the link, to be renewable without tools and to have the closure and ferrule in one piece. The 65-ampere and larger sizes to have not more than 4 separate parts including the link to be handled in renewing.

The Importance of Fuses

Measured by their cost and size, fuses may seem insignificant, but—when it is realized that these simple articles are the only safety devices universally used for protection against the hazards of electrical circuits, their importance can only be compared with the importance of buying fire insurance.

Buss Super-Lag Renewable Fuses Should Be Specified Because

They eliminate many useless shutdowns caused by harmless overloads.

They save money on fuse replacements.

They eliminate need for extra set of fuses.

They are a permanent investment.

They give the greatest protection at the lowest obtainable cost.

Low Cost Maintenance

The ever increasing use of electricity in buildings of all kinds causes more frequent blowing of fuses than was formerly the case and makes the renewable fuse far more economical than the non-renewable fuse. Fuses are made to blow—they are electricity's safety valve. The use of a non-renewable fuse means actually throwing money away at every blow. With Buss Renewable Fuses, a new link puts the fuse back into service quickly and the cost of the link is but 5% of the cost of a new fuse.

Permanent Investment

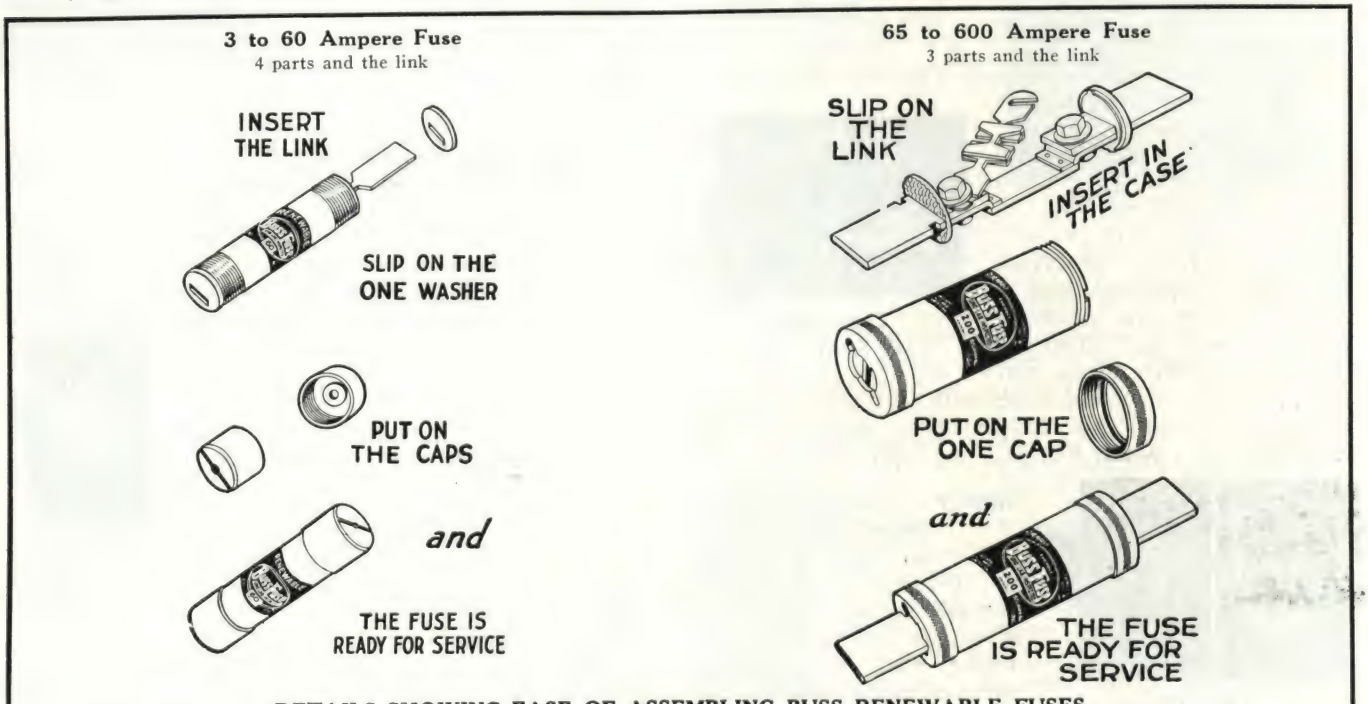
A board equipped with Buss Super-Lag Renewable Fuses can be maintained for life of board at a much less cost than if equipped with non-renewable fuses.

Blow-outs do not injure the fiber tube or metal parts of Buss Renewable Fuses because of simplicity of design and use of the highest quality of materials throughout.

The absence of small parts and the simplicity of the entire design practically eliminates the chance of poor contact with its resultant burned and charred fiber tubes.

Preferred by Maintenance Men

Buss Super-Lag Renewable Fuses are preferred by maintenance men because of their dependability, ease of renewal and long life.



DETAILS SHOWING EASE OF ASSEMBLING BUSS RENEWABLE FUSES

ECONOMY FUSE & MFG. CO.

Greenview Avenue at Diversey Parkway
CHICAGO, ILL.

ATLANTA, GA.
BALTIMORE, MD.
BOSTON, MASS.
BUFFALO, N. Y.
CINCINNATI, OHIO
CLEVELAND, OHIO
DETROIT, MICH.
DENVER, COLO.
KANSAS CITY, MO.
LOS ANGELES, CAL.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
NEW YORK, N. Y.
PHILADELPHIA, PA.
PITTSBURGH, PA.
ST. LOUIS, MO.
SAN FRANCISCO, CAL.
SEATTLE, WASH.

ECONOMY FUSE & MFG. CO. OF CANADA, LTD., MONTREAL, QUE.

Complete Stocks Carried by All Leading Electrical Jobbers and Dealers

Products

"Clearsite" Non-renewable Plug Fuses; Improved "Economy" Renewable Cartridge and Plug Fuses; "Drop Out" Renewal Links; "Arkless" Non-renewable Indicating Fuses; "Eco" Non-renewable, Non-indicating, Enclosed Fuses.

Also manufacturers of Moulded Insulation, Screws for Electrical Work, and S. & C. High Potential Fuses (in Canada).

"Clearsite" Non-renewable Plug Fuses

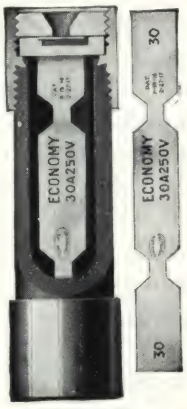
Clearsite fuses are the only non-renewable plug fuses using the famous Economy "Drop Out" link. This link, with amperage stamped upon it, is mounted with the operative section of the element directly under a window of unusual design. Clearsite fuses never fail to indicate. When blown on an overload a gap at the operative section is clearly visible; when blown on short circuit the window is blackened and vision of link is made impossible. Clearsite fuses, in capacities of from 3 to 30 amp., are sold in cartons of 500 and of 50, and in retail packages of 5. (Write for Catalogue 19-C.)

"Clearsite" Non-renewable Plug Fuse
Listed as Standard by Underwriters' Laboratories, Inc.

Improved "Economy" Renewable Fuses

"Economy" fuses are made in three general types (ferrule, knife blade and plug) with a full line of capacity ranges for all commercial voltages. They are the first line of fuses using an inexpensive bare link for restoring a blown fuse to its original efficiency to be listed as standard *in all capacities* by Underwriters' Laboratories, Inc.

The fusible elements are of the "Drop Out" renewal type, accurately rated and of definite design. Study this renewable link. Note the two narrow bridges of metal holding the drop-out portion in place. In operation on short circuits, the entire fuse metal does not volatilize, only these two narrow bridges fuse. The internal pressure is much less than when an entire strip of fusible metal is instantly converted into gas. There is no powdered filler to deteriorate or solidify. The winged washer in knife blade type and the end plug in ferrule type make replacement of links quick and easy. (Write for Catalogue 19-E.)

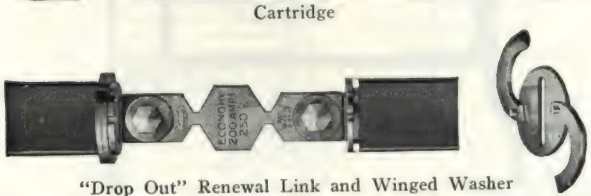


Ferrule Type Fuse and "Drop Out Renewal Link

Economy Fuse Savings—Since only the inexpensive link needs to be renewed and the rest of the fuse is good for years of service, a great annual saving in fuse maintenance costs may be obtained as compared with the use of "one-time" fuses.

"Drop Out" Renewal Link—The heart of an "Economy" fuse. Instantly restores a blown "Economy" fuse to its original efficiency at the absolute minimum of cost. A stock of "Drop Out" links, always on hand, represents a very small investment.

Cartridge



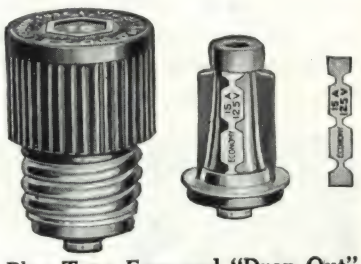
"Drop Out" Renewal Link and Winged Washer

"Economy" Knife Blade Type Fuse Disassembled

"Economy" Renewable Plug Fuses

Use of the "Drop Out" renewal link in this plug type fuse results in similar operation and saving as in the "Economy" cartridge type fuses.

No tools are required to replace the blown link and restore the plug to its original efficiency. (Catalogue 19-RP.)



Plug Type Fuse and "Drop Out" Renewal Link

"Arkless" Non-renewable Indicating Fuses

Equipped with a positive mechanical indicator; famous for consistent performance. (Catalogue 19-A.)

"Eco" Non-renewable Non-indicating Fuses

Our latest fuse of this type for electrical protection of circuits not subject to frequent overloaded conditions. (Catalogue 19-K.)

CONDUO-BASE

LICENSED MANUFACTURERS

DAHLSTROM METALLIC DOOR CO.
JAMESTOWN, N. Y.

KNAPP BROTHERS MFG. CO.
CHICAGO, ILL.

UNITED METAL PRODUCTS CO.
CANTON, OHIO

Products

STANDARD CONDUO-BASE, JUNIOR CONDUO-BASE, COUNTER-TOP-CONDUO-BASE, HOUSE CONDUO-BASE and CONDUO-BASE ACCESSORIES.

TRADE-MARK

Conduo-Base

A high grade, handsome metal base with easily accessible concealed raceways for light and telephone wires, forming a continuous electric outlet raceway at the base of walls and partitions, approved by the Underwriters' Laboratories, Inc.

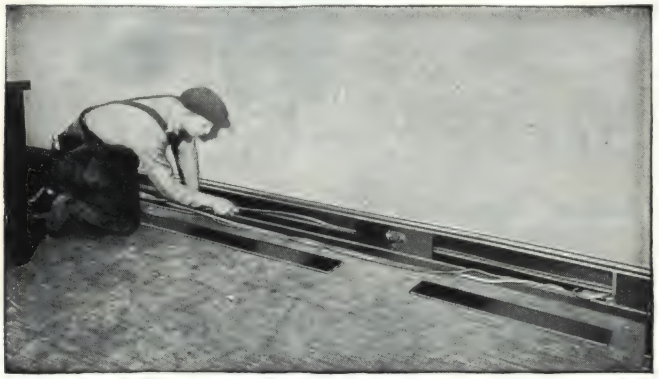
Advantages of Conduo-Base

Equipping a building with Conduo-Base saves (1) the cost of baseboards, (2) the cost of all prefixed outlets with their outlet boxes, conduits and wires, (3) the cost of wire moulds, (4) the cost of tearing up and patching of finished work whenever new electric outlets are required at points convenient to the ever-changing occupants' needs. It eliminates entirely the necessity of determining beforehand the location of electric outlets or the unsightly, dangerous, exposed wiring for electric equipment at a distance from a prefixed outlet.

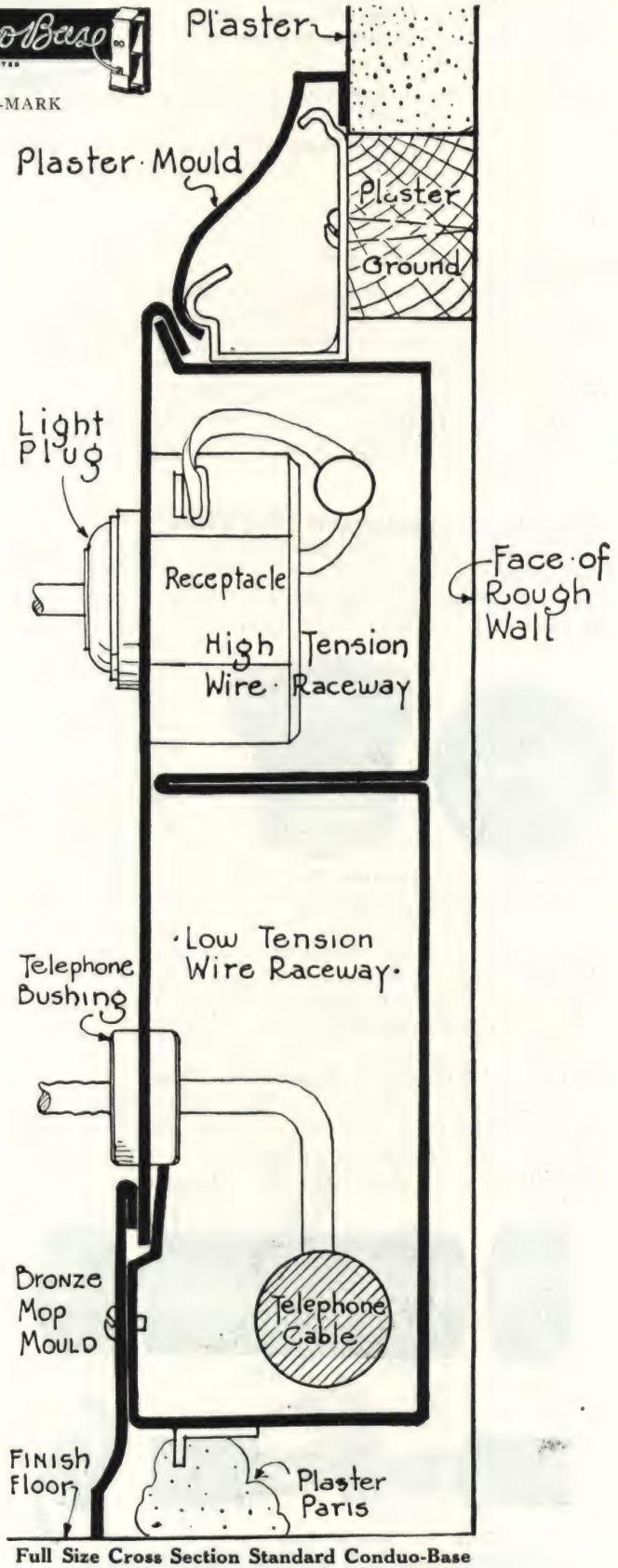
Conduo-Base provides a fireproof, concealed yet accessible, continuous outlet raceway along the entire perimeter of a room, wherein any number of new electric outlets for lamps, fans, adding or dictating machines, telephones, call systems, buzzers, etc., can be installed at the most convenient points desired with extreme ease and very little expense.

Five Minutes Work for a New Outlet

The illustration below shows the ease with which new outlets are made in Conduo-Base. The electrician taps the wires in Conduo-Base, connects same to a receptacle, mounts the receptacle to a standard punched 6-in. cover plate, and replaces the cover plate.



Five Minutes Work for a New Outlet



Full Size Cross Section Standard Conduo-Base

Continued on next page

Junior Conduo-Base

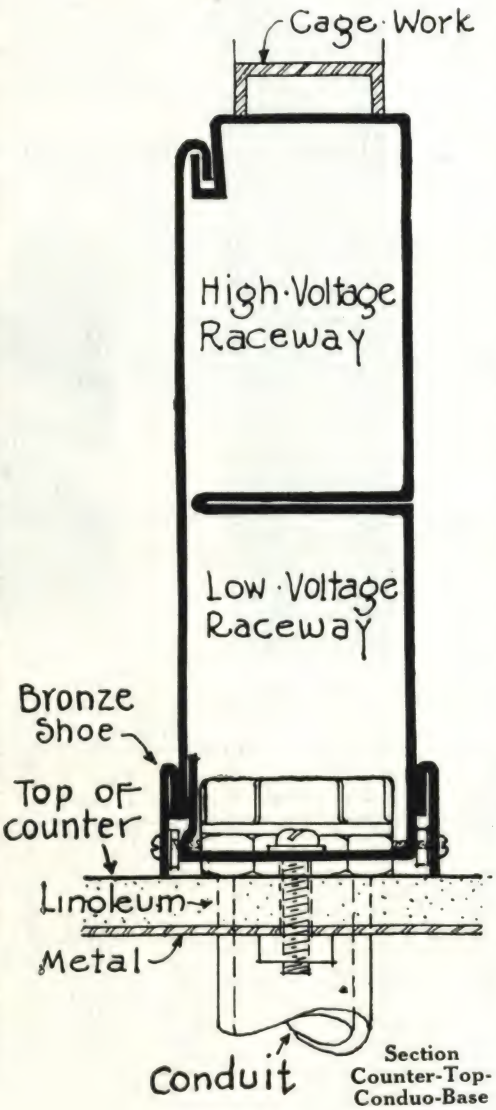
A neat, flush type Conduo-Base designed to compete in cost with ordinary baseboards, thus bringing within the means of any building the advantages of Conduo-Base.

In Junior Conduo-Base the telephone wires are carried in the upper raceway, and the light wires in the lower raceway, and it is restricted to shallow-type receptacles.

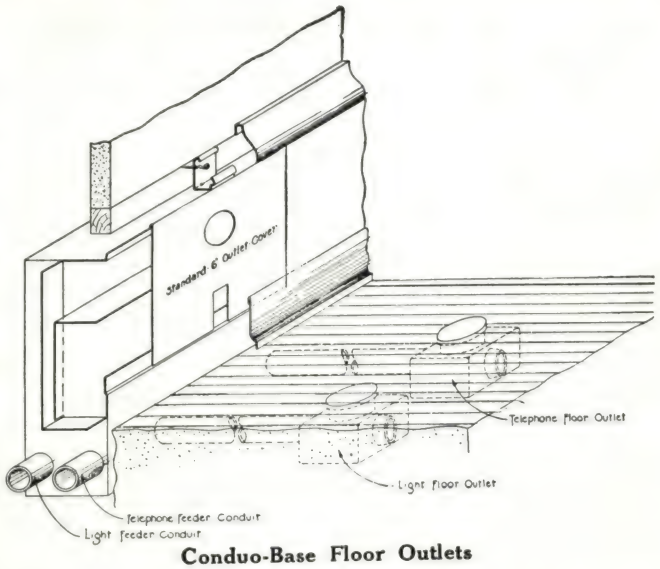
Full Size Cross Section Junior Conduo-Base

Counter-Top-Conduo-Base

A miniature Conduo-Base for counters, bank screens, etc., so that screen light switches, screen door switches, outlets for adding machines, telephones, buzzers, etc., may be had at counter level at the convenience of the teller.



Section Counter-Top-Conduo-Base



Conduo-Base Floor Outlets

Conduo-Base Floor Outlets

Conduo-Base provides an excellent means for a very economical system of floor outlets for both light and telephone wires.

Standard conduits fitted with floor outlet units are extended in the floor fill from Conduo-Base Conduit Terminal boxes to any desired points in the floor.

Specifications

(*Note:* Conduo-Base is approved by the Underwriters provided it is installed under their rules for electrical grounding, etc. We recommend, therefore, its installation by electrical contractors.)

The electrical contractor shall furnish and install complete with all its accessories, Conduo-Base of manufacture by DAHLSTROM METALLIC DOOR CO., Jamestown, N. Y., UNITED METAL PRODUCTS CO., Canton, Ohio, or KNAPP BROTHERS MFG. COMPANY, Chicago, Ill., along all walls and partitions throughout the building unless otherwise shown or specified, of types as follows: (1) Standard Conduo-Base; (2) Junior Conduo-Base; (3) Counter-Top-Conduo-Base; (4) House Conduo-Base; and of the following finishes: (a) plain; (b) grained; (c) marbleized. Note: Junior Conduo-Base comes in standard finish only.

Provide feed conduits to both raceways of Conduo-Base as shown. Provide floor outlets to all points shown from both raceways of Conduo-Base.

Installation, grounding, jumpering at door and other openings shall be in strict accordance with the printed directions of manufacturers.

All Conduo-Base shall bear the Underwriters' label.

Information and Service

For prices, estimates, quotations and contracts write to DAHLSTROM METALLIC DOOR CO., Jamestown, N. Y., UNITED METAL PRODUCTS CO., Canton, Ohio, KNAPP BROTHERS MFG. COMPANY, Chicago, Ill., or their branch offices in all principal cities.

FRETZ-MOON TUBE CO., INC.

Manufacturers of Galvite and Enamelite Conduit, Elbows and Couplings

BUTLER, PA.

AGENT REPRESENTATIVES

CHICAGO, ILL., J. W. Maguire Co., 910 So. Michigan Boulevard
CINCINNATI, OHIO, A. F. Scherer, 1002 American Building
CLEVELAND, OHIO, Warner-Jones Co., 507 Caxton Building
FLINT, MICH., H. P. Schuyler, 123 W. Rankin Street
INDIANAPOLIS, IND., Barrett Steel Sales Co., 508 Illinois Building
LOS ANGELES, CAL., Fletcher-Weil Co., 1923 E. Seventh Street
MINNEAPOLIS, MINN., Wm. P. Johnson Elec. Co., 43 So. Third Street
NEW YORK, N. Y., Langguth-Olson Co., 150 Nassau Street
R. B. Corey Co., 81 Murray Street
PHILADELPHIA, PA., L. P. Moon, 1420 Chestnut Street
RICHMOND, VA., Eichel & Co., 1107 E. Main Street
ROXBURY, MASS., L. S. Shiro, 67 Brookledge Street
SAN ANTONIO, TEXAS, Fred C. R. Spence, P. O. Box 119
SAN FRANCISCO, CAL., Fletcher Weil Co., 580 Market Street
SEATTLE, WASH., Fletcher Weil Co., 2215 Western Avenue
ST. LOUIS, MO., W. F. Harper, 3733 Lindell Boulevard
R. H. Geiser Co., 1114-24 So. Grand Boulevard

Fretz-Moon Galvite, Enamelite and Hot Dipped Galvanized Conduit

Fretz-Moon Conduit is known to architects the country over for its quality and uniformity. Only selected mild steel skelp is used in its manufacture, and the patented welding process employed produces a conduit which will not open at the seam even when subjected to severe abuse.

Fretz-Moon Conduit is extremely ductile, therefore easy to bend. It cuts easily and threads cleanly and smoothly.

Galvite (Blue Label)—Electro-galvanized by the latest approved method. The outside surface including the threads is heavily covered with a protection of pure zinc. The inside is coated with black enamel, baked on, giving a hard smooth raceway which materially expedites the fishing of wires.

Enamelite (Orange Label)—Has a black enamel coating baked to a glasslike finish on both inside and outside surfaces. The enamel, however, despite its smooth surface, is such that working the conduit does not cause it to flake and chip away from the metal.

Hot Dipped Galvanized Conduit (Red Label)—Made to meet the demand for a conduit heavily galvanized inside and outside and finished over the galvanized coating inside with a heavy baked on black enamel, giving a smooth hard raceway. Recommended particularly for locations where corrosive action is likely to be encountered, and where a conduit of the highest quality must be used.

Couplings—Are of the same finish as the conduit, so cleanly threaded that they can easily be turned up to the last thread by hand, saving time on the job.

Sizes

Fretz-Moon Conduit, ½ to 1½ in. is supplied in bundles, each piece exactly 10 ft. long. Sizes 2 to 6 in. are shipped loose. One end of each length is fitted with coupling, the other end with thread protector.

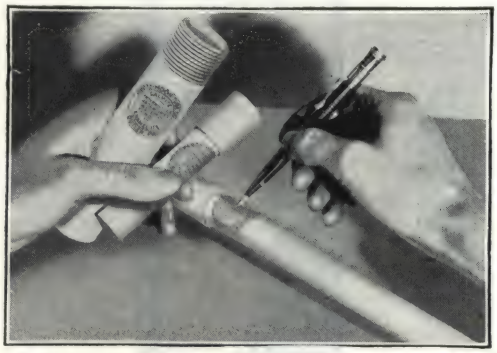
Inspection

Fretz-Moon Conduit is made under strict supervision, and every length must pass not only the inspection and testing to which it is subjected during manufacture, but also the inspection of the Underwriters' Laboratories, Inc. before it can be marked with the Underwriters' seal of approval.

Prompt Delivery

Complete stocks of conduit, elbows and couplings carried in all large jobbing centers, making for prompt delivery.

Clean Cut Threads on Conduit and Couplings Save Time and Trouble



Look for Fretz-Moon Tube Co. Label Which Is Your Protection

PRICE LIST

Conduit							Couplings		Elbows			
Size, in.	Price per foot	Weight per foot, lb.	Diameters, in. External	Diameters, in. Internal	Thickness, in.	Threads per inch	Price each	Wt., lbs. per 100	Price each	Wt., lbs. per 100	Radius, inches	Offset, inches
¼	$ .08½	.425	.540	.364	.088	18	$ .05	6.0	$ .19	42	3.000	5.625
⅜	.08½	.568	.675	.493	.091	18	.06	9.5	.19	53	3.000	5.625
½	.08½	.852	.840	.622	.109	14	.07	11.6	.19	75	4.000	7.000
¾	.11½	1.134	1.050	.824	.113	14	.10	20.9	.25	120	4.500	7.500
1	.17	1.684	1.315	1.049	.133	11½	.13	34.3	.37	200	5.750	9.500
1¼	.23	2.281	1.660	1.380	.140	11½	.17	53.5	.45	300	7.250	10.875
1½	.27½	2.731	1.900	1.610	.145	11½	.21	74.3	.60	427	8.250	12.625
2	.37	3.678	2.375	2.067	.154	11½	.28	120.8	1.10	700	9.500	15.250
2½	.58½	5.819	2.875	2.469	.203	8	.40	172.0	1.80	1300	10.500	17.375
3	.76½	7.616	3.500	3.068	.216	8	.60	249.8	4.80	1700	13.000	19.500
3½	.92	9.202	4.000	3.548	.226	8	.80	424.1	10.60	2300	15.000	21.250
4	1.09	10.889	4.500	4.026	.237	8	1.00	474.1	12.25	2700	16.000	22.500
4½	1.27	12.642	5.000	4.506	.247	8	1.50	550.0	18.55	3100	18.000	24.375
5	1.48	14.810	5.563	5.047	.258	8	1.65	700.0	25.75	5500	24.000	32.000
6	1.92	19.185	6.625	6.065	.280	8	2.40	750.0	32.00	9000	30.000	39.750

Conduit is furnished in 10-ft. lengths, threaded both ends, with coupling screwed on one end.
Conduit is always designated by its nominal inside diameter. All weights and dimensions shown above are nominal.

GARLAND MANUFACTURING COMPANY

Manufacturers of Rigid Steel Conduit and Fittings for Electric Wiring

PITTSBURGH, PA.

REPRESENTATIVES

NEW YORK, N. Y., J. A. Hawks, Inc., 415 Greenwich Street
BOSTON, MASS., S. B. Condit, Jr. Co., 261 Franklin Street
PHILADELPHIA, PA., W. A. Leiser & Co., 1607 Sansom Street
COLUMBUS, OHIO, B. Frank Perry, Inc., 36 West Gay Street
CHICAGO, ILL., M. B. Austin & Co., 108-16 So. Desplaines Street
ATLANTA, GA., H. C. Biglin, 138 Marietta Street
DENVER, COLO., Sales Service Co., 1109 Broadway
LOS ANGELES, CAL., J. G. Pomeroy Co., 336 Azusa Street

Our product available through all Electrical Jobbing Houses

EXPORT DEPARTMENT

NEW YORK, N. Y., S. A. Rapier, Manager, Room 225, 56 Wall Street

Products

"Galvaduct" Galvanized Rigid Steel Conduit; "Loricated" Enameled Rigid Steel Conduit.

Also Couplings, Elbows and other Fittings for electric wiring.

Garland Rigid Conduit

Rigid conduit installations are now generally recognized as the most permanent and the safest system for installing electric wires in all modern structures. It is the only system in which wires once installed may be easily removed and others put in their place.

Garland Rigid Conduit is made of a dead soft steel tubing which offers minimum resistance to bending, cutting and threading. All welds are thoroughly made. Threads are sharp and to an exact standard, so that no trouble is experienced in connecting lengths or fittings. Both inner and outer surfaces are thoroughly cleaned by special methods; all burrs, scale and silicate being removed so that the protective coatings adhere closely and uniformly to the tube.

Both "Galvaduct" and "Loricated" Conduits are carefully inspected during manufacture to insure the finished products conforming to the high standards established during *more than 30 years of conduit manufacture.*

These conduits are regularly examined and labeled under the supervision of the Underwriters Laboratories, Inc., meeting their every requirement with a generous margin to spare.

Every Length of Garland Rigid Steel Conduit Bears the Official Stamp of the National Board of Fire Underwriters

"Galvaduct"

The first brand of galvanized conduit manufactured in the United States.

"Galvaduct" Rigid Steel Conduit is protected from corrosion by a coating of pure zinc of uniform density and thickness, deposited by the electro chemical method, which insures a coating that will not chip or flake in bending or handling on the job.

The interior is coated with special enamel that will not become tacky, insuring a perfect raceway for fishing wires.

"Loricated"

The pioneer brand of rigid electric conduit manufactured in America.

"Loricated" Rigid Steel Conduit is treated with a high grade of furnace baked enamel which retains its flexibility and will not crack, chip or peel. This coating resists corrosion, acids, alkalis, moisture and changes of temperature.

Specifications for Conduit System

(1) All conduit used shall be "Loricated" (Black Enameled) or "Galvaduct" (Electro-galvanized) as manufactured by Garland Manufacturing Company, Pittsburgh, Pa. Each length shall bear the manufacturer's name or trade-mark and the Underwriters' label.

(2) The National Electrical Code standards shall govern the size and method of installation of conduits used on each circuit. No conduits smaller than ½ in. shall be used and all wire for the same circuit shall be run in one conduit. All conduits shall be large enough so that wires may be pulled without using mechanical devices of any kind.

(3) Conduit shall be continuous from outlet to outlet or to junction boxes or cabinets. When entering outlet boxes, etc., conduit shall be firmly fastened with approved locknuts and bushings.

(4) Conduit when cut to length on the job shall be carefully reamed to remove any possible burrs formed by the cutting tool. When installed the ends must butt in couplings.

(5) Not more than four 90° bends shall occur in any one run of rigid conduit. Where it becomes necessary to have more than four 90° bends a junction box shall be installed.

A Few Important "Galvaduct" and "Loricated" Installations

Grant Building, Pittsburgh, Pa.
Naval Academy, Annapolis, Md.
Marshall Field Building, Chicago, Ill.
Woolworth Building, New York, N. Y.
New York and New Jersey Vehicular Tunnel, New York, N. Y.
Denver Gas and Electric Building, Denver, Colo.
Prudential Building, Newark, N. J.
Hanna Building, Cleveland, Ohio
Rochester Trust & Safe Deposit Co., Rochester, N. Y.
B. F. Goodrich Building, Akron, Ohio
Palace Theater, Milwaukee, Wis.
"Stanley Rowland Clark" Theater, Pittsburgh, Pa.
Carnegie Library and Institute, Pittsburgh, Pa.
Manger Hotel, New York, N. Y.
Chamber of Commerce Building, Indianapolis, Ind.
Commercial National Bank Building, Chicago, Ill.
Walter Reed Hospital, Washington, D. C.
Smith Building, Seattle, Wash.
Chrysler Building, New York, N. Y.
Rice Building, Boston, Mass.
Bibb Manufacturing Company Plant, Macon, Ga.
Keystone Athletic Club, Pittsburgh, Pa.

Installations in many other important structures in every State of the Union, as well as in many foreign countries.

NATIONAL ELECTRIC PRODUCTS CORPORATION

NATIONAL METAL MOLDING DIVISION

Manufacturers of Six Complete Wiring Systems and Fittings for Every Conceivable Requirement

PITTSBURGH, PA.

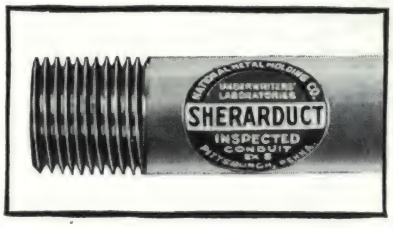
BRANCH OFFICES IN PRINCIPAL CITIES OF THE UNITED STATES

National Products Are Inspected and Listed by the Underwriters' Laboratories, Inc., and Are Distributed by Electrical Jobbers in All Parts of the Country

Sherarduct Rigid Steel Conduit

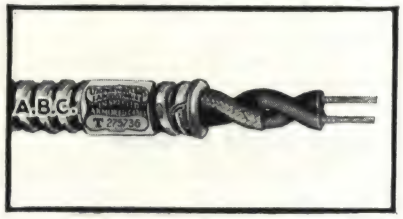
Rigid steel conduit impregnated and coated with zinc inside and out by the Sherardizing process and with acid resisting enamel baked into the pores of the zinc.

Bends easily around curves or offsets.



National Flexsteel A.B.C. Armored Cable

A.B.C. Armored Bushed Cable supplied with "Anti-Short" Insulating Bushing installed, is foolproof as to grounds and shorts. Eliminates difficulties which previously have been encountered in installing armored cable.

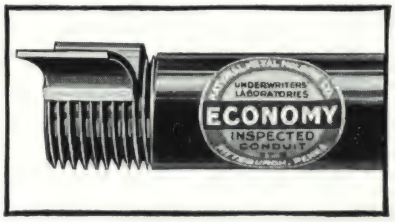


Economy Rigid Steel Conduit

Rigid steel conduit with a tough, elastic, black enamel baked into the pores of the steel.

Thread protectors keep threads sharp and clean.

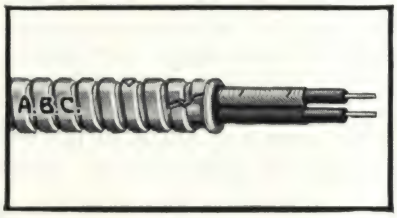
Enamel will not crack or peel off.



Ovalflex A.B.C. Flat Armored Cable

A safely bushed and insulated flat armored cable for underplaster installations and alterations.

Requires no channeling of underplaster materials — fits under plaster. Bends easily flatwise and edgewise.



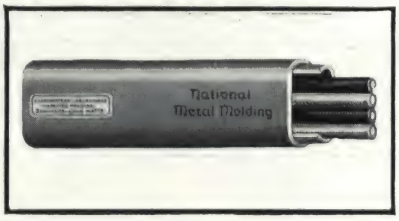
Ovalduct Underplaster Raceway

For underplaster and surface work. Will hold 3 No. 14 wires. Can be installed under ordinary thickness of plaster without channeling under body. Ovalduct fittings make it interchangeable with other wiring systems.

National Metal Molding Surface Raceway

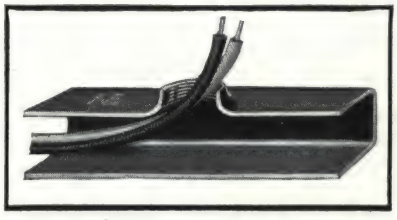
A practical surface raceway that gives wiremen choice of laying in or of fishing wires. Rustproof, inconspicuous.

A complete line of fittings to meet every wiring need.



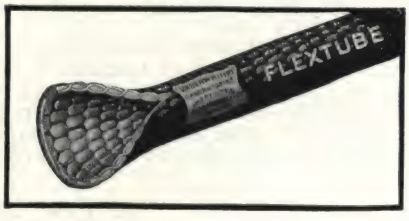
Nepcoduct Underfloor Distribution

A steel duct for carrying electrical wires for light and power, signal and telephone and making the wires accessible at almost any point in the floors. A complete line of fittings for any requirement.



Flextube Non-Metallic Tubing

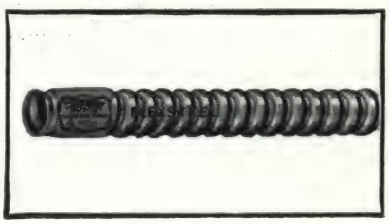
Seamless, non-collapsible loom thoroughly dusted inside with soapstone. Made with a slick wax finish that will not come off on the hands. Protects wires against mechanical damage—moisture-proof.



Flexsteel Flexible Metallic Conduit

A strong, flexible armored conduit made in both single and double electro-galvanized steel strip.

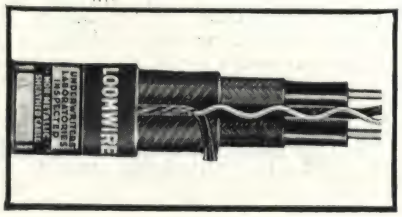
Each coil is full weight, full quality, and full length.



LoomWire Non-Metallic Sheathed Cable

Two or more separately insulated conductors, code size, in a flexible impenetrable sheath of paper and loom braid.

Manufactured with or without a Krinkled Ground Wire.



THE WIREMOLD COMPANY

Manufacturers of Electrical Conduits, Cables and Fittings

HARTFORD, CONN.

SALES REPRESENTATIVES

BOSTON, MASS., Edward Rigby, 10 High Street
NEW YORK, N. Y., The Wiremold Co., 58 W. 15th Street
PHILADELPHIA, PA., E. E. Hedler, 250 No. 11th Street
PITTSBURGH, PA., H. C. Moran, 1724 Grant Building
BUFFALO, N. Y., R. W. Mitscher, Ellicott Square Building
ATLANTA, GA., H. C. Biglin, 138 Marietta Street
CHICAGO, ILL., M. B. Austin & Co., 108-116 So. Desplaines Street
DETROIT, MICH., R. J. Thorne, 4325 Commonwealth Avenue
DALLAS, TEX., Jenkins & Gunther, Sante Fe Building
SAN FRANCISCO, CAL., Geo. A. Gray Co., 411 Natoma Street

Products

The world famous Wiremold Surface Wiring System: (A) Wiremold Conduit; (B) Wiremold Fittings; (C) Wiremold Fixture Fittings.

Also Wireflex "Slick-finish" Non-metallic Sheathed Cable, Wireduct "Slick-finish" Non-metallic Conduit.

WIREMOLD
TRADE MARK

Installation

Every Wiremold salesman is an expert Wiremold layout and installation man.

Get in touch with the nearest one through any of the above branch offices or write us direct. Wiremold Catalog and Wiring Guide free on request.

THE WIREMOLD SURFACE WIRING SYSTEM FOR "MODERNIZED LIGHTING"

The Wiremold System possesses all the advantages of open construction in that it can be easily extended or moved about—yet the wires are at all times enclosed and mechanically protected from external injury.

Wiremold Conduit and Fittings are not makeshifts but are specifically and scientifically designed for surface wiring. Wiremold clings to the surface and looks as though it belongs there.

Construction

Wiremold Conduit and Fittings are rolled from high grade sheet steel. The base of Wiremold Conduit and base plates of Wiremold Fittings are given a special zinc treatment which prevents corrosion. An ingenious and exclusive patented "tongue and groove" joint method of coupling conduit to fittings provides solid connections.

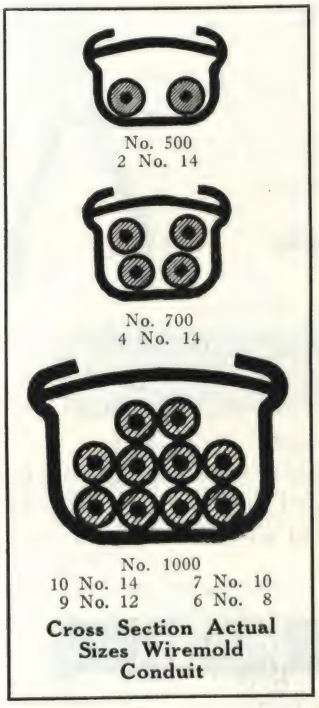
The two features together insure complete and permanent electrical continuity for ground return.

Finish

The capping of Wiremold Conduit and the cover of Wiremold Fittings, i. e., the visible parts, are finished in a neutral tone of heavy, fine quality enamel that blends with any color scheme or serves as a ground coat where graining, staining or special finish is desired.

Wiremold Conduit Fittings and Fixture Fittings

(A) Wiremold Conduit—Made in three sizes as follows:



No. 500
2 No. 14

No. 700
4 No. 14

No. 1000
10 No. 14 — 7 No. 10
9 No. 12 — 6 No. 8

Cross Section Actual Sizes Wiremold Conduit

No. 500 Wiremold Conduit System—designed for extension work requiring circuits of two and short runs of three wires.

No. 700 Wiremold Conduit System—designed for installations requiring circuits of four wires.

No. 1000 "Master Size" Wiremold Conduit System—designed for main and sub-feeders and various wire groupings, such as: telephone, radio, signal and call systems.

With No. 1000 series and No. 500 and No. 700 series a complete wiring system may be installed "from the panel box to the outlets."

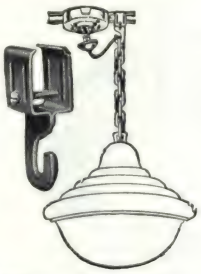
Wiremold is also made in the form of *"Wiremold Beam Strap"*—a special screw-on base with slide-on cover. Simple, easy, quick, and a most practical beam-strapping method. Made in sizes to fit all standard beams and all sizes of Wiremold. "Laid around a beam also as quick as on a flat surface!"

(B) Wiremold Fittings—For every conceivable wiring requirement and are designed to provide (1) quick, easy, economical installation, (2) solidity and safety of construction, (3) convenient switch and outlet locations, (4) strong and durable fixture bases and connections, (5) connectors and couplers for pipe and other conduit systems. All electrical contractors know how to make use of these fittings as needed.

A Typical Wiremold Fitting Utility Box
Cat. No. 5728

(C) Wiremold Fixture Fittings—Make it easy to "Modernize with Light." (1) Wiremold "Diple" Stamped Hook Canopy Fitting uses regular Wiremold base and cover instead of canopy. No stud or stem necessary—simply hang fixture to "Diple" hook in base and wire in regular way. (2) Wiremold "Diple" Thru-Hook Connector Fitting provides modern method of hanging fixtures, simplifies cleaning and relamping, saves studs, stems and canopy from rust. (3) Wiremold Fixture Hook Disconnector Outlet makes it possible to hang fixture and conduit anywhere and plug into receptacle fittings.

Wiremold "Diple" Stamped Hook Canopy Fitting
(Patented)
Cat. No. 5738E



Wiremold Fixture Hook
Cat. No. 5708

Wiremold "Diple" Thru-Hook Connector Fitting
(Patented)
Cat. No. 5738-D

TRIANGLE CONDUIT COMPANY, INC.

Dry Harbor Road and Cooper Avenue
BROOKLYN, N. Y.

FACTORIES
BROOKLYN, N. Y. WHEELING, W. VA.
CANADA: Canadian Triangle Conduit Co., Ltd., TORONTO

The Triangle Conduit Company, Inc. stands ready at all times to assist the architect and engineer in any problem relating to the specification or installation of its products.

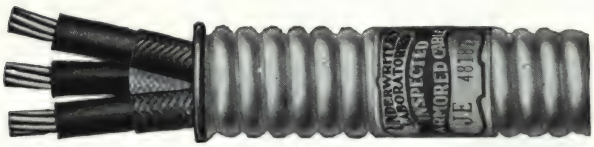
TRADE-MARK

TRIANGLE WIRE AND CABLE

Triangle A.B.C. Armored Bushed Cable

Furnished in standard coils with the new fiber bushings for protecting the conductors at each cut end of the armored cable, which prevents short circuits or grounds. The conductors are enclosed in a heavy wrapping of Kraft paper before being covered with the steel armor, giving it greater protection. Due to a special process, Triangle A.B.C. cable is quite flexible and is therefore easier to handle. It is made in all sizes from 14/2 up to 2/3 conductor.

14/2

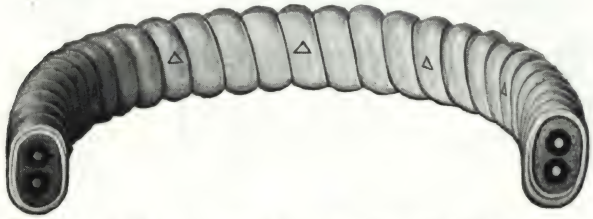


4/3

Armored Cable with Protective Bushing

Triangle Flat Armored Cable

Another hardy member of the Triangle family for use in under-plaster installations. Made in sizes 14/2 and 14/3. Its dimensions allow it to be run concealed in the ordinary thickness of plaster.



Section of Flat Armored Cable Showing Its Flexibility

Triangle Lead Encased Armored Cable

Has a seamless lead sheath under the armor and is very desirable in installations where dampness and moisture are encountered. Made in sizes from 14/2 to 4/3.

Lead Armored Cable

Triangle Armored Cable Tool

An ingenious device for cutting and stripping armored cable in sizes 14/2, 14/3 and 12/2, without the possibility of injury to the wire or insulation.

The armor is stripped with two quick, easy movements.

Made of the highest grade tool steel throughout. Will last indefinitely.

"Triex"—Triangle Non-metallic Sheathed Cable

Used very extensively in residence wiring. The conductors are standard code rubber covered wire. Each conductor is enclosed in a spiral paper wrapping with a heavy outer braid applied over all giving it a very rugged construction.

The highest type of engineering efficiency, workmanship and quality is embodied in this product. It is available with or without ground wire and made in sizes from 14/2 to 6/3.

Without Ground Wire

With Ground Wire

"Triex" Non-metallic Sheathed Cable

Continued on next page

Triangle Rubber Covered Wire and Cable

Made in three distinct grades,—Code, Intermediate and Thirty Percent. This Triangle product is very well-known among the trade because of its high standard of quality and is accepted everywhere by the best architects and engineers.

Because of the demands that have been made upon us from time to time, we are making this (in the smaller sizes) in quite a number of combinations of colors of braid that are extremely valuable in designating circuits.

Sizes include a range from No. 18 fixture wire to 1,000,000 c.m., single or double braid, solid or stranded.

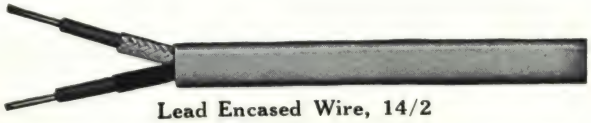
Rubber Covered Wire, Single Conductor

Rubber Covered Cable, 3/0

Rubber Covered Cable, 1,000,000 Cir. Mils

Triangle Lead Encased Rubber Covered Wire and Cable

Over a base of the well-known Triangle Rubber Covered Wire a seamless coating of lead is drawn. Continuous rigid inspection during this process insures a product of the highest quality. Made in sizes from No. 14 to 1,000,000 c.m.



Lead Encased Wire, 14/2

Lead Encased Cable, 500,000 Cir. Mils

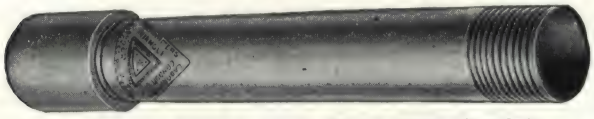
TRIANGLE CONDUIT

Triangle Rigid Steel Conduit

Hot-Dipped Galvanized—All Triangle Rigid Steel Conduit is made from mild steel tubing, offering minimum resistance to bending, cutting and threading.

The *hot-dipped* galvanizing process gives equal protection to both the interior and the exterior of the tubing, which is very essential in rigid steel conduit. The *hot-dipped* galvanized type of protective coating is more and more regarded by the foremost architects and engineers as the highest standard of quality in this particular product.

In addition to the *hot-dipped* galvanizing, we are also applying a transparent lacquer coating inside and out, subjecting it to a scientific baking process which gives added protection, at the same time entirely eliminating any stickiness or "tackiness" of the finished product.



Hot-dipped Galvanized Rigid Steel Conduit

Black Enameled—Triangle Black Enameled Rigid Steel Conduit is also made of the highest quality steel tubing and the finish is so applied as to make this conduit outstanding in its field. Triangle Black Enameled Conduit is ductile and uniform, and like our *hot-dipped* conduit, is equipped with threads and couplings that make installation easy work.

Black Enameled Rigid Steel Conduit

Triangle Flexible Steel Conduit

In the many places where a rigid conduit cannot be used, Triangle Flexible Steel Conduit can be readily substituted to advantage. It will bend sharply and evenly without opening. It fits snugly against a wall, even on irregular surfaces, and is adaptable for open or concealed wiring. It is especially desirable for wiring of machinery, due to its flexibility and because it makes the job entirely safe and practical. Made in all sizes from 3/8 to 3 in.

Flexible Steel Conduit

Triangle Non-Metallic Conduit

This conduit is of single wall construction and insures a smooth interior surface for the fishing of wire—a most desirable feature.

Indestructible, moistureproof, firesafe, fully guaranteed.

Sizes—7/32 to 2 in., packed in easily accessible cartons of from 250 to 100-ft. coils.

Non-metallic Flexible Conduit

AMERICAN STEEL & WIRE COMPANY

Subsidiary of United States Steel Corporation

Manufacturers of Electrical Wires and Cables

SALES OFFICES

CHICAGO, 208 So. La Salle Street
CLEVELAND, Rockefeller Building
DETROIT, Foot of First Street
CINCINNATI, Union Trust Building
MINNEAPOLIS—ST. PAUL, Merchants National Bank Building, St. Paul
MILWAUKEE, 850 Bankers Building
ST. LOUIS, 506 Olive Street
KANSAS CITY, 417 Grand Avenue
OKLAHOMA CITY, Hales Building
BIRMINGHAM, Brown-Marx Building
MEMPHIS, Sterick Building
DALLAS, Praetorian Building
DENVER, First National Bank Building
SALT LAKE CITY, Walker Bank Building
NEW YORK, 30 Church Street
BOSTON, Statler Building
PITTSBURGH, Frick Building
PHILADELPHIA, Widener Building
ATLANTA, 101 Marietta Street
WORCESTER, 94 Grove Street
BALTIMORE, 32 So. Charles Street
BUFFALO, 670 Ellicott Street
WILKES-BARRE, Miners Bank Building

PACIFIC COAST DISTRIBUTORS, COLUMBIA STEEL COMPANY

SAN FRANCISCO, Russ Building
LOS ANGELES, 2087 E. Slauson Avenue
PORTLAND, 777 Nicolai Street
SEATTLE, 4th Avenue So. and Connecticut Street
HONOLULU, Castle & Cooke Building

EXPORT DISTRIBUTORS, United States Steel Products Company, 30 Church Street, NEW YORK

Products

ELECTRIC WIRES and CABLES:

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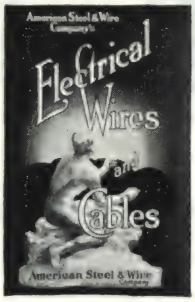
Bare Wires and Cables, Copper, Iron and Steel	8

For our catalogues on Concrete Reinforcement, Triangle Mesh for Stucco Base, and Wire Rope, see List of Manufacturers.



Facilities

The company's extensive factory facilities are well equipped with chemical, physical, and electrical laboratories, wherein the problems incident to the solution of every difficulty encountered are handled by thoroughly reliable experts and up-to-date methods. All steel and copper used is rolled and drawn in our mills and is under the company's supervision throughout every operation. All raw materials are tested and inspected before being used, the manufacturing processes are constantly checked, and finally the finished material is subjected to an exhaustive series of tests that determine beyond question whether or not it is of proper quality.

With such facilities, this company is enabled to manufacture electrical conductors of all kinds to the severest specifications and to give a standard of quality unexcelled.

Rubber Covered Wires and Cables

Used for general interior light and power wiring.

The conductor consists of uniformly soft annealed, commercially pure copper wire, insulated with code thickness of high grade vulcanized rubber protected with closely woven, strong, and elastic cotton braids saturated in waterproof compound.

All conductors are thoroughly and evenly coated with tin to protect copper from injurious effect from sulphur in rubber insulation.

Grades of Rubber Insulation—Four standard grades of rubber compound are made for rubber covered conductors.

In addition, the company insulates wire to any specifications covering particular requirements, such as 20% or 40% rubber compounds.

Americore Rubber Covered Wire—This grade meets all requirements of the National Electrical Code. It is recommended for all service conditions in which the working pressure is 7000 volts or under.

Amparak Rubber Covered Wire—An "intermediate" grade commonly known as *engineers'* wire. The insulation is of high grade compound made to suit the demand of engineers and architects desiring a better wire than Americore but not so high a quality as Amerite. Recommended especially for open wiring (knob and tube system) in dwellings, industrial plants, etc.

A.S.W. 30% Wire—This high grade wire is often called for by contractors and used for the same purpose as Amerite wire. Sometimes known as Commercial 30%.

Amerite Rubber Covered Wire—This is the highest grade of rubber covered wire. It answers all requirements of the 30% Para rubber grade. It is used for high voltage circuits. It has great strength and elasticity, high insulating qualities, and long life.

Identification—Every wire insulated with the company's standard compounds has a distinguishing woolen tracer thread placed lengthwise of the conductor between the rubber and the braid as follows: Americore, *uncolored* thread; Amparak, *dark green;* Amerite and A.S.W. 30%, *crimson.*

Americore Rubber Covered Wires and Cables

This wire is made to comply with the National Electrical Code requirements and every coil is regularly examined and labeled under the supervision of the Underwriters' Laboratories, Inc. A strictly high grade wire for interior light and power wiring.

Americore Wire
Solid tinned copper conductor

Gauge, B. & S., or cir. mils	Thickness of insulation, in., for 0 to 600 volts Type R. S.	600 to 1500 volts Type R. S.-15	1500 to 2500 volts Type R. S.-25	2500 to 3500 volts Type R. S.-35	3500 to 5000 volts Type R. S.-50	5000 to 7000 volts Type R. S.-70
14–8	3/64	6/64	8/64	10/64	12/64	16/64
7–2	4/64	7/64	9/64	10/64	12/64	16/64
1–4/0	5/64	8/64	10/64	10/64	12/64	16/64
225,000 to 500,000	6/64	9/64	10/64	11/64	12/64	16/64
525,000 to 1,000,000	7/64	10/64	10/64	12/64	12/64	16/64
Over 1,000,000	8/64	10/64	10/64	12/64	14/64	18/64

Note: Type R. S. as given above signifies single braid rubber covered wire. Double braid or tape and braid would be designated as Type R. D.

Continued on next page

Americore Light Insulation Fixture Wire

Solid tinned copper conductor, rubber insulation, single braid, black finish

Size, B. & S. gauge	Thickness rubber, in.	Diam. over braid, in.	List No.	Standard coils, ft.
16	1/64	6/64	8006	1000
18	1/64	5/64	8008	1000
20	1/64	5/64	....	1000

Americore Twin Rubber Covered Wire

Americore Twin Rubber Covered Cable

AMERICORE TWIN RUBBER COVERED WIRES AND CABLES

Size, B. & S. gauge	Thickness rubber, in.	Solid Conductor		Stranded Conductor			Shipped on reel number
		List No.	Weight per 1000 ft., lb.	Number of wires	List No.	Weight per 1000 ft., lb.	
2	4/64	922	558	7	692	597	466
3	4/64	923	470	7	693	488	466
4	4/64	924	380	7	694	406	466
5	4/64	925	320	7	695	336	466
6	4/64	926	259	7	696	285	466
8	3/64	928	161	7	698	171	500 ft. Coils
10	3/64	930	112	7	700	122	500 ft. Coils
12	3/64	932	82	7	702	90	500 ft. Coils
14	3/64	934	63	7	704	69	500 ft. Coils

Underwriters' rules permit use of above in sizes No. 14 and larger. No. 6 and larger shipped on reels containing 1000-ft. lengths; smaller sizes shipped in coils containing 500-ft. lengths.

These sizes, solid or stranded, will have one conductor with white braid, the other conductor with black braid, covered over all with a paraffined braid finished with black wax.

Americore Cable, Stranded Tinned Copper Conductor

AMERICORE RUBBER COVERED WIRES AND CABLES

Size, B. & S. gauge	Thickness rubber, in.	Solid		Stranded			Standard packages, amounts, ft.
		List No.	Weight per 1000 ft., lb.	Number wires in strand	List No.	Weight per 1000 ft., lb.	
Single Braid							
2	4/64	812	259	7	562	276	1000 Reels
3	4/64	813	212	7	563	226	1000 Reels
4	4/64	814	175	7	564	186	1000 Reels
5	4/64	815	144	7	.....	155	1000 Reels
6	4/64	816	120	7	566	128	500 Coils
8	3/64	818	75	7	568	80	500 Coils
10	3/64	820	53	7	570	56	500 Coils
12	3/64	822	38	7	572	41	500 Coils
14	3/64	824	29	7	574	31	500 Coils
16	2/64	826	17	.....	.....	18	500 Coils
18	2/64	828	13	.....	.....	14	500 Coils
Double Braid							
4/0	5/64	850C	.....	19	867A	826	1000 Reels
3/0	5/64	850B	.....	19	868A	672	1000 Reels
2/0	5/64	850A	.....	19	869	548	1000 Reels
1/0	5/64	850	.....	19	870	451	1000 Reels
1	5/64	851	.....	19	871	362	1000 Reels
2	4/64	852	276	7	872	286	1000 Reels
3	4/64	853	222	7	873	236	1000 Reels
4	4/64	854	184	7	874	196	1000 Reels
5	4/64	855	154	7	.....	164	1000 Reels
6	4/64	856	127	7	876	135	500 Coils
8	3/64	858	81	7	878	86	500 Coils
10	3/64	860	58	7	880	61	500 Coils
12	3/64	862	43	7	882	46	500 Coils
14	3/64	864	33	7	884	35	500 Coils
16	2/64	866	19	7	.....	20	500 Coils
18	2/64	868	15	7	.....	16	500 Coils

Americore Feeder Cable

Capacity, cir. mils	Number and diam. of wires in strand, in.	Thickness rubber, in.	Diam. over tape and braid, in.	List No. single braid	Weight per 1000 ft., lb.	Shipped on reel number
250,000	37x.0822	3/32	56/64	340	1006	467
300,000	37x.0901	3/32	59/64	341	1182	467
350,000	37x.0973	3/32	62/64	342	1355	467
400,000	37x.1040	3/32	65/64	343	1533	467
450,000	37x.1103	3/32	68/64	344	1706	467
500,000	37x.1162	3/32	72/64	345	1875	467
600,000	61x.0992	7/64	79/64	346	2263	468
750,000	61x.1109	7/64	86/64	347	2774	468
1,000,000	61x.1280	7/64	96/64	348	3627	468
1,250,000	91x.1172	8/64	107/64	348A	4546	468
1,500,000	91x.1284	8/64	115/64	349	5383	468
2,000,000	127x.1255	8/64	129/64	349A	7066	.....

Shipped in reels containing 1000 ft. lengths.

Americore Rubber Covered Switchboard Cable

National Electrical Code Standard; low potential, 0-600 volts; Class A

Size, B. & S. gauge	Number of wires in strand	Thickness of rubber, in.	Diameter over single braid, in.	Diameter over double braid, in.	List No.		Weight per 1000 ft., lb.		Standard packages, amounts, ft.
					Single braid	Double braid	Single braid	Double braid	
1	259	5/64	37/64	40/64	221	271	376	406	1000
2	210	4/64	33/64	36/64	222	272	302	329	1000
3	151	4/64	30/64	33/64	223	273	231	255	1000
4	133	4/64	27/64	30/64	224	274	210	231	1000
5	82	4/64	23/64	26/64	226	276	144	163	1000
6	49	4/64	23/64	26/64	226	276	145	164	1000
8	49	3/64	19/64	22/64	228	278	87	101	500
9	40	3/64	18/64	21/64	229	279	73	87	500
10	19	3/64	17/64	20/64	230	280	61	74	500
12	19	3/64	15/64	18/64	232	282	45	57	500
14	19	3/64	14/64	17/64	234	284	34	45	500

A. S. & W. Co's 30% Rubber Covered Tree Wire

This special Fibretex tree wire is insulated with the best grade of 30% rubber compound, the thickness of insulation used being ample for whatever voltage required.

This insulation is protected by a layer of rubber filled tape, and over the tape there is a layer of 3-ply hard twisted jute; this serving of jute is thoroughly saturated with a dense weatherproof compound and forms an excellent foundation for the Fibretex tape, which is applied directly over it.

Fibretex tape is specially prepared and treated to render it highly resistant to abrasions.

The outside finish consists of a simple weather-proof braid, which is heavily saturated with a dense special compound mixed with powdered mica.

Amparak Rubber Covered Wires and Cables

Made in sizes and styles as above described for Americore covering, except that quality of rubber is better than code.

Amerite Rubber Covered and Signal Wires

Standard Specifications—The rubber compound shall be made up from pure Hevea rubber of the best quality, suitable mineral matter, the necessary solid waxy hydrocarbons and sulphur. It is to be carefully and thoroughly vulcanized in the most approved manner and after vulcanization shall be homogeneous, tough and elastic. Insulation shall adhere closely to the wire and be placed concentrically around it.

Chemical—Analysis of this compound shall show not less than 30% of pure Hevea rubber, not more than 4% of solid waxy hydrocarbons, not more than 0.7% of free sulphur, and

Continued on next page

not more than 2.25% of total sulphur in any form. The analysis shall not show the presence of organic matter other than so-called mineral waxes and the substances normally present in fine Para rubber. The specific gravity of the rubber compound on the wire shall be not less than 1.85 as compared with distilled water at 60° F.

Mechanical—A strip of the vulcanized compound not less than 4 in. long shall be taken from the wire and marks placed on it 2 in. apart. The sample shall then be stretched until the marks are 6 in. apart and then immediately released. Five seconds after such a release the marks shall not be over 2⅜ in. apart. The sample shall then be stretched until the marks are 10 in. apart before breaking. The tensile strength of the compound shall not be less than 1250 lb. per sq. in.

These tests shall be made at ordinary room temperatures and in any case not less than 60° F.

Electrical—Each and every length of conductor when tested shall withstand a voltage test, and shall show an insulation resistance according to the tables which form a part of this specification. These tests shall be made at the works of the manufacturer, after the conductor has been covered with compound and same has been vulcanized, and before the application of tape, or other covering.

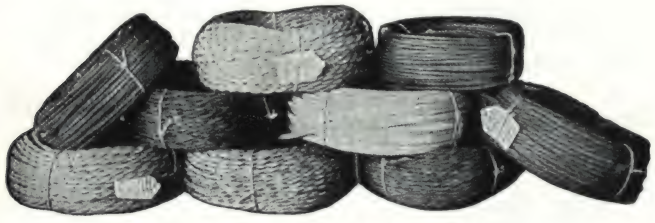
Tests shall be made after at least thirty-six hours' immersion in water and while the wire is still immersed. The insulation resistance tests shall be made after the voltage test with a battery of the proper electromotive force and the necessary readings obtained after one minute's electrification.

Inspection—The purchaser may, at his discretion, send to the works of the manufacturer a representative who shall be afforded every opportunity to see that the foregoing specifications are complied with.

Americore Flexible Cords

The term "cord" is ordinarily applied to any small pliable cable consisting of two or more flexible conductors insulated with rubber and braided. Under this heading are included all lamp and reinforced portable cords, brewery, canvasite, packing house, theater and stage, border light and heater cords. This construction in single conductor is used for exposed fixture work and is classified and tagged as Flexible Fixture wire. Care should be taken not to confuse this with regular rubber covered fixture wire, which is used for concealed fixture work.

Flexible cord is used in short lengths for exposed wiring in offices and residences to connect the concealed wiring with drop lights and appliances of various kinds, and is used in many other places where a short flexible connection is wanted. Its use is confined to temperatures not exceeding 120° F. and voltages not exceeding 300, except that sizes 14 and larger with $\frac{3}{64}$-in. insulation may be used where difference in potential is not more than 600 volts. Size 16 must have $\frac{1}{32}$-in. insulation, and while Underwriters permit $\frac{1}{64}$-in. on size 18, it is also furnished with $\frac{1}{32}$-in., particularly on types PD, PWP and P.



Lamp Cord of All Kinds and Sizes

LAMP CORDS AND REINFORCED PORTABLE CORDS
Construction of Copper Conductors

Lamp Cord Strands (All Types)							
Size B. & S.	Number of wires	Size each wire	Wt. copper per 1000 ft. each condr.	Size B. & S.	Number of wires	Size each wire	Wt. copper per 1000 ft. each condr.
10	104	30	34.0	18	16	30	4.9
12	65	30	21.0	19	13	30	4.1
14	41	30	13.2	20	10	30	3.1
16	26	30	8.3	22	6	30	1.9

The standard colors for cotton braids on lamp and portable cords are:

Type C —Green and yellow (combination) Type P-64—Black
Type PO—Black Type P-32—Black
Type PD—Black

There are no standard colors for silk braids, and each order must specify the color desired.

All dry cotton braided cords are furnished with a red tracer thread in the braid on one conductor for polarity identification.

Weatherproof finished cords have raised tracer in one conductor, and in the case of three conductor cords, the second conductor has two raised tracers.

Silk covered cords, with the exception of Type C, have red tracer same as dry cotton braided cords. Type C silk covered tracer furnished only when specified.

Types—The following types are approved by the National Board of Fire Underwriters and are known as "New Code":

Type C, Trade Name, Lamp Cord—For pendant or portable use, hanging free in air, in dry places and not subject to hard usage. Construction: twisted pair, with glazed cotton or silk braid on each conductor. No outer covering. Insulation not less than $\frac{1}{32}$ in. for Nos. 16 and 18 A. W. gauge. Larger sizes same as for rubber covered wires.

Twisted Lamp Cord

Type PO, Trade Name, Parallel Lamp Cord—For portable or pendant use in offices, dwellings and similar dry places where not likely to be subjected to rough usage and where appearance is an essential feature. Construction: Parallel wires, with soft cotton braid on each conductor, glazed cotton or silk braid over the parallel wires. Insulation same as Type C except that $\frac{1}{64}$-in. rubber may be used on size 18 only.

Type "PO" Parallel Silk or Cotton Lamp Cord

Type PD, Trade Name, Twisted Portable—For pendant or portable use in offices, dwellings, or similar dry places where not likely to be subjected to rough usage and where appearance is essential. Construction: Twisted pair, with soft cotton braid on each conductor; outer covering of glazed cotton or silk. Insulation same as Type C.

Type "PD" Twisted Portable Lamp Cord

Type PWP, Trade Name, Moistureproof Reinforced Cord—For pendant or portable use in damp places. Construction: Twisted pair with soft cotton braid on each conductor; rubber jacket not less than $\frac{1}{64}$ in. thick around the twisted pair; outer covering of soft cotton, saturated with a moistureproof compound.

Type PWP-32 Moistureproof Reinforced Cord

Continued on next page

Insulation on conductors same as Type C except that $\frac{1}{64}$-in. rubber may be used on size 18 only.

Type P, Trade Name, Reinforced Cord—For pendant or portable use in dry places, and where subject to hard usage. Construction: Twisted pair, with soft cotton braid on each conductor; rubber jacket not less than $\frac{1}{64}$ in. thick around the twisted pair; outer covering of glazed cotton or silk. Insulation on conductors same as Type C except that $\frac{1}{64}$-in. rubber may be used on size 18 only.

Specify—Thickness of rubber required on Types P or PWP, i.e., P-32, P-64 or PWP-32 and PWP-64.

Special Flexible Cords

The trade name, type, construction and finish are given in the table below. These are also approved "New Code" Americore cords.

SPECIAL FLEXIBLE CORDS

Trade name	Type	Number of conductors	Conductor and insulation	Covering on each conductor	Jute fillers	Rubber jacket in.	Number of weather-proof braids over all
Stage Cable	T	2 or 3	See below	One weather-proof braid or tape	Yes	.....	2
Border Light Cable	B	2 or more		One weather-proof braid or tape	No	.....	2
American Special Brewery Cord	.....	2		One dry braid	No	1/64	2
Deck Cable	.....	2		One dry braid	Yes	1/32	1

Conductors and Insulations

Size		Copper conductor	Cotton wind	Insulation, Americore, in.
Stage Cable and Border Light Cable	2	133 wires	No	4/64
	4	133 wires	No	4/64
	6	49 wires	No	4/64
	8	49 wires	No	3/64
	10–14	Lamp cord strand	Yes	3/64
	16–20	Lamp cord strand	Yes	2/64
Deck Cable	10–14	7 wires	No	3/64
	16–18	7 wires	No	2/64
All others	10–14	Lamp cord strand	Yes	3/64
	16–20	Lamp cord strand	Yes	2/64

Brewery Cord

Canvasite Cord

Packing House Cord

Special Flexible Cords

These three types are no longer approved by the underwriters

Americore Identification Marker

Our registered marker for Americore cords is an uncolored worsted tracer thread running lengthwise of the wire between the rubber and braid. Commercial cord has blue tracer.

Rubber Clad Portable Cords

Rubber clad cords are made to withstand the hardest kind of service. Used for wiring portable drills, grinders, washing machines, garage lights, trouble lights and other electrical equipment where service conditions are severe.

Types—These are as follows:

Type S, Construction—Conductors are regular

Rubber Clad Portable Cord

lamp cord strand, cotton wound. Nos. 10, 12 and 14 are insulated with $\frac{3}{64}$-in. 30% rubber; Nos. 16 and 18 with $\frac{1}{32}$-in. 30% rubber, on each conductor. In the two-conductor cables, one conductor is insulated with red rubber, and one with black rubber. In the three-conductor cables, one conductor is insulated with red rubber, one with black rubber, and one with white rubber. Two or three conductors are twisted together with cotton fillers, and covered with a skeleton braid of hard cotton. A covering of 60% rubber is applied over all to the diameter given in the above table.

Type SJ, Construction—Junior cord is the same as regular No. 18 cord, except that each conductor is composed of 41 wires each No. 34; and that the belt of 60% rubber is thinner, making a smaller outside diameter.

STANDARD PACKING LAMP AND PORTABLE CORDS

Type of wire	Standard packages		
	Cotton covered	Artificial silk covered	No braid
Single conductor—Type C	500-ft. spools	500-ft. spools	.....
Single conductor—1/64-in. rubber	1000-ft. spools	1000-ft. spools	.....
Twisted pair—Type C	250-ft. coils	250-ft. spools	.....
Twisted pair—1/64-in. rubber	250-ft. coils	500-ft. spools	.....
Parallel—Type PO	250-ft. coils	250-ft. spools	.....
Parallel—1/64-in. rubber	250-ft. coils	500-ft. spools	.....
Reinforced portable cords	500-ft. coils	500-ft. coils	.....
Rubber clad, Type S	.....	.....	250-ft. coils
Rubber clad, Type SJ	.....	.....	500-ft. coils
Brewery, Type CB	500-ft. coils	.....	.....
Canvasite, Type CC	500-ft. coils	.....	.....
Packing house, Type PKWP	500-ft. coils	.....	.....
Deck cable, Type CB	500-ft. coils	.....	.....

Hard Corded Braid

This is usually made of hard twisted cotton cord saturated with a waterproof compound. It is very flexible and possesses extreme durability under hard service conditions. It can be furnished on any size cable and is especially adapted for portable cords and mining machine cable.

Tubular Woven Braid

This is a loom weave, similar to that on fire hose, made up of hard twisted cotton saturated with a weatherproof compound. It is very durable and offers an excellent protection to the insulation for portable cords.

Elevator Lighting, Control and Annunciator Cable

These cables are made to conform to National Board of Fire Underwriters' requirements. Our new standards are considerably more flexible than those usually offered. The steel supporting strands are of special design. The braids have distinctive colors so that they can be easily distinguished from one another.

Lighting Cables—Generally made size 14 and in two or three conductors.

Control Cables—Made size 16 and in any number of conductors from two to sixteen.

Annunciator Cables—Usually size 18, although 16 is sometimes required. The number of conductors vary from two to twenty-five or more.

Miscellaneous Flexible Cords

Weatherproof Braided Twisted Pair Cord—Insulated with Americore rubber same as Type C, except that braids have weatherproof finish.

Continued on next page

Three-conductor Reinforced Portable Cord—Same as Type P or PWP, except that it has three conductors.

Plain Core Parallel or Twisted Lamp Cord—Consisting of two rubber covered conductors not braided, either twisted together or laid parallel, with one hard cotton or artificial silk braid over all.

Mercerized Cotton Covered Cords—Mercerized cotton braids can be furnished on any of the Americore Flexible cords.

Americore Heater Cords

We manufacture heater cords in many constructions and carry in stock three standards. Standard "E" is Duplex; Standard "F" is Twisted Pair. Both these standards meet Underwriters' specifications.

Standard "S" is a special Duplex Heater Cord which does not meet Underwriters' specifications.

Any of these standards can be furnished with soft or hard cotton braid. Our standard finish is a soft cotton braid, slate in color, with red tracer.

Standard "E"—Each conductor is a flexible bunched strand composed of No. 34 B. & S. gauge copper wires, covered with a cotton wind, insulated with $\frac{1}{64}$-in. unvulcanized globe rubber, and covered with one wind of asbestos. Two such conductors are twisted together and covered with one dry cotton braid over all.

Standard "E" Heater Cord

Standard "F"—Each conductor is a flexible bunched strand composed of No. 34 B.& S. gauge copper wires, covered with a cotton wind, insulated with $\frac{1}{64}$-in. unvulcanized globe rubber, and covered with one wind of asbestos and one dry cotton braid. Two such conductors are twisted together to form a twisted pair.

Standard "F" Heater Cord

Standard "S"—Each conductor is a standard lamp cord strand, covered with a wind of asbestos, insulated with .025-in. vulcanized globe rubber over the asbestos. Two such conductors are twisted together, and covered over all with a dry cotton braid.

AMERICORE HEATER CORDS

Size B. & S.	Standard strand For types "E" and "F"		Lamp cord strand For type "S"		Weight per 1000 ft.		
	Number wires	Size each	Number wires	Size each	Standard "E"	Standard "F"	Standard "S"
14	104	34	41	30	46	47	.....
16	65	34	26	30	33	35	.....
17	52	34	21	30	29	30	.....
18	41	34	16	30	24	26	29
20	26	34	10	30	.....	.....	34

Annunciator and Office Wire

Annunciator Wire—Used in primary battery circuits for call bell or annunciator wiring in hotels, offices or houses. Commercially pure, soft copper wire from No. 14 to No. 22 B. & S. is used. This is insulated with two firm winds of cotton applied in opposite directions and saturated with specially prepared paraffin wax compound. The outside wrap is made of any color or combination of colors—the most common being bright and fast red or blue with white. Put up on spools weighing about 7 lbs. net.

Annunciator Wire

Size, B. & S. gauge	List No.	Length in 1 lb., ft.	Size, B. & S. gauge	List No.	Length in 1 lb., ft.
14	3114	67	20	3120	221
16	3116	101	22	3122	311
18	3118	155			

Office Wire—Standard grade consists of a copper conductor, varying in size from No. 14 to No. 20 B. & S., insulated with one wind and one braid of cotton, both of which are applied tight and even.

These two cotton covers are thoroughly saturated with our special paraffin wax compound. The outer braid is given a high polish and is made in any color or combination of colors specified. The standard colors are red and white or blue and white.

This wire is put up in coils of about 20 lbs.

Used largely by telephone and telegraph companies for inside wiring, extending from the instruments to the junction where they connect with outside wires and cables as they enter building. Also used as high grade bell and annunciator wire.

Office Wire

Size, B. & S. gauge	List No.	Length in 1 lb., ft.	Size, B. & S. gauge	List No.	Length in 1 lb., ft.
14	3314	56	18	3318	115
16	3316	80	20	3320	154

Special Annunciator and Office Wire—Special kinds furnished as specified. Also conductors of other than standard sizes, either solid or stranded. Untinned copper wire is used in the regular product, but tinned wire will be furnished if required.

Multiple Conductors—Any of these insulated wires supplied, two in parallel or twisted in pairs, in 3-conductor cables or in cables having any number of conductors. Same can be covered with one or more braids or with tape and braid and finished in any manner specified.

Rubber Covered Copper Telephone Wire

Specifications—The following are considered standard by the larger telephone companies:

No. 14 B. & S. Twisted Pair "Outside Distribution Wire"—Each conductor hard drawn tinned copper wire, insulated to a diameter of $\frac{5}{32}$ in. over rubber and covered with cotton braid, saturated with black weatherproof compound, wax finish, one conductor having a raised tracer to distinguish it from the other.

No. 14 B. & S. Twisted Pair "Outside Distribution Wire"

No. 18 B. & S. Twisted Pair "Bridle Wire"—Each conductor soft drawn tinned copper wire, insulated to a diameter of $\frac{7}{64}$ in. over rubber and covered with cotton braid, saturated with black weatherproof compound, wax finish, one conductor having a raised tracer to distinguish it from the other.

No. 18 B. & S. Twisted Pair "Bridle Wire"

Continued on next page

No. 19 B. & S. Single Conductor Twisted Pair and Triple Conductor "Inside" or "Substation" Wire—Conductors soft drawn tinned copper insulated to a diameter of 3/32 in. over rubber, covered with single hard glazed cotton braid. Single conductors are braided with plain colored cotton, while in the twisted pair one conductor contains a differently colored tracer thread, and in triple conductor two of the three wires contain different colors or different design of tracer threads, thus making no two of conductor braids alike. Sometimes a differently colored cotton braid is used, one for each conductor, for purposes of distinction.

No. 19 B. & S. Single Conductor Twisted Pair, and Triple Conductor "Inside" or "Substation" Wire

TELEPHONE WIRES, TWISTED PAIRS

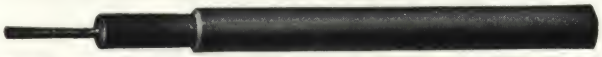
Size, B. & S. gauge	Finish	Diam. over rubber, in.	List No.			Weight per 1000 ft., lb.
			No test	100 megohms	Over 100 megohms	
14	Braided	11/64	9141	9040	9040A	63
14	Braided	5/32	9145	9045	9045A	57
16	Braided	5/32	9165	9065	9065A	49
16	Braided	9/64	9169	9069	9069A	43
16	Braided	4/32	9164	9064	9064A	37
18	Braided	4/32	9184	9084	9084A	32
18	Braided	7/64	9187	9087	9087A	28
19	Braided	7/64	9197	9097	9097A	26
19	Braided	3/32	9193	9093	9093A	22
20 or 22	Braided	3/32	9120 9122	9020 9022	9020A 9022A	17
19	Plain	3/32	9193P	9093P	9093B	16
20 or 22	Plain	3/32	9120P 9122P	9020P 9022P	9020B 9022B	15

"Pot Head" Wires, Plain Telephone Conductors—Furnished in the smaller sizes, Nos. 18, 19, 20 or 22 B. & S., either single conductor or twisted pair. Soft tinned copper conductors insulated to a diameter of 3/32 in. over rubber without any outer braid or protection. In case of twisted pairs, one conductor is sometimes made of a differently colored rubber than the other to discriminate between them.

"Pot Head" Wire, Plain Telephone Conductor

Telephone Cables—Made to include any number of single conductors or twisted pairs of telephone wires either plain or braided, bunched together or laid up concentrically, with a tape or cotton braid or other fibrous covering over all. Frequently incased in lead sheath, or armored. These cables vary greatly in construction and are furnished to buyers' requirements and specifications.

Rubber Covered Iron Telephone Wire, Single Conductor—These conductors are generally No. 12 or 14 B. W. G. galvanized iron wire insulated with code thickness of vulcanized rubber, either single or double cotton braid, weatherproof, saturated and wax polished.



Rubber Covered Iron Telephone Wire, Single Conductor

Weatherproof and Slow Burning Wires and Cables

These have moderate degree of insulation and are less expensive than rubber insulated conductors. Double and triple braid.

Reliance weatherproof wire meets every requirement for outdoor service, while Reliance slow burning wire is superior for indoor uses.

Wires and cables are made in strict accordance with all requirements of the National Board of Fire Underwriters, sizes varying from No. 20 B. & S. to the largest feeder cables used. Sizes No. 4/0 B. & S. and smaller are usually made of solid wires, while larger sizes have stranded conductors.

Unless hard drawn copper be specified, wires of purest grade of annealed copper, uniform in softness and having minimum conductivity of 98% Matthiessen's standard, will be used.

Reliance Weatherproof Insulation—For use outdoors where moisture is certain and where fireproof qualities are not necessary; also where, on account of small separation, bare wires would be liable to swing into contact with each other or with other low tension cables.

The wires are first covered by two or three closely and evenly woven braids of strong fibrous material, which is then completely saturated with weatherproof insulating compound. After drying thoroughly, the wire receives dressing of mineral wax, when the surface is thoroughly burnished and polished, reducing to a minimum trouble from sleet and ice.

Reliance Weatherproof Wire

Solid copper wire, double braid, black finish
National Electrical Code Standard

Reliance Weatherproof Wire

Solid copper wire, triple braid, black finish
National Electrical Code Wire

Size. B. & S. gauge	Minimum thickness of insulation, in.	List No.	Weight, lb.		Standard packages, amounts, ft.	Shipped on reel number
			Per 1000 ft.	Per mile		
0000	.0781	2140	767	4,050	2,400	467
000	.0781	2130	629	3,320	2,500	467
00	.0781	2120	502	2,650	3,200	467
0	.0781	2100	407	2,150	4,300	467
1	.0781	2101	316	1,670	1,000	422
2	.0625	2102	260	1,370	1,300	422
3	.0625	2103	199	1,050	1,600	422
4	.0625	2104	164	865	2,100	465
5	.0625	2105	135	710	2,500	422
6	.0625	2106	112	590	3,400	422
8	.0469	2108	75	395	5,000	422
9	.0469	2109	62	325	6,000	422
10	.0469	2110	53	280	2,000	Coils
12	.0469	2112	35	185	3,000	Coils
14	.0469	2114	25	130	4,000	Coils
16	.0469	2116	20	105	2,500	Coils
18	.0469	2118	16	85	3,000	Coils

Reliance Weatherproof Cable

Stranded copper conductors, double braid, black finish
National Electrical Code Wire

Reliance Weatherproof Cable

Stranded copper conductors, triple braid, black finish
National Electrical Code Wire

Continued on next page

RELIANCE WEATHERPROOF CABLE

Stranded copper conductors, triple braid, black finish National Electrical Code Wire

Size	Minimum thickness of insulation, in.	List No.	Weight, lb.		Standard packages, amounts, ft.	Shipped on reel number
			Per 1000 ft.	Per mile		
2,000,000	.1250	2350	7008	37,000	600	468
1,750,000	.1250	2351	6193	32,700	700	468
1,500,000	.1250	2352	5380	28,400	850	468
1,250,000	.1250	2353	4508	23,800	1000	468
1,000,000	.1250	2354	3674	19,400	1320	468
900,000	.1094	2357	3332	17,600	1320	468
800,000	.1094	2359	2992	15,800	1320	468
750,000	.1094	2360	2822	14,900	1320	468
700,000	.1094	2361	2650	14,000	1320	468
600,000	.1094	2363	2235	11,800	1320	468
500,000	.1094	2365	1894	10,000	1320	468
450,000	.0938	2367	1724	9,100	1320	468
400,000	.0938	2368	1553	8,200	1320	468
350,000	.0938	2369	1345	7,100	2640	468
300,000	.0938	2370	1174	6,200	2640	468
250,000	.0938	2371	985	5,200	2640	468
0000	.0781	2340	800	4,220	2000	467
000	.0781	2330	653	3,450	2000	467
00	.0781	2320	522	2,760	3000	467
0	.0781	2300	424	2,240	3000	467
1	.0781	2301	328	1,735	1000	422
2	.0625	2302	270	1,425	1300	422
3	.0625	2303	206	1,090	1600	422
4	.0625	2304	170	900	2100	465
5	.0625	2305	140	740	3000	465
6	.0625	2306	115	610	3400	422
8	.0469	2308	78	410	5000	422

Reliance Weatherproof Iron Wire, Double Braid

Reliance Weatherproof Iron Wire, Triple Braid

For fire alarm, telephone, telegraph and burglar alarm construction where danger of short circuits with other wires or trees exists

Reliance Slow Burning Wires and Cables—Have insulation that will not carry flame. Especially useful in hot, dry places, and where wires are brought together, as on the back of a large switchboard or in a wire tower. Each insulating braid completely saturated with white, slow burning compound, and outside thoroughly slicked down and given a hard, smooth, white surface.

Reliance Slow Burning Wire, National Code Standard

Solid conductor, triple braid, white finish

Reliance Slow Burning Cable

Stranded copper conductor, three white braids

Special Weatherproof and Slow Burning Wires—A combined insulation of black weatherproof and white slow burning coverings is often required. The wires may have a single coating of each kind or three coatings, two of slow burning and one of weatherproof, or conversely. When weatherproof covering is inside, the conductor is known as "white finish weatherproof," and when flameproof covering is inside, it is called "black finish slow burning." Outside surfaces are finished smooth and hard. The white finish weatherproof wire only is approved by the National Electrical Code.

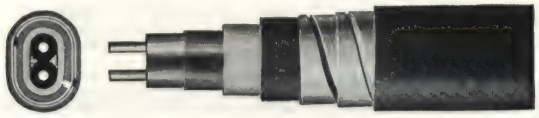
Park and Suburban Cables (Flat Steel Tapes or Armorlokt)

These cables have been designed for use without conduit or other protection, and offer all the advantages of a cable in conduit at but a small part of the cost of such a system.

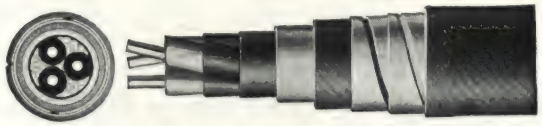
They are usually laid in the ground in a shallow trench from 12 to 24 in. below the surface, the depth depending upon the location, no other protection being necessary, due to their construction.

These cables are made with any number of conductors, or any size, either solid or stranded, and for any voltage, and may be insulated with rubber, with paper, or with cambric, as desired. The method of construction is practically the same in every case.

Single Conductor



Twin Conductor



Three Conductors

Flat Steel Taped Park or Suburban Cables

Rubber insulated

Single Conductor Armorlokt Cable

Construction—Standard construction is illustrated. The wires making up the copper conductor are tinned and insulated with rubber of required thickness and quality. Then a rubber filled tape is applied.

In the case of Three-conductor and Two-conductor or Duplex (round), each conductor is insulated with rubber, taped, and the conductors are then twisted together with jute fillers. Tape is then wrapped around the group. In the case of the Twin (flat) there are no jute fillers or tape over all. Twin cable is furnished when two conductors are required, unless Two-conductor round cable is specified.

A lead sheath is placed over the tape to exclude moisture. An asphalt saturated jute covering is applied over the lead sheath, acting as a cushion between the armor and lead, thus protecting the lead from mechanical injury by the flat steel tapes or special Armorlokt tape and preventing an accumulation of moisture between the lead and armor.

A steel tape armor consisting of either two flat steel tapes or one Armorlokt tape is then applied. All tapes are wound in the same direction, the outer tape overlapping the line of separation between the spirals of the inner tape, thus giving flexibility, while preventing any opening in the armor when the cable is bent, which might possibly allow an injury to the lead sheath and insulation below. This also applies to our Armorlokt

Continued on next page

tape, which is interlocked. Galvanized tapes can be furnished if required.

An asphalt saturated jute covering is placed outside of the steel tape armor to protect it from corrosive action of moisture or any chemicals which may be in the soil, and from electrolysis.

Uses—

Street lighting	In coal mines
Railroad yard lighting	Industrial plants
Park and ground lighting	Railway signal service

Submarine service under lakes and rivers where tensile strength is not looked for. And many others.

Inquiries—We make such a great variety of electric light and power cables, they are made in so many different sizes and with so many different thicknesses of insulation and finished in so many different ways that it would be impracticable to attempt to tabulate them all. This class of our product is making an enviable record and is well and favorably known in all parts of the country.

Inquiries containing full information are solicited.

If desired, can furnish competent men to make installations at a reasonable charge.

Bare Wires and Cables—Copper, Iron and Steel

Copper wire for all purposes in any required shape or size; for telephone and telegraph, high voltage long distance transmission, and industrial purposes in general. Copper cables of all capacities and degrees of flexibility, hard drawn or annealed, bare or insulated.

HARD DRAWN COPPER TELEGRAPH AND TELEPHONE WIRE

Size, B. & S. gauge	Diameter, in.	Weight per mile in lb.	Size, B. & S. gauge	Diameter, in.	Weight per mile in lb.
8	.1285	264	12	.0808	104
9	.1144	209	14	.0641	66
10	.1019	166			

PROPERTIES OF HARD DRAWN COPPER WIRE
(Adopted by the A. S. T. M.)

Size, B. & S. ga.	Diameter, in.	Area, cir. mils	Tensile strength, lb. per sq. in.	Per cent elongation in 10 in.	Size, B. & S. ga.	Diameter, in.	Area, cir. mils	Tensile strength, lb. per sq. in.	Per cent elongation in 10 in.
0000	0.460	211,600	49,000	3.75	8	0.128	16,380	63,400	1.4
000	0.410	168,100	51,000	3.20	9	0.114	12,996	64,200	1.3
00	0.365	133,200	52,800	2.70	10	0.102	10,404	64,800	1.2
0	0.325	105,600	54,500	2.4	11	0.091	8,281	65,400	1.1
1	0.289	83,520	56,000	2.1	12	0.081	6,561	65,700	1.0
2	0.258	66,560	57,500	2.0	13	0.072	5,184	66,000	0.9
3	0.229	52,440	58,500	1.9	14	0.064	4,096	66,200	0.9
4	0.204	41,620	59,500	1.8	15	0.057	3,249	66,400	0.8
5	0.182	33,120	60,500	1.7	16	0.051	2,601	66,600	0.8
6	0.162	26,240	61,500	1.6	17	0.045	2,025	66,800	0.7
7	0.144	20,740	62,500	1.5	18	0.040	1,600	67,000	0.7

Perfected Telephone and Telegraph Wire

There are three standards of extra galvanized telephone and telegraph wire in general commercial use. The arbitrary designation of these different qualities, as E. B. B., B. B. and Steel, was adopted years ago. The three grades are all made from the very best materials by improved processes under the careful supervision of skilled and experienced men.

While these three grades differ in physical characteristics, there is no difference in the standard as regards galvanizing. All grades are galvanized to the highest commercial standard by our "Perfected" process.

Every bundle of wire before shipment is tested physically and electrically to insure a uniform product of high standard. The galvanizing is tested to determine if the zinc coating is continuous, tight and elastic; also of sufficient thickness. The latter test is a chemical, not merely a visual one. The life of a galvanized wire depends primarily upon the thickness and quality of galvanizing.

"Extra Best Best" (E. B. B.)—Stands highest in conductivity of any telegraph wire with a weight per mile ohm of from 4700 to 5000 lb. Uniform in quality, pure, tough and pliable. It is largely used by telegraph companies and in railway telegraph service; also for tie wires and signal bonding.

"Best Best" (B. B.)—Superior to the E. B. B. in tensile strength and equal in galvanizing, but of lower electrical value. Weight per mile ohm, 5600 to 6000 lb. This grade is used very largely by telephone companies.

"Steel"—More expressly designed for short-line telephone service, where a measure of conductivity can be exchanged for high tensile strength. Weight per mile ohm, 6500 to 7000 lb.

RESISTANCE AND WEIGHTS OF TELEGRAPH AND TELEPHONE WIRES

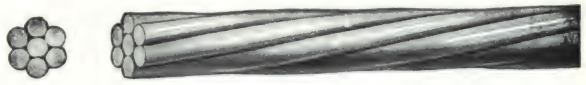
Size, B.W.G. gauge	Diam., in.	Weight per 1000 ft., lb.	Weight per mile, lb.	Bundles per mile	Approximate breaking strain, lb.			Average resistance per mile at 68° F. (International ohms)		
					E. B. B.	B. B.	Steel	E. B. B.	B. B.	Steel
4	.238	153	811	1/4	2,028	2,271	2,433	5.98	7.15	8.32
6	.203	112	590	1/3	1,475	1,652	1,770	8.22	9.83	11.44
8	.165	74	390	1/2	975	1,092	1,170	12.43	14.87	17.31
9	.148	60	314	1/2	785	897	942	15.44	18.47	21.50
10	.134	49	258	1/2	645	722	774	18.79	22.48	26.16
11	.120	39	206	1/2	515	577	618	23.54	28.16	32.77
12	.109	32	170	1/2	425	476	510	28.52	34.12	39.71
14	.083	19	99	1/2	247	277	297	48.98	58.59	68.18

American Special Copper Bearing Steel Telephone Wire can be furnished where required, in the B. B. Iron grade and the steel grade only.

Perfected Steel Strand

Used for guying smokestacks, telephone, telegraph and overhead transmission line poles; for supporting telephone, signal and transmission cables in overhead work and trolley wire in catenary construction; also as a ground wire in protecting transmission lines from lightning.

American Special Copper Bearing Steel Strand can be furnished where required in the common grade only.



Perfected Steel Strand

Seven steel wires twisted into a single strand
Galvanized or extra galvanized

Diam., in.	Size of wire used, in.	Approx. wt. per 1000 ft., lb.	Approx. strength, lb.
3/4	.250	1,200	16,700
5/8	.207	813	11,600
9/16	.188	671	9,600
1/2	.165	517	7,400
7/16	.145	399	5,700
3/8	.125	296	4,250
5/16	.104	205	3,200
9/32	.093	164	2,570
1/4	.080	121	1,900
7/32	.072	98.3	1,540
3/16	.062	72.9	1,150
5/32	.052	51.3	870
9/64	.047	40	700
1/8	.041	31.8	540
7/64	.035	25	450
3/32	.031	20	400
5/64	.026	13	300

PERFECTED STEEL STRAND

Siemens-Martin Extra Galvanized		High Strength Extra Galvanized		Extra High Strength Extra Galvanized	
Diam., in.	Tensile strength, lb.	Diam., in.	Tensile strength, lb.	Diam., in.	Tensile strength, lb.
5/8	19,100	5/8	29,600	5/8	42,400
9/16	15,700	9/16	24,500	9/16	35,000
1/2	12,100	1/2	18,800	1/2	26,900
7/16	9,350	7/16	14,500	7/16	20,800
3/8	6,950	3/8	10,800	3/8	15,400
5/16	5,350	5/16	8,000	5/16	11,200
9/32	4,250	9/32	6,400	9/32	8,950
1/4	3,150	1/4	4,750	1/4	6,650
9/64	1,900	9/64	2,850	9/64	3,990
1/8	910	1/8	1,330	1/8	1,830

CRESCENT INSULATED WIRE & CABLE CO.

ESTABLISHED 1889

CRESCENT ARMORED WIRE CO., SUBSIDIARY

Manufacturers of Electrical Wires and Cables

MAIN OFFICE AND FACTORIES

TRENTON, N. J.

SALES REPRESENTATIVES

ATLANTA, GA., E. B. GLENN, 201 Red Rock Building
BALTIMORE, MD., H. E. PARSONS CO., 230 E. Pleasant Street
BOSTON, MASS., G. M. HATHAWAY & CO., 161 Lincoln Street
CHICAGO, ILL., STACKHOUSE & ALLEN, 611 West Adams Street
CLEVELAND, OHIO, HENGER-FAIRFIELD CO., 1808 Columbus Road
DALLAS, TEX., ROYAL SMITH, 912 Commerce Street
DETROIT, MICH., HEMPHILL & CO., 517 E. Woodbridge Street
INDIANAPOLIS, IND., A. I. CLIFFORD CO., 31 E. Georgia Street
LOS ANGELES, CAL., HENGER-SELTZER CO., 711 E. 14th Street
MINNEAPOLIS, MINN., BEN B. MOORE, 106 Third Avenue No.
NEW YORK, N. Y., KEARTON & NAGLE, 550-52 W. 36th Street
PHILADELPHIA, PA., E. R. BLYLER, The Bourse
PITTSBURGH, PA., GENERAL SALES CO., 424 Fourth Avenue
SAN FRANCISCO, CAL., HENGER-SELTZER CO., 1063 Howard Street
SEATTLE, WASH., ALBERT S. KNIGHT CO., 3006 Western Avenue
ST. LOUIS, MO., MONCRIEFF H. SMITH & CO., 1607 Olive Street

Products

"CRESCENT" NATIONAL ELECTRICAL CODE RUBBER COVERED WIRE and CABLE.

INTERMEDIATE GRADE RUBBER COVERED WIRE and CABLE.

"IMPERIAL" 30% PARA RUBBER COVERED WIRE and CABLE.

"CRESCENT" LEAD ENCASED WIRE and CABLE.

"CRESCENT" VARNISHED CAMBRIC CABLE.

"CRESCENT" A.B.C. ARMORED BUSHED CABLE.

"CRESCENT" LEAD COVERED ARMORED CABLE.

"CRESCENT" FLEXIBLE METALLIC CONDUIT.

Also Lamp, Heater, Brewery, Canvasite, Packinghouse and Rubber Sheathed Portable Cords; Elevator Lighting, Control and Annunciator Cables; Borderlight and Stage Cables; Dampproof Office and Annunciator Wires and Cables; Special Flexible Cords, Cordage and Cables for Telephone Instruments and Radio; Magnet Wires—cotton and silk covered; Organ Wire and Cable.

Service

The completeness of the Crescent line assures you of one reliable source of supply for wire and cable ranging from light fixture wire up to 2,000,000 C.M. cable and a complete range of styles of insulation for almost every electrical purpose.

In making wire and cable for over forty years, we have gained wide and invaluable experience and have enlarged our plant at various times to take care of increasing demands for high quality wire products. Every manufacturing operation from drawing copper rod on down to adding the final finish is completed in our own plant.

To insure its high quality, a rigid inspection is made after every operation ending with the final inspection of the finished product.

The co-operation of our Engineering Staff is freely offered on all special wiring problems.

To facilitate deliveries, complete stocks are carried at our plant in Trenton, N. J. and in the various cities where our sales representatives are located.

"Crescent" National Electrical Code Rubber Covered Wire and Cable

This is a high grade wire suitable for all installations of knob-and-tube or conduit work where the working voltage does not exceed 7000.

Intermediate Grade Rubber Covered Wire and Cable

This is a better grade of insulation than National Electrical Code Wire for those architects, engineers and contractors who wish added mechanical and electrical safety and durability. All of the sizes of wires and cables in the table can be furnished in this grade or any other special grade of insulation.

"Imperial" 30% Para Rubber Covered Wire and Cable

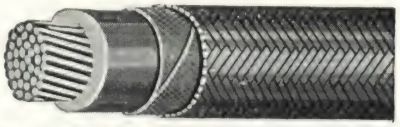
This is the best commercial grade of rubber covered wire for installations demanding maximum mechanical and electrical protection and longest life. The insulation is composed of not less than 30% (by weight) of new Hevea rubber, so compounded that it possesses the most desirable combination of strength, elasticity, slow aging and high electrical insulating properties. It is recommended for all high voltage circuits and where the additional safety warrants the greater first cost.

"Crescent" Lead Encased Wire and Cable

This wire being protected by a seamless sheath of commercially pure soft lead is not affected by extreme moisture or by corrosive fumes usually encountered in wiring industrial buildings. A well made lead encased cable, not abused, will last indefinitely and gives the most permanent kind of wiring where conditions warrant the additional cost. We are equipped to furnish all of the standard rubber covered wires and cables previously noted, as well as special cables, with a lead sheath.

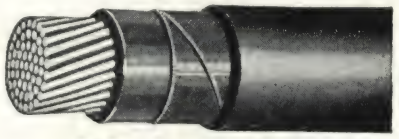
No. 14 B&S Solid, Single Braid

No. 14 B&S Solid, Double Braid



500,000 C. M. Cable, Stranded, Tape and Braid

No. 14 B&S Solid, Duplex, Lead Encased



Lead Encased Cable

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UNDERWRITERS' CODE REQUIREMENTS FOR WIRES IN CONDUIT—"CRESCENT" N. E. C. WIRE
(600 VOLTS WORKING PRESSURE)

Wire size B&S gauge	Conductor: Area in circular mils	Conductor: Style	Conductor: Diameter, in mils	Insulation thickness, 64ths in.	Approx. over-all diameter, in.	Resistance per 1000 ft. in ohms	Allowable current capacity, amperes	Conduit sizes: Number of conductors 1	2	3	4
Single Braid											
18	1624	Solid	40.3	1	.105	6.259	3	½	½	½	½
18	1624	Solid	40.3	2	.135	6.259	3	½	½	½	½
16	2582	Solid	50.8	1	.115	3.936	6	½	½	½	½
16	2582	Solid	50.8	2	.145	3.936	6	½	½	½	½
14	4106	Solid	64.0	3	.19	2.475	15	½	½	½	½
14	4106	Strand	7x 24.2	3	.22	2.5245	15	½	½	½	¾
12	6530	Solid	80.8	3	.21	1.557	20	½	½	¾	¾
12	6530	Strand	7x 30.5	3	.23	1.5882	20	½	½	¾	¾
10	10382	Solid	101.9	3	.24	.9792	25	½	¾	¾	¾
10	10382	Strand	7x 38.5	3	.26	.9988	25	½	¾	¾	¾
8	16509	Solid	128.5	3	.27	.6158	35	½	¾	¾	1
8	16509	Strand	7x 48.6	3	.29	.6282	35	½	¾	¾	1
Double Braid											
6	26251	Solid	162.0	4	.36	.3872	50	½	1	1¼	1¼
6	26251	Strand	7x 61.2	4	.38	.3949	50	½	1	1¼	1¼
4	41742	Solid	204.3	4	.40	.2436	70	¾	1¼	1¼	1½
4	41742	Strand	7x 77.2	4	.43	.2485	70	¾	1¼	1¼	1½
3	52633	Strand	7x 86.7	4	.46	.1970	80	¾	1¼	1¼	1½
2	66373	Strand	7x 97.4	4	.49	.1563	90	¾	1¼	1½	1½
1	83694	Strand	12x 83.5	5	.57	.1239	100	¾	1½	2	2
Tape and Braid											
1/0	105592	Strand	19x 74.6	5	.61	.09826	125	1	1½	2	2
2/0	133079	Strand	19x 83.7	5	.65	.07792	150	1	2	2	2½
3/0	167806	Strand	19x 94.0	5	.71	.06179	175	1	2	2	2½
4/0	211600	Strand	19x105.5	5	.77	.04900	225	1¼	2	2½	2½
	250000	Strand	37x 82.1	6	.86	.04147	237	1¼	2½	2½	3
	300000	Strand	37x 90.0	6	.91	.03457	275	1¼	2½	3	3
	350000	Strand	37x 97.2	6	.96	.02963	300	1¼	2½	3	3½
	400000	Strand	37x103.9	6	1.0	.02592	325	1¼	3	3	3½
	450000	Strand	37x110.3	6	1.05	.02305	362	1½	3	3	3½
	500000	Strand	37x116.2	6	1.1	.02074	400	1½	3	3	3½
	600000	Strand	37x127.3	7	1.19	.01729	450	2	3	3½	4
	700000	Strand	61x107.1	7	1.27	.01481	500	2	3½	3½	4½
	750000	Strand	61x110.9	7	1.31	.01382	525	2	3½	3½	4½
	800000	Strand	61x114.5	7	1.34	.01296	550	2	3½	4	4½
	900000	Strand	61x121.5	7	1.41	.01153	600	2	3½	4	4½
	1000000	Strand	61x128.0	7	1.51	.01036	650	2	4	4	5
	1250000	Strand	91x117.2	8	1.59	.00829	750	2½	4½	4½	6
	1500000	Strand	91x128.4	8	1.76	.00692	850	2½	4½	5	6
	2000000	Strand	91x148.2	8	1.96	.00518	1050	3	5	6	6

"Crescent" A. B. C. Armored Bushed Cable

A perfected product that has met the unqualified approval of electrical contractors and inspectors all over the country.

The twisted conductors are covered with heavy kraft paper armor thoroughly impregnated with a moistureproof compound; then covered with flexible steel armor.

The red fibre anti-short bushings, which are furnished with the cable for insertion at each termination of the armor, fulfill a long felt need for a definite and safe means for protecting the conductors from the sharp, cut edge of the steel armor.

A. B. C. Cable and the anti-short bushings, which insure maximum protection against grounds and shorts represent the last word in a good, safe, sound, and low cost wiring system.

Armored Bushed Cable
U. S. Patent No. 1687013
(Licensee)

"Crescent" Lead Covered Armored Cable

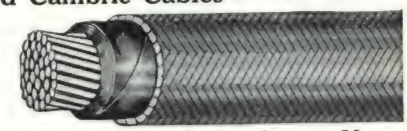
In addition to the steel armor, this type of wire has a seamless lead sheath under the armor.

It is used for installations where much moisture will be encountered.

Two-conductor, Lead Encased, Armored Wire

"Crescent" Varnished Cambric Cables

Insulation of varnished cambric provides maximum dielectric properties. The cambric is saturated with special non-hardening insulating varnish, which provides high dielectric strength and permanent flexibility. Varnished cambric cable will withstand a greater degree of heat than rubber covered cable, and may be covered with either lead sheath for use under moist conditions, or cotton braid for use in dry places, braid being saturated in weatherproof compounds or slow burning compounds as desired.



Stranded, Single Conductor, Varnished Cambric, Weatherproof Braid

Stranded, Single Conductor, Varnished Cambric and Lead

Stranded, Three Conductor, Varnished Cambric and Lead

"Crescent" Flexible Metallic Conduit

This is made from the same high grade electro-galvanized steel strip as our armored cable, in standard sizes from ⅜ to 3 in. It is chiefly used for armoring motor leads and for entering switch panels from knob-and-tube systems.

Flexible Metallic Conduit

NATIONAL ELECTRIC LIGHT ASSOCIATION

420 Lexington Avenue

NEW YORK, N. Y.

When Building Today
Wire for Tomorrow

Your client of today is the Electric and Power Company's customer of tomorrow

Our Interest in the Architect

The NATIONAL ELECTRIC LIGHT ASSOCIATION, now in its 45th year, is devoted to "advancing the art and science of the production, distribution and use of electricity in public service." It has nothing to sell. Its interest is for mutual benefit to all concerned with respect to economy, efficiency and present and future needs for electric service.

There are 1500 power companies in membership which have a direct obligation to all consumers of electricity.

The electric light and power company accepts as one of its responsibilities assistance to the architect in obtaining for his clients the greatest advantage from use of electricity. The increasing demand for electric service makes it imperative that the architect forecast and provide for future wiring requirements in structures for home, commercial and public use.

The light and power companies have been encountering an increasing number of instances where owners of buildings were unable to make practical alterations to wiring installations without incurring excessive expense.

By adequately providing for the many new uses of electricity, buildings are enhanced in convenience and value, and costly alterations are avoided.

Specially trained representatives of the Electric Light and Power Company will gladly call on you or your Consulting Engineers to help you with any technical details of today—or tomorrow.

Specifications

Write to the NATIONAL ELECTRIC LIGHT ASSOCIATION, 420 Lexington Avenue, New York, N. Y., for typical wiring specifications for your files.

THE BRYANT ELECTRIC COMPANY

Manufacturers of "Superior Wiring Devices" Since 1888

1421 State Street, BRIDGEPORT, CONN.

BRANCHES

BOSTON, MASS., 50 High Street
NEW YORK, N. Y., 342 Madison Avenue
CHICAGO, ILL., 844 West Adams Street (Office and Warehouse)
PHILADELPHIA, PA., 1333 Chestnut Street
SAN FRANCISCO, CAL., 149 New Montgomery Street (Office and Warehouse)

The Company and Its Facilities

The Company's plant at Bridgeport covers over half a million square feet of floor space, devoted exclusively to the manufacture of electrical wiring devices. The growth of the Company is due to two factors; a desire to make only the best electric wiring devices and the ability to carry out that desire.

How to Obtain Bryant Wiring Devices

Responsible representatives and distributors have been located in all parts of the world. The name of the nearest American, Canadian or Hawaiian representative will be sent on request, also information on foreign distributing channels.

Identified Terminals and How to Use Them

To simplify electric wiring and to make it safer, it is recommended (and in many communities required by law) that one side of every electrical circuit be permanently and effectively grounded. It is now compulsory that the grounded wire of a circuit be covered with white insulation.

On all Bryant screw shell devices the shell terminal is identified. The standard means of identification is by putting washed nickel finish on the terminal and binding screw.

On devices with leads attached, the shell lead is white. Devices with green leads have the grounded lead identified with a strand of white. On all "Spartan" receptacles the polarized terminal is the identified terminal.

Materials Used in Bryant Superior Wiring Devices

All devices of the socket and receptacle type have screw shells of gilding metal which resists corrosion. This applies also to cut-out bases.

Center contacts of socket devices are of phosphor bronze, in permanent spring tension.

Current-carrying parts are of copper, brass, bronze or gilding metal. No steel used.

Steel wearing parts, case-hardened. Coil springs, tempered piano wire.

Binding screws, large flat heads and staked so they will not fall out. Steel binding screws never used.

Contacts of switches, phosphor bronze or brass. Insulation, fibre, Bakelized cloth or paper.

Porcelain parts, white with exposed parts glazed. "Spartan" flush receptacles, exposed parts glazed black.

Socket keys, switch handles, pendent balls and push buttons, a lustrous black (red in some push buttons) composition is used. Sheet insulation, vulcanized fibre is used in sockets, receptacles and switches. Where requirements are severe, Bryant "Templus" is used.

Interchangeable Cold Molded Black Composition Socket Caps and Bodies

These sockets are extremely rugged in construction and are suitable for installation where metal shell sockets may not be satisfactory.

No. FA
⅛-in. cap metal bushing

No. FT
Pendent cap

No. FQ
Pendent cap with cord grip

No. FD
½-in. cap metal bushing

No. FC
⅜-in. cap metal bushing

Keyless body with weatherproof shade holder groove, 660 watts, 250 volts

No. 3773

Key body with weatherproof shade holder groove, 250 watts, 250 volts

No. 3770

Wash nickel is the standard finish on the exposed metal parts.

Interchangeable Porcelain Socket Line

Each socket cap and base will fit all bodies.

No. PA—⅛-in. female brass cap
No. PB—¼-in. female brass cap
No. PC—⅜-in. female brass cap
No. PD—½-in. female brass cap
No. PE—⅜-in. female aluminum cap

No. PP—⅜-in. female brass angle cap
No. RW—½-in. female brass angle cap

No. PT Pendent Cap
½-in. cord hole

No. RT Pendent Cap
½-in. cord hole

No. RL Base
For 3¼-in. outlet boxes

No. RM Base
For 3¼ and 4-in. outlet boxes

No. 70
S.P. Key Socket
Body with shade-holder groove, 250 watts, 250 volts

No. 72
S.P. Key Socket
Body with indicating key and shade-holder groove, 660 watts, 250 volts

No. 73
Keyless Socket
Body with shade-holder groove, 660 watts, 250 volts

No. 75
S.P. Pull Socket
Body with shade-holder groove and insulating link, 250 watts, 250 volts

No. 76
S.P. Pull Socket
Body with shade-holder groove and insulating link, 660 watts, 250 volts

No. 71
Push Button Socket
Body with shade-holder groove, 660 watts, 250 volts

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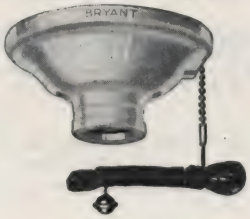
Porcelain Outlet Box Receptacles

No. 4273



No. 4278

For mounting on standard 3¼ and 4-in. outlet boxes with shade-holder groove—250 volts.

No. 4273—Keyless.
No. 4274—Pull 6½-in. chain, insulator, 4-ft. cord.
No. 4275—6½-in. chain.
No. 4276—4-ft. cord.
No. 4277—6½-in. chain, insulator.
No. 4278—6½-in. chain and 4-ft. cord.
No. 4279—3-ft. chain.

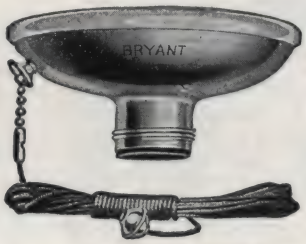
Surface and Outlet Box Receptacles

No. 4102

For 3¼-in. outlet boxes, keyless, with binding screws, 660 watts, 250 volts

No. 4100

For 3¼ and 4-in. outlet boxes, keyless, with binding screws, 660 watts, 250 volts



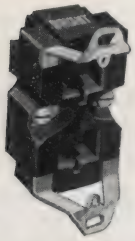
No. 4104

For 3¼ and 4-in. outlet boxes, pull, with binding screws, short chain and 4-ft. cord and pendant, 250 watts, 250 volts

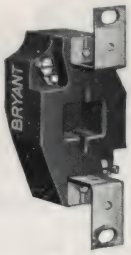
"D. D." Disappearing Door, Flush Receptacles, Plates and Plug

Designed especially for hotel and other installations where it is desired to restrict the use of current to only those appliances provided with the special plug necessary for making the connections.

Each outlet: 15 amperes, 125 volts; 10 amperes, 250 volts.



No. 657



No. 730

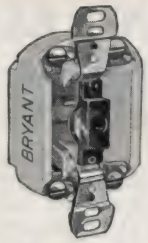
No. 659

No. 730—Single composition receptacle.
No. 657—Duplex composition receptacle.
No. 659—Bakelite plug, for one or two cords.

No. OD361 Brass Plate
For No. 730 Single Receptacle

No. OD261 Brass Plate
For No. 657 Duplex Receptacle

These plates are made in .060 metal only



No. 2830

Radio Jack Flush Receptacle

No. 2830 Radio Jack Flush Receptacle, porcelain cup with rectangular bakelite boss. This receptacle will take any standard radio jack and is designed for use with "S" type tumble switch plates.

Surface Tumbler Switches

125-250 volts

No. 3921

Porcelain Bases, Bakelite Handles, Metal Covers—

No. 3921—S. P. Indicating, 6 amperes, 125 volts; 3 amperes, 250 volts.
No. 3923—Three-point, 5 amperes, 125 volts; 2 amperes, 250 volts.

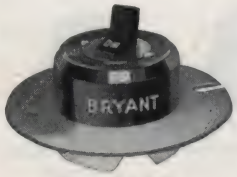
Metal Covers on Cadmium Plated Box Covers—

No. 3931—S. P. Indicating, for 3¼-in. box, 6 amperes, 125 volts; 3 amperes, 250 volts.
No. 3933—Three-point, for 3¼-in. box, 5 amperes, 125 volts; 2 amperes, 250 volts.
No. 3941—S. P. Indicating, for 4-in. box, 6 amperes, 125 volts; 3 amperes, 250 volts.
No. 3943—Three-point, for 4-in. box, 5 amperes, 125 volts; 2 amperes, 250 volts.

Brown Bakelite Covers and Handles—

No. 3921-B—S. P. Indicating, 6 amperes, 125 volts; 3 amperes, 250 volts.
No. 3923-B—Three-point, 5 amperes, 125 volts; 2 amperes, 250 volts.

No. 3921-B



No. 3931-B

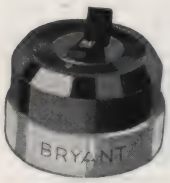
Bakelite Covers on Cadmium Plated Box Covers—

No. 3931-B—S. P. Indicating, for 3¼-in. box, 6 amperes, 125 volts; 3 amperes, 250 volts.
No. 3933-B—Three-point, for 3¼-in. box, 5 amperes, 125 volts; 2 amperes, 250 volts.
No. 3941-B—S. P. Indicating, for 4-in. box, 6 amperes, 125 volts; 3 amperes, 250 volts.
No. 3943-B—Three-point, for 4-in. box, 5 amperes, 125 volts; 2 amperes, 250 volts.

Porcelain Bases, Bakelite Handles, Metal Covers—

No. 3911—S. P. Indicating, 10 amperes, 125 volts; 5 amperes, 250 volts.
No. 3912—D. P. Indicating, 10 amperes, 125 volts; 10 amperes, 250 volts.
No. 3913—Three-point, 10 amperes, 125 volts; 5 amperes, 250 volts.
No. 3914—Four-point, 10 amperes, 125 volts; 5 amperes, 250 volts.

No. 3911



No. 3911-B

Brown Bakelite Covers and Handles—

No. 3911-B—S. P. Indicating, 10 amperes, 125 volts; 5 amperes, 250 volts.
No. 3912-B—D. P. Indicating, 10 amperes, 125 volts; 10 amperes, 250 volts.
No. 3913-B—Three-point, 10 amperes, 125 volts; 5 amperes, 250 volts.
No. 3914-B—Four-point, 10 amperes, 125 volts; 5 amperes, 250 volts.

Continued on next page

"Spartan" Flush Receptacles

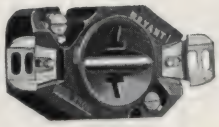
Body is made of brown bakelite. Bosses have easy finding ribs. Depth is only $2\frac{3}{32}$ in. Plaster ears are integral with yoke. The two extra large No. 8 binding screws, provided in each side wiring terminal, make of this device a connecting block as well as a convenience outlet.

No. 4832

No. 4831
Brown bakelite single flush receptacle for plate without door

No. 120
Black porcelain single flush receptacle for plate without door

No. 122
Black porcelain duplex flush receptacle for plate without doors



No. 9020
Brown composition single flush receptacle for plate without door

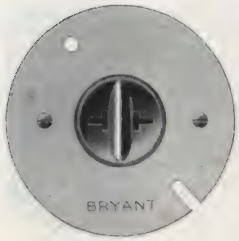
No. 9022
Brown composition duplex flush receptacle for plate without doors

"Spartan" Outlet Box Receptacles

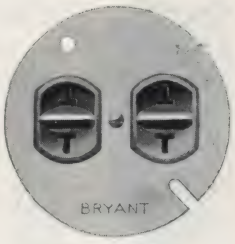
Each outlet, 15 amperes, 125 volts; 10 amperes, 250 volts. Receptacles are of brown composition and side wired.

With Black Japanned Box Covers—
No. 3760 single receptacle for 3¼-in. boxes.
No. 3761 duplex receptacle for 3¼-in. boxes.
No. 4760 single receptacle for 4-in. boxes.
No. 4762 duplex receptacle for 4-in. boxes.

With Cadmium Plated Box Covers—
No. 3780 single receptacle for 3¼-in. boxes.
No. 3781 duplex receptacle for 3¼-in. boxes.
No. 4780 single receptacle for 4-in. boxes.
No. 4782 duplex receptacle for 4-in. boxes.



No. 3780



No. 3781

Flush Lamp Receptacle and Louvre Plate

No. 427

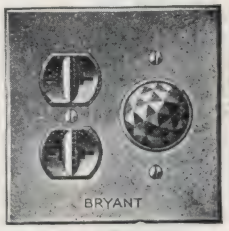
No. 427 receptacle with No. 618 125-volt lamp.
No. 627 receptacle with No. 619 32-volt lamp.
No. OL241 louvre plate for use with flush lamp receptacles.

No. OL241

Receptacle and Pilot Light Combination

10 amperes, 125 volts.

No. 763 combination of one duplex "Spartan" duplex receptacle, one pilot light, and two-gang solid plate ready wired. Device is limited by the lamp used to 125 volts. Insertion of the plug illuminates the bull's-eye.



No. 763

Brass Jewel Plates

For use with Nos. 427 or 627 receptacles.
No. OB41—.040 in. stamped.
No. OB61—.060 in. stamped.
No. OB11—Solid.

No. OB41

No. 746
Jewel
See page 68, installed in Symbol "S" Plate

Switch and Pilot Light Combinations

10 amperes, 125 volts.

Nos. 2959 and 3959

These combinations consist of one tumble switch and one pilot lamp with brass guard and .060-in. single gang brass plate, ready wired.
No. 2959 with D.P. tumbler switch.
No. 3959 with S.P. quadruple break tumbler switch.
The lamp is in circuit when the switch is "on," making this device especially adaptable for the control of cellar, garage, and other lights where a telltale is desired.

Ruby Jewels

Round, for use with "F" plates.
No. 736, solid ring.
No. 737, ventilated ring. Rectangular, for use with "S" plates.
No. 746, solid rim.

No. 737

No. 746

Continued on next page

No. 2957

No. 2989

"Spartan" Receptacle and Switch Combinations

With Switches Operating Horizontally, Porcelain Cups—*10 amperes, 125 volts; 5 amperes, 250 volts.*

No. 2957—Double pole switch, .060-in. brass plate.
No. 3957—Single pole quadruple break switch, .060-in. brass plate.
No. 2979—Double pole switch, brown bakelite plate with integral boss.
No. 3979—Single pole quadruple break switch, brown bakelite plate with integral boss.

With Switches Operating Vertically, Bakelite Cups—*10 amperes, 250 volts.*

No. 2994—Double pole switch, .060-in. brass plate.
No. 3944—Single pole quadruple break switch, .060-in. brass plate.
No. 2989—Double pole switch, brown bakelite plate with integral boss.
No. 3989—Single pole quadruple break switch, brown bakelite plate with integral boss.

With Switches Operating Vertically, Bakelite Cups—*20 amperes, 250 volts.*

No. 2995—Double pole switch, .060-in. brass plate.
No. 3995—Single pole quadruple break switch, .060-in. brass plate.
No. 2999—Double pole switch, brown bakelite plate with integral boss.
No. 3999—Single pole quadruple break switch, brown bakelite plate with integral boss.

These switches can also be furnished with transparent handles with luminous inserts. Add "BH" to catalogue number.

No. 2979

No. 2994

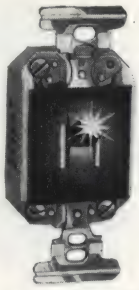
"BRYANT" FLUSH TUMBLER SWITCHES

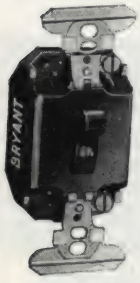
No.	Description	Amperes 125 volts	Amperes 250 volts	No.	Description	Amperes 125 volts	Amperes 250 volts
With Porcelain Cups and Plaster Ears							
Brown Composition Handles				**Locking Type**			
3951	S.P. Indicating	10	5	3951-L	S.P. Indicating	10	5
3952	D.P. Indicating	10	10	3952-L	D.P. Indicating	10	10
3952	Three-point	10	5	3953-L	Three-point	10	5
3954	Four-point	5	2	3954-L	Four-point	5	2
3955	D.P. Indicating	20	10	3955-L	D.P. Indicating	20	10
3920	S.P. Quadruple break indicating	20	10	3920-L	S.P. Quadruple break indicating	20	10
Enclosed Switches with Brown Bakelite Cups and Plaster Ears							
Brown Bakelite Handles				**Locking Type, Brown Bakelite Bosses**			
3961	S.P. Indicating	10	5	3961-L	S.P. Indicating	10	5
3962	D.P. Indicating	10	10	3962-L	D.A. Indicating	10	10
3963	Three-point	10	5	3963-L	Three-point	10	5
3964	Four-point	5	2	3964-L	Four-point	5	2
3965	D.P. Indicating	20	10	3965-L	D P. Indicating	20	10
3970	S.P. Quadruple break indicating	20	10	3970-L	S.P. Quadruple break indicating	20	10

Above switches can be furnished with transparent handles with luminous inserts, add "BH" to catalogue number; or with luminous tops on handle, add "IT" to catalogue number.

One No. 3950 key is furnished with each of above locking type switches

No. 3951


No. 3953-LT



No. 3961

No. 3964-BH

"Unigle," "Dugle" and "Trigle" Flush Tumbler Switches

These switches consist of one, two or three switches with brown bakelite handles, mounted in a single gang bakelite cup; each mechanism is rated 6 amperes, 125 volts; 3 amperes, 250 volts.

No. 2853

"Unigle" Switches—

No. 2851—S. P. indicating.
No. 2853—Three-point.

"Dugle" Switches, Common Feed—

No 2891—Two three-point.
No. 2892—Two S P indivating.
No. 2896—One S P. indicating and one three-point.

No. 2894

"Dugle" Switches, Separate Feed—

No 2893—Two three-point.
No. 2894—Two S. P. indicating.
No. 2895—One S. P. indicating and one three-point.

"Trigle" Switches, Common Feed—

No. 2860—Three S. P. indicating.
No. 2865—Two S. P. indicating and one three-point.

"Trigle" Switches, Separate Feed—

No. 2864—Three S. P. indicating.
No. 2866—Two S P. indicating and one three-point.

No. 2860

Continued on next page

Brass Flush Plates

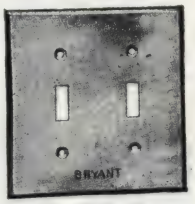
Brush brass is standard finish. These plates can be furnished in special finishes.

One-gang (Symbol "S")

Symbol "S" for Tumbler Switches—One Horizontal Row—

No. OS11—One-gang solid.
No. OS12—Two-gang solid.
No. OS13—Three-gang solid.
No. OS61—One-gang .060 in.
No. OS62—Two-gang .060 in.
No. OS63—Three-gang .060 in.
No. OS41—One-gang .040 in.
No. OS42—Two-gang .040 in.
No. OS43—Three-gang .040 in., one vertical row—tandem.
No. 3792—Two-gang solid.
No. 3793—Three-gang solid.

When ordering combination plates, specify "S" section to accommodate switches operating vertically.



Two-gang (Symbol "S")

Symbol S1, S2 and S3 for "Unigle," "Dugle" and "Trigle" Switches—

"Unigle"—Symbol S1

No. OS111—One-gang solid.
No. OS141—One-gang .040 in.
No. OS161—One-gang .060 in.

"Dugle"—Symbol S2

No. OS211—One-gang solid.
No. OS241—One-gang .040 in.
No. OS261—One-gang .060 in.

No. OS141

No. OS241

"Trigle"—Symbol S3

No. OS311—One-gang solid.
No. OS341—One-gang .040 in.
No. OS361—One-gang .060 in.

When ordering combination plates, specify "S1," "S2" or "S3" sections to accommodate "Unigle," "Dugle" or "Trigle" Switches.

No. OS341

No. OF61

Symbol "F" for Single Receptacles and Round Jewels—

No. OF11—One-gang solid.
No. OF41—One-gang .040 in.
No. OF61—One-gang .060 in.

Symbol "V" for Duplex Receptacles—

No. OV11—One-gang solid.
No. OV41—One-gang .040 in.
No. OV61—One-gang .060 in.

For combinations specify Symbols "F" or "V."

No. OV61

No. OG41

Symbol "G" Telephone Plates—

$\frac{13}{32}$-in. metal bushed hole.
No. OG11—One-gang solid.
No. OG41—One-gang .040 in.
No. OG61—One-gang .060 in.

Symbol "K" Blank Plates—

No. OK11—One-gang solid.
No. OK41—One-gang .040 in.
No. OK61—One-gang .060 in.
No. OK42—Two-gang .040 in.
No. OK62—Two-gang .060 in.
No. OK43—Three-gang .040 in.

For combinations specify Symbols "G" or "K."

One-gang (Symbol "K")

"DeLuxe" Wood Inlaid Plates—

Mahogany or circassian walnut inlay with dull bronze or dull silver metal borders.
No. OS71—One-gang, tumbler.
No. OS72—Two-gang, tumbler.
No. OS73—Three-gang, tumbler.
No. OF71—One-gang, single receptacle.
No. OV71—One-gang, duplex receptacle.
For finishes add to catalogue number:
"WB"—walnut bronze, "MB"—mahogany bronze.
"WS"—walnut silver, "MS"—mahogany silver.

No. OS71

"DeLuxe" All-metal Plates—

Made of genuine bronze or nickel silver.
No. OS71B—One-gang, tumbler.
No. OS72B—Two-gang, tumbler.
No. OS73B—Three-gang, tumbler.
No. OF71B—One-gang, single receptacle.
No. OV71B—One-gang, duplex receptacle.
For metals desired, add to catalogue number:
"DB"—dull bronze, "DS"—dull silver.
Polished finishes are not recommended.

No. OV71-B

Three-wire Polarized Receptacles

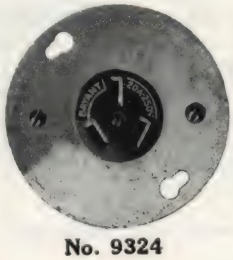
15 amperes, 125 volts.
10 amperes, 250 volts.
No. 9116—Composition flush receptacle.
No. 9117—Porcelain flush conduit box receptacle.
No. 9119—Porcelain concealed base receptacle.
No. 9120—Composition flush receptacle. Grounding terminal connected to the yoke.

20 amperes, 250 volts.
No. 9326—Porcelain flush receptacle.
No. 9325—Porcelain concealed base receptacle.
No. 9324—Receptacle with cadmium plated cover for 4-in. outlet boxes.

No. 9116

No. 9326

No. 9117


No. 9324

Nos. 9119 and 9325

Continued on next page

Molded Brown Bakelite Flush Plates

"Templus" Plates

Stipple finished, furnished complete with bakelite headed screw, except "V" plates which take metal screws finished to match the plates.

No. OS51

No. OSF52

For Tumbler Switches—
No. OS51—One-gang.
No. OS52—Two-gang.
No. OS53—Three-gang.
No. OS54—Four-gang.

No. OS251

No. OS351

For "Dugle" and "Trigle" Switches—
No. OS251—One-gang "Dugle."
No. OS351—One-gang "Trigle."

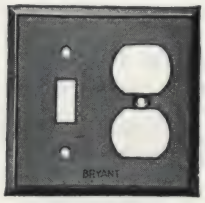
No. OS54

For Single Receptacle and Round Jewel — No. OF51—One-gang.

For Duplex Receptacle — No. OV51—One-gang.

Telephone Plate —No. OG51 — One-gang, $\frac{13}{32}$-in. hole.

No. OF51



No. OSV52

For One-Tumbler Switch and Single Receptacle—No. OSF52—Two-gang.

For One-Tumbler Switch and Duplex Receptacle — No. OSV52 — Two-gang.

No. OV51

No. OK52

Blank Plates — No. OK51 — One-gang.
No. OK52—Two-gang.

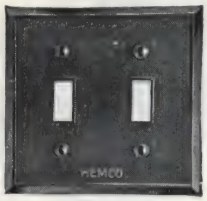
Bell Push Plates —No. OT51 — One-gang, $\frac{5}{8}$-in. hole. Can also be furnished in two gangs.

"Hemco" Plates

Ribbed finish, furnished complete with bakelite-headed screws, except "V" plates, which take metal-headed screws finished to match the plates.

For Tumbler Switches—
No. HS31—One-gang.
No. HS32—Two-gang.
No. HS33—Three-gang.
No. HS34—Four-gang.
No. HS35—Five-gang.
No. HS36—Six-gang.

No. HS31



No. HS32

For "Dugle" and "Trigle" Switches—No. HS231 — One-gang "Dugle."
No. HS331 — One-gang "Trigle."

No. HS231

No. HS331

For Flush Receptacles—
No. HF31—One-gang, single.
No. HV31—One-gang, duplex.

Telephone Plates — No. HG31—One-gang, $\frac{13}{32}$-in. hole.
No. HX132 — Two-gang with one $\frac{13}{32}$-in. hole in center.
No. HX232 — Two-gang with two $\frac{13}{32}$-in. holes in center in tandem position.

No. HK31

No. HF31

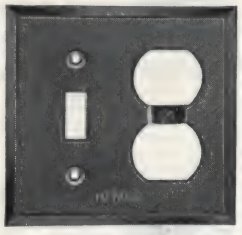
Radio Jack Plates — No. HO31 — One-gang, 37/64-in. hole. Also fits Western Electric Telephone Jack Receptacle No. 367.
No. HO231—One-gang, $\frac{7}{16}$-in. hole.

No. HV31

No. HG31

Combination Plates — No. HKV32—Two-gang, 1 blank and 1 duplex receptacle.
No. HSF32—Two-gang, tumbler switch and single receptacle.
No. HSV32—Two-gang, tumbler switch and duplex receptacle.
No. HSSV32—Three-gang, 2 tumbler switches and 1 duplex receptacle.

Blank Plates—
No. HK31—One-gang.
No. HK32—Two-gang.



No. HSV32

No. 2355

"Perkins" Self-restoring Door Switches

6 amperes, 125 volts; 3 amperes, 250 volts.
These switches are furnished complete with brass plates, brass strike plates and outlet boxes with knockouts for both armored cable and rigid conduit.
No. 2355 switch is "on" when door is open.
No. 2356 switch is "off" when door is open.

Receptacle and Pilot Lamp Combination

10 amperes, 125 volts

No. 5121—Single-gang, with .060-in. brass plate and porcelain cup. The insertion of the plug lights the lamp.

No. 5121

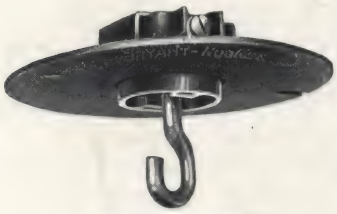
Continued on next page

"HooKeX" Receptacle and Cap

15 amperes, 125 volts—10 amperes, 250 volts

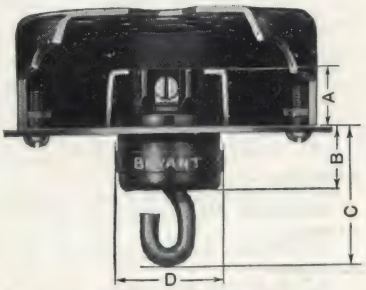
This receptacle fits standard 4-in. outlet boxes and with the cap, provides a means of hanging ceiling lighting units which eliminates soldered joints and makes the fixtures easily removable for transfer or cleaning. May be used either with or without fixture canopies.

No. KX-3744—Receptacle and cap complete.
No. KX-3745—Receptacle only.
No. KX-3746—Cap only.



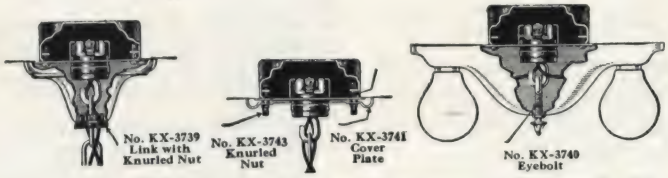
No. KX3745

No. KX3746



Installation of KX3744 in Standard 4-in. Outlet Box

A = 7/8 in. C = 1 5/8 in.
B = 3/4 in. D = 1 7/16 in.



Methods of Ceiling Unit Suspension, Using "HooKeX"

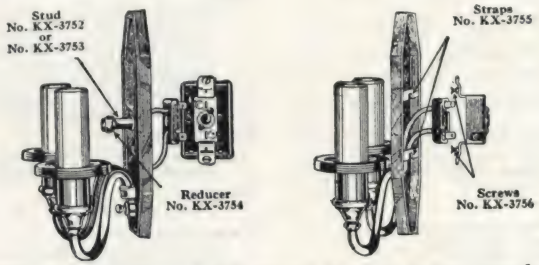
"KeNex" Brown Bakelite Polarized Cap and Receptacle

15 amperes, 125 volts—10 amperes, 250 volts

This receptacle will fit any standard switch box and affords a means of attaching wall fixtures so that they are as easily removable as a picture. Soldered joints are eliminated, all connections being made with bending screws.

No. KX-3749—Receptacle and cap complete.
No. KX-3750—Receptacle only.
No. KX-3751—Cap only.

No. KX3750



Illustrating Use of "KeNex" Cap and Receptacle

No. KX3751

"Diple" Brown Bakelite Thru-Hook Connector

15 amperes, 125 volts—10 amperes, 250 volts

This device provides a means of hanging and making portable various types of ceiling units, facilitating removal for cleaning or replacement.

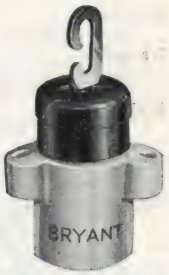
No. DL-270—Connector complete.
No. DL-271—Body only.
No. DL-272—Cap only.

No. DL270

"Diple" Connector Sockets

No. DL-1359—Porcelain body, brown bakelite connector, 660 watts.

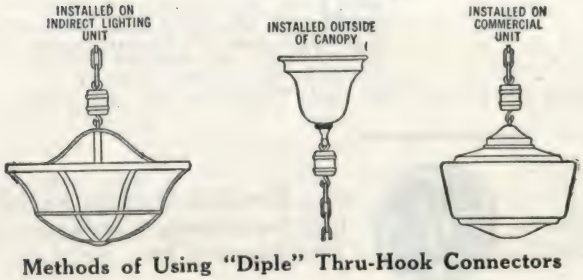
No. DL-1360—Porcelain body, brown bakelite connector, 1500 watts.



No. DL1359

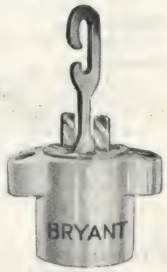
No. DL271

No. DL272



Methods of Using "Diple" Thru-Hook Connectors

Operation of "Diple" Connector Socket



No. DL1359
Connector with body separated

GENERAL ELECTRIC COMPANY

Manufacturers of Wiring Materials

MERCHANDISE DEPARTMENT

BRIDGEPORT, CONN.

GENERAL ELECTRIC MERCHANDISE DISTRIBUTORS

Alabama
BIRMINGHAM, Matthews Electric Supply Co.
MOBILE, Matthews Electric Supply Co.

Arizona
PHOENIX, General Electric Supply Corp.

Arkansas
LITTLE ROCK, General Electric Supply Corp.

California
LONG BEACH, General Electric Supply Corp.
LOS ANGELES, General Electric Supply Corp.
OAKLAND, General Electric Supply Corp.
SACRAMENTO, General Electric Supply Corp.
SAN DIEGO, General Electric Supply Corp.
SAN FRANCISCO, General Electric Supply Corp.

Colorado
DENVER, Hendrie & Bolthoff Manufacturing & Supply Co.
DENVER, General Electric Supply Corp.

Connecticut
BRIDGEPORT, Southern New England Elec. Co.
HARTFORD, Southern New England Elec. Co.
NEW HAVEN, Southern New England Elec. Co.
WATERBURY, Southern New England Elec. Co.

District of Columbia
WASHINGTON, National Electrical Supply Co.

Florida
JACKSONVILLE, General Electric Supply Corp.
MIAMI, General Electric Supply Corp.
TAMPA, General Electric Supply Corp.

Georgia
ATLANTA, General Electric Supply Corp.
SAVANNAH, General Electric Supply Corp.

Illinois
CHICAGO, General Electric Supply Corp.
CHICAGO, Commonwealth Edison Co.
CHICAGO, Metropolitan Electrical Supply Co.
QUINCY, Crescent Electric Supply Co.
ROCKFORD, Swords Electric Company
SPRINGFIELD, General Electric Supply Corp.

Indiana
EVANSVILLE, General Electric Supply Corp.
FORT WAYNE, Protective Electrical Supply Co.
INDIANAPOLIS, General Electric Supply Corp.
SOUTH BEND, South Bend Electric Company

Iowa
BURLINGTON, Crescent Electric Supply Company
DAVENPORT, Crescent Electric Supply Company
DES MOINES, General Electric Supply Corp.
DUBUQUE, Crescent Electric Supply Company
SIOUX CITY, General Electric Supply Corp.

Kansas
SALINA, General Electric Supply Corp.
WICHITA, Sutton Electric Supply Company

Kentucky
LOUISVILLE, General Electric Supply Corp.

Louisiana
NEW ORLEANS, General Electric Supply Corp.
SHREVEPORT, General Electric Supply Corp.

Maine
BANGOR, General Electric Supply Corp.
PORTLAND, General Electric Supply Corp.

Maryland
BALTIMORE, General Electric Supply Corp.

Massachusetts
BOSTON, General Electric Supply Corp.
NEW BEDFORD, Union Electric Supply Co.
PITTSFIELD, Mountain Electric Supplies Co.
SPRINGFIELD, General Electric Supply Corp.

Michigan
DETROIT, Frank C. Teal Company
DETROIT, General Electric Supply Corp.
GRAND RAPIDS, C. J. Litscher Electric Company
JACKSON, C. J. Litscher Electric Company
KALAMAZOO, C. J. Litscher Electric Company

Minnesota
DULUTH, General Electric Supply Corp.
MINNEAPOLIS, General Electric Supply Corp.
ST. PAUL, General Electric Supply Corp.

Mississippi
JACKSON, General Electric Supply Corp.

Missouri
JOPLIN, General Electric Supply Corp.
KANSAS CITY, General Electric Supply Corp.
ST. JOSEPH, General Electric Supply Corp.
ST. LOUIS, General Electric Supply Corp.

Montana
BUTTE, General Electric Supply Corp.

Nebraska
OMAHA, General Electric Supply Corp.

New Jersey
ATLANTIC CITY, General Electric Supply Corp.
JERSEY CITY, General Electric Supply Corp.
NEWARK, General Electric Supply Corp.
NEWARK, E. B. Latham & Co.
PATERSON, General Electric Supply Corp.

New York
ALBANY, Havens Electric Company
BINGHAMTON, Southern Tier Electrical Supply Co.
BUFFALO, The Falls Equipment Co.
NEW ROCHELLE, Royal Eastern Electrical Supply Co.
NEW YORK, General Electric Supply Corp.
(Also Borough of Brooklyn and the Bronx)
NEW YORK, E. B. Latham & Company
NEW YORK, Royal Eastern Electrical Supply Co.
(Also Borough of Brooklyn and Long Island City)
NIAGARA FALLS, The Falls Equipment Co.
ROCHESTER, General Electric Supply Corp.
SYRACUSE, Syracuse Supply Company
UTICA, Langdon & Hughes Electric Co.

North Carolina
CHARLOTTE, General Electric Supply Corp.
GREENSBORO, National Electrical Supply Co.
RALEIGH, General Electric Supply Corp.

North Dakota
FARGO, General Electric Supply Corp.

Ohio
AKRON, General Electric Supply Corp.
CINCINNATI, General Electric Supply Corp.
CLEVELAND, General Electric Supply Corp.
COLUMBUS, General Electric Supply Corp.
DAYTON, General Electric Supply Corp.
DAYTON, Wm. Hall Electric Company
TOLEDO, General Electric Supply Corp.

Oklahoma
OKLAHOMA CITY, General Electric Supply Corp.
TULSA, General Electric Supply Corp.

Oregon
PORTLAND, General Electric Supply Corp.

Pennsylvania
ERIE, General Electric Supply Corp.
PHILADELPHIA, General Electric Supply Corp.
PITTSBURGH, General Electric Supply Corp.
SCRANTON, General Electric Supply Corp.

Rhode Island
PROVIDENCE, Union Electric Supply Co.

South Carolina
COLUMBIA, Perry-Mann Electric Co.

Tennessee
CHATTANOOGA, General Electric Supply Corp.
KNOXVILLE, General Electric Supply Corp.
MEMPHIS, General Electric Supply Corp.
NASHVILLE, General Electric Supply Corp.

Texas
ABILENE, General Electric Supply Corp.
AMARILLO, General Electric Supply Corp.
DALLAS, General Electric Supply Corp.
EL PASO, General Electric Supply Corp.
HOUSTON, General Electric Supply Corp.
SAN ANTONIO, General Electric Supply Corp.

Utah
SALT LAKE CITY, General Electric Supply Corp.

Virginia
NORFOLK, General Electric Supply Corp.
RICHMOND, General Electric Supply Corp.

Washington
SEATTLE, General Electric Supply Corp.
SPOKANE, General Electric Supply Corp.
TACOMA, Home Electric Company

West Virginia
CHARLESTON, Virginian Electric Inc.
WHEELING, Gee Electric Company

Wisconsin
APPLETON, G-Q Electric Company
LACROSSE, General Electric Supply Corp.
MADISON, Crescent Electric Supply Co.
MILWAUKEE, G-Q Electric Company
RACINE, G-Q Electric Company

For General Office, Sales Offices, Service Shops, and Associated Companies, see our pages on Motors

Products

G-E Wiring System, G-E Wiring Devices, Code Wires, Conduit and Fittings, Fiber Duct.

For G-E Electric Refrigerators, Floodlighting, Generators, Converters, Motors, Controllers, Switchboards, etc., see Manufacturers' Index.

Continued on next page

G-E Wiring System

GENERAL ELECTRIC WIRING SYSTEM

The General Electric Wiring System is a system of wiring, embodying adequate outlets conveniently controlled, and using General Electric materials throughout.

G-E Wiring System recommendations for adequate wiring in residences and in the living quarters of apartment houses and apartment hotels are as follows:

Provide Individual Panel Boards—For each apartment or suite. Locate at an accessible point in the service quarters. This recommendation is made so that the occupant may promptly and conveniently re-establish service after an overload.

Provide One Spare Circuit—In the cutout cabinet for every five circuits or less in use. This is for future extensions which cannot be anticipated.

Provide a Lighting Outlet—For each 50 square feet of floor space in rooms having an area of less than 250 square feet. In rooms having an area of 250 square feet or more provide one lighting outlet for every 60 square feet of floor space. These should be divided between ceiling lights and wall lights to provide both general illumination and decorative lighting according to the character of the room. The purpose of this recommendation is to provide for even illumination free from glare. Closets should be included in determining areas and allotting light outlets.

Provide a Twin Convenience Outlet—For every 50 square feet of floor space. The purpose of this recommendation is to provide for the convenient use of portable lamps and appliances regardless of the furniture arrangement; and to provide for present and future developments in such devices as electrically operated phonographs, household motion-picture projection machines, radio sets, etc.

Combination Switch, Pilot Lamp and Convenience Outlet Units—Should be provided in kitchens, laundries, breakfast nooks and other service rooms for the connection and control of heating appliances. The purpose of this recommendation is to provide for a convenient means of controlling heating devices such as flat irons, ironing machines, toasters, etc., without necessitating the constant removal and replacement of the connecting plugs.

Switch Control Should Be Accessible at Every Doorway—Passage through any room and any doorway should be as convenient at night as it is during the day. The inconvenience of groping in the dark for inconveniently located switches is a common experience resulting from the mission of a sufficient number of points of control.

Fan Outlets—Should be provided in the principal living rooms. Finding a suitable place for the electric fan is always a seasonal problem in homes and more particularly in apartments. The purpose of this recommendation is to help in the solution of this problem by providing a place for the suspension of the electric fan which is both safe and convenient; and a place which can be located so as to provide the best circulation of air without regard for the location of furniture and furnishings.

Electrical Specifications for G-E Wiring System

The electrical contractor shall furnish and install the G-E Wiring System complete from the lighting company's service to all outlets; locating all outlets as indicated on the drawings.

The electrical contractor shall do all necessary cutting, trenching and filling (the words "trenching and filling" should be omitted where work of this character is not required) for the installation of his work.

The electrical contractor shall leave his work ready for the lighting company to connect to, doing all work required by their rules.

The work shall conform to the rules of the "National Electrical Code" and the local regulations governing electrical installations.

All necessary certificates shall be obtained by the electrical contractor at his expense and delivered to the architect before work is accepted.

The electrical contractor shall guarantee to make good any defects in his work which shall develop within one year of date of acceptance.

The electrical contractor shall furnish and install a complete bell system, locating bells and buzzers as indicated on the drawings. The bell system shall be operated by a bell-ringing transformer feeding from a separate circuit on the lighting distribution panel. All bells, buzzers, and push buttons shall be of high grade as approved.

The electrical contractor shall furnish and install single outlet telephone plates mounted on switch boxes at telephone outlets indicated on the drawings and run conduit to cellar from each outlet. This work shall be done in a manner acceptable to the telephone company.

Outlets shall be located as follows:

Wall light outlets: 5 ft. 6 in. above finished floor to center of outlet.

Wall switches: 4 ft. above finished floor to center of outlet.

Convenience outlets in kitchen, laundry, basement and garage, and in combinations: 4 ft. above finished floor to center of outlet.

Convenience outlets in all other locations: in baseboard, mounted horizontally.

Telephone outlets: in baseboard, mounted horizontally.

Elexit fan outlets: 6 ft. 6 in. from floor to center of outlet.

All flush plates shall be finished as directed by the architect.

Bids shall be submitted in duplicate on G-E Wiring System proposal forms.

Exceptions and Additions—*Note:* Supplementary paragraphs to cover local conditions and special applications can be introduced into these specifications under this caption.

Continued on next page

WIRES AND CABLES

G-E Code Wire—600 Volts

Code Wires and Cables Braided—Furnished in sizes 14 to 2,000,000 cm. with thickness of insulation, depending upon size conductor, from 3/64 to 8/64 in. in three standard grades, Code, Intermediate and 30%, and special grades on order.

Code Wires and Cables Leaded—Furnished in same sizes and thicknesses of insulation as braided and same grades of insulation except lead covered instead of braid.

Parallel Lamp Cord—Type PO—For use as pendent cord or portable on small devices in dry places. Consists of two flexible stranded copper conductors, each wound with cotton, rubber insulated and braided; conductors are then laid parallel, and a braid of cotton or rayon is applied over all.

Reinforced Portable Cord—Type P (Glazed Cotton or Rayon); Type P-WP (Cotton Weatherproofed)—Consists of pair of stranded copper conductors, each covered with a winding of fine cotton, rubber insulation, and cotton braid, both twisted together. A reinforcement of rubber is placed over the twisted pair, and a cotton, rayon or weatherproof braid over all.

Sizes, 10 to 18 B&S gauge. Sizes smaller than No. 18—not approved by Underwriters.

Cotton and rayon finish, for use as pendent cord, or portable for hard usage in dry places; weatherproof finish for use in damp places. Sizes No. 18 with 1/64 in. insulation is approved for use on portable lamps only.

Special Portable Cord—Type PD—For use in places where not liable to rough usage. Consists of two flexible stranded copper conductors, each wrapped with cotton braided; conductors are then twisted together and a glazed cotton or silk braid is applied over all.

Sizes, 10 to 18 B&S gauge.

G-E Flex Portable Cord, All-Rubber Reinforced—

Type S—Flexible stranded copper, cotton wrap. Each conductor is insulated with 30% rubber and over this is applied a heavy jacket using high percentage of pure rubber. Particularly recommended for hard service in dry or damp places. Suitable for use in garages and industrial service in general.

Type SJ—Same construction as Type S except that it has a lighter over-all rubber jacket and is suitable for service less severe than Type S.

Type SJ-Jr—Same construction as Type SJ except that the over-all rubber jacket is lighter. This cord is suitable for use on floor lamps, adding machines, calculators and dictating machines.

G-E Flex Special—A low priced all-rubber cord of the steam-cured type. Similar to SJ in construction. Suitable for use on cleaners, washing machines, floor polishers and similar devices where the service is not severe.

Portable Cord—Type K—Conductors are flexible stranded copper, with cotton wrap, rubber insulation and weatherproof cotton braid on each. Two conductors are twisted together with jute filler and double weatherproof braid applied over all. For use as pendent or portable in damp places.

Deck Cable—For use in very damp places and where subject to very rough usage. Consists of two stranded copper conductors, each covered with a winding of cotton, rubber insulation and a cotton braid; conductors are then twisted, and filled with jute. A jacket of 3/32 in. rubber compound is applied over all, and finished with a single weatherproofed cotton braid. Sizes, 10 to 18 B&S gauge.

Deltabeston Wire and Cord—Asbestos Insulated

Deltabeston wires and cords are suitable for service where wires are subjected to very high temperatures.

Deltabeston insulation consists of pure asbestos fiber applied in the fibrous state, resulting in a thoroughly felted wall completely surrounding the conductor without the openings found where braided yarn is used. It is impregnated and completely filled with a special non-inflammable compound which increases the dielectric strength and makes the insulation cling tenaciously to the conductor. This insulation is fireproof—it will resist temperatures as high as the fusing temperature of the copper conductor, and further, it is so tough that it will not crack when the wire is sharply bent. Its use is an assurance against burnouts and other troubles.

All Deltabeston wires are approved by the Underwriters' Laboratories, Inc.

Deltabeston Stove Wire—Recommended for wiring electric stoves and ranges in and around ovens, boiler rooms and similar places where excessive moisture is not present.

Standard color of finish is white, but black can be supplied, if desired, at same price. Made in sizes 18 to 6 B&S gauge.

Deltabeston Heater Cord—Used in connecting electric stoves, heaters, irons and other heating appliances where the cords are likely to be exposed to high temperatures.

Made in the following types: Style A, with asbestos braid over all; Style C, with glazed cotton braid over all; Style D, with glazed cotton braid on each conductor; Style E, with glazed cotton braid on each conductor and glazed cotton braid over all. Any of these types can be furnished with braided instead of standard wire, at additional cost. Made in sizes No. 18 to 12 B&S gauge.

Deltabeston Switchboard Wire—Furnished all-asbestos insulated, sizes 18 to 4/0 B&S gauge for pressures up to 600 volts; varnished cambric and asbestos insulated with flameproof cotton braid in sizes 14 to 6 B&S gauge for pressures up to 750 volts; and varnished cambric and asbestos insulated with asbestos braid in sizes 18 to 4/0 B&S gauge for pressures up to 1500 volts.

Approved by the Underwriters' Laboratories, Inc.

Deltabeston Fixture Wire (Plain)—Recommended for all classes of fixture wiring; especially suitable for fixtures in which temperatures liable to be attained by some parts are such as to render the use of rubber covered wires or cords either undesirable or impracticable. Smooth and flexible—may be fished through fixtures with utmost ease. Standard color of finish is black. Gray, cream, old brass, or bronze finishes cost extra. Sizes, 18 to 10 B&S gauge.

Delabeston Cotton or Art Silk Covered Fixture Wire—Same as plain, black finish fixture wire described above with an additional outer covering of art silk or cotton. Especially suited for fixtures on which wiring is exposed to view. Small diameter; neat and attractive in appearance. Furnished in single, two and three conductors in the various styles. Sizes, 18 to 12 B&S gauge.

Deltabeston Motion Picture Machine Cable—Widely used for wiring of searchlights, railway controllers, cranes, motion picture projectors and other devices in which wires are subjected to high temperatures. Flexible and extra flexible types.

Continued on next page

CONDUIT AND FITTINGS

Rigid Conduit

G-E White (Greenfielduct)—A mild steel, hot dipped galvanized conduit for permanent installations. Thoroughly protected inside and outside against rust. Supplied in straight lengths and elbows cut and threaded, and with couplings accurately drilled and tapped.

G-E Black (Sprague duct)—Made from exactly the same high-grade steel, pickeled, cleaned, straightened and threaded same as Greenfielduct except that it is protected by a coating of corrosion-resistant black enamel instead of zinc.

Flexible Conduit

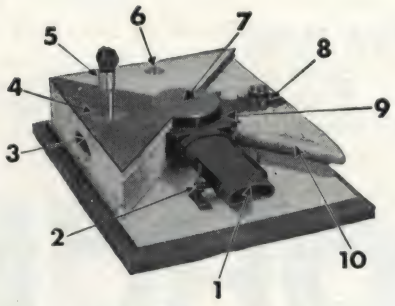
Galvanized Flexible Steel Conduit—Single-strip and double-strip types; extremely flexible; smooth interior surface for pulling conductors. There is practically no waste when this conduit is used, as all short pieces can be clamped together by couplings.

This conduit is manufactured in sizes $\frac{5}{16}$ to 3 in.

Single Strip Conduit

Fiberduct

A non-corrodible raceway for underfloor wiring designed to allow flexibility of wiring for the life of the building. It is flexible in that it allows the establishment of outlets when and where they are desired. Consists of the duct, junction boxes, couplings, supports and outlets for single or double duct installations.



(1) G-E Fiberduct.
(2) Coupling-support with leveling screws.
(3) Oval crown 1 in. below surface molds strong concrete arch.
(4) Brass floor flange flush with linoleum.
(5) Lighting outlet, brass standpipe, bakelite head.
(6) Brass insert; grouted—cannot pull out.
(7) Adjustable-height cover recessed for linoleum.
(8) Brass insert threads into duct.
(9) Heavy, one-piece iron junction box with leveling screws.
(10) Conduit for feeder lines.

"BX" Flexible Steel Armored Conductors

G-E "BX" is manufactured in a variety of sizes, No. 14 and larger, 2 and 3-conductor. Each coil is furnished with a quantity of "Anti-Short" bushings which furnish addition protection at the point where the armor is cut.

We also manufacture and carry in stock Type "BXL" for use in damp places. In the construction of "BXL" a continuous lead sheath is applied under the steel armor.

BraidX Non-metallic Sheathed Cable

BraidX is G-E code wire (2 or 3-wire and sizes No. 14 to 6) compactly enclosed in a fire-resisting, waterproof, non-metallic sheath of high insulating quality. BraidX should be installed in continuous runs from outlet to outlet, with no taps except at outlets. In no case is an insulating support required for BraidX.

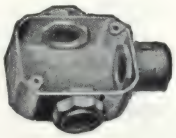
Two-wire Conductor for BraidX

Spraguelets (Conduit Bodies)

Three drawn steel electro-galvanized bodies (SP48241 Branch Spraguelet, SP14241 Shallow Spraguelet and SP34461 Deep Spraguelet) and two interchangeable couplings, together with a simplified line of covers, constitute the entire list of Spraguelet parts from which approved rigid conduit bodies can be readily made up for every purpose.

SP48241
Branch Spraguelet

SP14241
Shallow Spraguelet



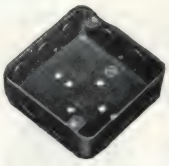
SP34461
Deep Spraguelet

SP1410
½-in. Coupling

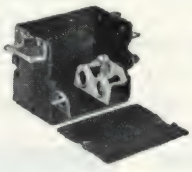
SP1420
¾-in. Coupling

Boxes and Fittings for Conduit, BX and BraidX

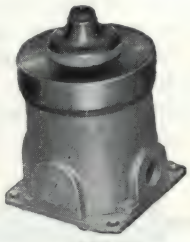
For use with the above we manufacture a complete line of boxes, covers and fittings including locknuts and bushings, connectors, ground clamps, fixture studs, entrance fittings, etc. Illustrations of a number of these items are shown below. Complete listing and illustrations will be found in Merchandise Department Catalogue GEA-604A.



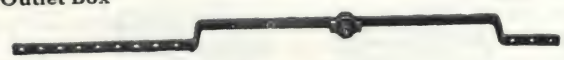
SP52151
4-in. Square Outlet Box



SP6972
For "BX"



SP8400
Adjustable Floor Box



Bar Hanger

SP1493
Entrance Ell

SP1611
Conduit Insulet

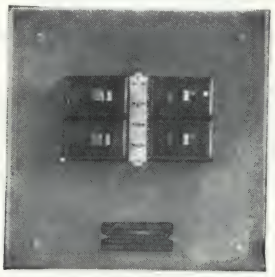
Continued on next page

PANELBOARDS, FUSES, SWITCHES AND FLUSH PLATES

Circuit Breaker Panelboards

For residential purposes only. Catalogue No. GE2806—4 circuit; Catalogue No. GE287—6 circuit. Each unit rated 15 amperes, 125 volts, 25-60 cycles or d-c.

G-E Automatic Circuit Breaker Panelboards provide protection for four or six circuits. They are approved for use in place of branch circuit fuse panels, bringing the greatest convenience to the user in the home.



Catalogue No. GE2806
Four Circuit
(Approximately ⅛ actual size)

The handle indicates by its position when the breaker has opened. All that is necessary to re-establish the circuit is to move the handle to the "on" position.

These panels are standard 3-wire mains—2-wire circuits. One side of each circuit is connected through the breaker. A connecting bus bar can be supplied to convert the panel for 2-wire mains. An index plate is provided for designation of the separate circuits.

National Electrical Code Standard.

Standard Wiring Symbol—▬

Fuses

Non-indicating, indicating and renewable cartridge fuses. Plug fuses.

Cartridge fuse elements 99.9 per cent pure zinc calibrated to within .0005 in., insuring uniform accuracy and dependable protection.

Fibre casings withstand most severe internal pressures insuring ample protection against fire resulting from exploding fuse casings.

Plug fuses have *Pyrex transparent tops, insuring quick detection of blown fuses. All connections made mechanically insuring freedom from open circuiting as a result of acid corrosion.

Sizes—Cartridge fuses: 1 to 600 amperes, 250 and 600 volts. Plug fuses: 3, 6, 10, 12, 15, 20, and 30 amperes, 125 volts.

How to Specify—All cartridge and plug fuses shall be of General Electric manufacture.

Local Switches

Tumbler. Black or brown handles. Porcelain (GE1688 type) and genuine textolite (GE2588 type) boxes. Single pole; double-pole, 10 and 20 amperes; three-way; four-way.

GE1688
Black Handle
GE2513
Brown Handle

A sturdy but inconspicuous self-indicating genuine textolite handle is employed. Operates with the sweep of the finger, arm or elbow.

GE2588
Black Handle
GE2591
Brown Handle

Positive-start, quick-make-and-break mechanism assures smooth and positive operation and freedom from freezing or burning of contacts.

Flexible phosphor bronze contact springs of ample size insure long service without heating.

Specially tested steel music wire actuating springs.

Wide mounting ears lie directly against the plaster, assuring perfect alignment of the switch with the wall. No makeshifts, such as washers or shims, necessary.

Genuine textolite box switches are totally enclosed and are almost noiseless. Particularly suitable for use in bedrooms. Designed especially for high grade installations.

When to Specify—Porcelain switches will meet most conditions satisfactorily but in installation requiring materials of unusual excellence, the genuine textolite type is the logical selection.

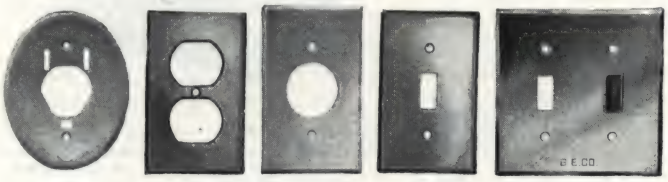
How to Specify—All flush switches shall be of General Electric manufacture, Cat. No. (*) type.

Standard Wiring Symbols—Single-pole, S^1, Double-pole, S^2. Three-way, S^3. Four-way, S^4. Combination of single-pole and pilot lamp, S^P. Combination of three-way and pilot lamp, S^{3P}. Combination of single-pole, pilot and convenience outlet, S^P ⊖—.

Flush Plates

Brass and genuine textolite.

Brass plates are made of clear new brass, free from all blemishes and streaks. Bevels are sharp and clean cut. Combination plates with any arrangement of units can be supplied.



Brush brass is the standard finish but special finishes can be supplied.

Genuine textolite plates are made in both stippled black and in stippled brown finishes. Bevels are polished.

Non-corrosive, substantial and tasteful.

Sizes—Brass plates. 0.040-in., 0.060-in. and 0.100-in. thickness.

Genuine textolite plates, 0.060 in. supported by heavy ribs.

When to Specify—Specify genuine textolite plates in all moist climates and locations.

In selecting brass plates 0.000-in. metal is most satisfactory.

0.040 metal is the lowest gauge permitted by the National Electrical Code.

How to Specify—All flush plates shall be (†) gauge brass (‡) finish and of General Electric manufacture.

All flush plates shall be (§) genuine textolite and of General Electric manufacture.

*Reg. U. S. Pat. Office

*Insert catalogue number of type desired such as GE1688 or GE2588.
†Insert gauge selected: 0.040, 0.060 or 0.100.
‡Insert finish.
§Insert color—black or brown.

Continued on next page

OUTLETS AND RECEPTACLES

Convenience Outlets

Side wired. Top wired.

High heat compound, either black or brown. Heavy phosphor bronze contact springs.

GE2257 Black
GE2535 Brown

GE658 Black
GE2533 Brown

GE2258 Black
GE2536 Brown

GE694 Black
GE2534 Brown

Double T slots. Designed to provide ample wiring room and reduce the possibility of accidental grounds.

Top-wired types equipped with wide mounting ears which rest directly against the plaster. Eliminates end for washers or shims.

Side-wired types less substantial and of competitive grades.

Capacity—10 amperes, 250 volts, 15 amperes, 125 volts.

When to Specify—Specify top-wired types when the most substantial construction is desired, and side-wired types when low first cost is paramount.

Use single types for mounting in combination with switches or pilot lamp receptacles—and twin types for all other purposes requiring a capacity of 10 amperes, 250 volts or less.

How to Specify—All single convenience outlets shall be of General Electric manufacture, Cat. No. (*) type, 10 amperes, 250 volts.

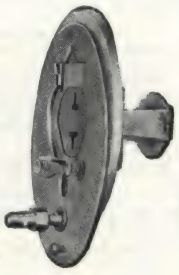
All twin convenience outlets shall of General Electric manufacture, Cat. No. (*) type, 10 amperes, 250 volts.

Standard Wiring Symbols—Single convenience outlets ⊖. Twin convenience outlets $\ominus_2$.

Fan Outlets

Elexit.

Double T slot. A convenience outlet when not in use for fan suspension. Rigidly locks fan in place. Fan hanger plate accommodates all makes of fans.



Rating—10 amperes, 250 volts; 15 amperes, 125 volts.

How to Specify—All fan outlets shall be fan hanger of General Electric manufacture.

Standard Wiring Symbol— (L) (X)

Heavy Duty Flush Plug Receptacles

Two-pole and 3-pole; polarized. Porcelain and composition.

High capacity bronze contacts.

Capacities—20 amperes, 250 volts; 30 amperes, 250 volts; 60 amperes, 125 volts.

*Insert catalogue number of type desired.

When to Specify—When current consuming devices (such as platewarmers, electric ovens, electric stoves and medium size ranges) of a rated capacity larger than 15 amperes, 125 volts are to be used, separate cutout cabinets, circuits and heavy duty plug receptacles are necessary.

GE1367
20 Amp.—250 Volt

GE996
30 Amp.—250 Volt

How to Specify—All heavy duty flush plug receptacles be of proper capacity and of General Electric manufacture.

Standard Wiring Symbol—(▲)

Pilot Lamp Receptacles

Freely ventilated. Lower current consumption. Lamp can be renewed without removing the plate. Used with Cat. No. GE2823 brown textolite flush plate with dome.

GE2822
Pilot Lamp

Rating—Two-candlepower, 125 volts.

How to Specify—All pilot lamp receptacles shall be Cat. No. GE2822 of General Electric manufacture.

Standard Wiring Symbol—P.

One-light Lampholders

Keyless and pull. Brass shell and porcelain.

Rating—Pull, 250 watts, 250 volts. Keyless, 660 watts, 250 volts.

When to Specify—When inexpensive lampholders are required for inconspicuous locations such as closets, pantries, service hallways, etc., specify one-piece lampholders using porcelain types in damp locations.

How to Specify—One-light lampholders shall be porcelain in damp locations and brass shell elsewhere and of General Electric manufacture.

One-light keyless lampholders controlled by wall switches shall be Cat. No. GE088 and Cat. No. GE264.

One-light pull lampholders shall be Cat. No. GE2565 and Cat. No. GE721.

Standard Wiring Symbols—

Ceiling Pull (R) Wall Pull (R) Ceiling Keyless (R) Wall Keyless (R)

HARVEY HUBBELL, INC.

Manufacturers of Electrical Specialties

MAIN OFFICE AND FACTORY
BRIDGEPORT, CONN.

BRANCH OFFICES
ATLANTA, GA., H. C. Biglin, 138 Marietta Street
BOSTON, MASS., 176 Federal Street
CHICAGO, ILL., 318 W. Washington Street
NEW YORK, N. Y., 122 E. 42nd Street
SAN FRANCISCO, CAL., Garnett Young & Co., 390 Fourth Street

Product—N. E. C. Standard

Approved Electrical Specialties and Wiring Devices to meet every requirement, including Hubbell "Screwless" Bakelite Plates; "Uniplex," "Duplex" and "Triplex" Switches; "Switch-Taps"; Convenience Outlets, Two, Three and Four-wire Polarized Flush Receptacles; "Twist-Lock" Devices; and other Electrical Specialties of a like nature.

Hubbell Quality

"A Reputation for Making Wiring Devices Better Than Good Enough."

A reputation has become attached to Hubbell Wiring Devices which credits them with being made better than "good enough." Ordinary standards do not satisfy Hubbell. After code requirements are met, Hubbell continues to test and perfect until a device is as good as the finest materials, skilled workmanship and nearly forty years of experience in manufacturing electrical wiring devices can make it.

This extra measure of quality put into Hubbell Wiring Devices not only benefits the user, but protects the reputation of the specifying architect. Hubbell Electrical Specialties and Wiring Devices can be secured through electrical supply houses or distributors throughout the world.

HUBBELL SHALLOW FLUSH TOGGLE SWITCHES

Hubbell All-bakelite Enclosed Shallow Flush Toggle Switches

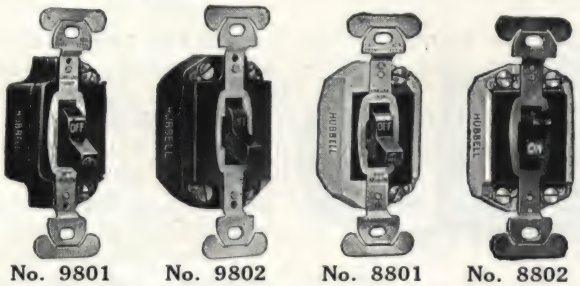
Particularly recommended for the better class of installations, this new switch has the following noteworthy features:

Electrically and mechanically perfect in design, "approved."

A radically new form of contact spring scientifically designed so that two different rates of vibration are set up in the spring; one tending to counteract the other. Thus recoil is practically eliminated in the ends of the contact spring when the solid metal contact blade strikes between them. As a result, burning and pitting of the spring are prevented even when in circuit with Type "C" lamps.

Hubbell Shallow Flush Toggle Switches with Porcelain Bases

These switches have the same outstanding characteristics of quality workmanship and smoothness of operation, but are of the so-called competitive type, therefore do not embody those elements of fineness carried out to the *n*th degree in the shallow flush toggle switches of the enclosed bakelite base type.



No. 9801 No. 9802 No. 8801 No. 8802

General

Both of these types of switches permit installation in 2-in. partitions and will fit in 1½-in. switch boxes. The composition insulating handle is of square design to fit standard square handle switch plates with the rectangular opening.

Supporting screwholes spaced $3\frac{9}{32}$ in. on centers.

Wide plaster ears are standard equipment. These wide ears are scored so as to be readily removed if desired.

Both brown and black handles are standard. Brown furnished unless otherwise specified.

HUBBELL SHALLOW FLUSH TOGGLE SWITCHES

Enclosed Bakelite Base, Square Handle

Cat. No.	Description	Amperes 125 volts	Amperes 250 volts
9801	Single pole, indicating	10	5
9802	Double pole, indicating	..	10
9803	Three-way	10	5
9804	Four-way	5	2
9805	Single pole, indicating	..	20
9806	Double pole, indicating	..	20

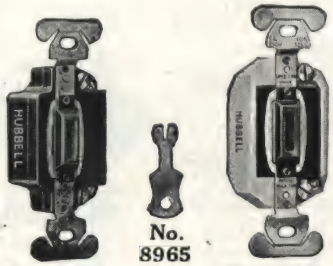
Enclosed Porcelain Base, Square Handle

Cat. No.	Description	Amperes 125 volts	Amperes 250 volts
8801	Single pole, indicating	10	5
8802	Double pole, indicating	..	10
8803	Three-way	10	5
8804	Four-way	5	2
8941	Single pole, indicating	20	..

HUBBELL LOCKING TYPE SHALLOW FLUSH TOGGLE SWITCHES

For Use with Rectangular Opening Switch Plates

Of the same general construction as the No. 8801 and 9801 lines as listed above, but equipped with special locking feature which prevents unauthorized manipulation of switch except by the possessor of a No. 8965 key.



No. 9701 No. 8965 Key No. 8961

One No. 8965 key furnished with each switch. Black and brush brass are standard finishes on key-way. Brush brass furnished unless otherwise specified.

ENCLOSED BAKELITE BASE

Cat. No.	Description	Amperes 125 volts	Amperes 250 volts
9701	Single pole, locking	10	5
9702	Double pole, locking	..	10
9703	Three-way, locking	10	5
9704	Four-way, locking	5	2
9705	Single pole, locking	..	20
9706	Double pole, locking	..	20
8965	Key	..	..

ENCLOSED PORCELAIN BASE

Cat. No.	Description	Amperes 125 volts	Amperes 250 volts
8961	Single pole, locking	10	5
8962	Double pole, locking	..	10
8963	Three-way, locking	10	5
8964	Four-way, locking	5	2
8965	Key	..	..

Continued on next page

HUBBELL "UNIPLEX," "DUPLEX" AND "TRIPLEX" SWITCHES AND PLATES

"Space and Time Savers"

One of the most revolutionary and distinctive principles in switch construction ever offered to the architect and his clients, embodying economy of material and simplification of installation heretofore unknown.

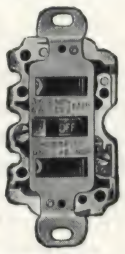
Each switch consists of small, quality, trigger action toggle switch movements made up in units of one, two or three mounted in a single bakelite box small enough to be installed in a standard single outlet box.

Certain of the combinations are provided with a common terminal on one side, (see catalogue number listing below) which simplifies the wiring as compared with the ordinary three-gang installation.

In a great majority of cases where a two or three-gang installation is required, there is ample capacity in this small, neat, compact line of switches to do the work of three large switches in a three-gang box, with a large plate, at almost one-third the cost; and as an architectural consideration, using one-third the space.

This line of "Uniplex," "Duplex" and "Triplex" Switches can be furnished in various combinations of units embracing single pole, double pole, three-way and four-way units, as listed below. Certain types also may be used as electrolier switches, and all the circuits or any part of them may be thrown by a single movement of the hand. These switches have the same easy, positive action as the Hubbell Shallow Flush Toggle Switches, the terminals are accessible for easy wiring and the switches bear the Hubbell guarantee of quality, reliability and perfection.

"Uniplex" Switches



No. 9911

No. 9911 Switch and No. 9921 Plate

No. 4911

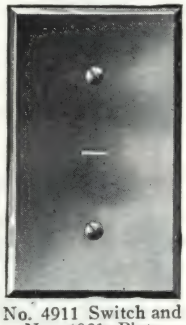
HUBBELL "UNIPLEX" SWITCHES—ONE UNIT

With Single Lateral Operating Square Composition Handle				Locking Type Switches			
Cat. No.	Description	Amperes 125 v.	Amperes 250 v.	Cat. No.	Description	Amperes 125 v.	Amperes 250 v.
9911	1 Single pole unit	6	3	4911	1 Single pole unit	6	3
9912	1 Double pole unit	10	5	4912	1 Double pole unit	10	5
9913	1 Three-way unit	6	3	4913	1 Three-way unit	6	3
9914	1 Four-way unit	3	1	4914	1 Four-way unit	3	1

No. 9911 Switch and No. 9926 Plate

HUBBELL SINGLE PLATES FOR "UNIPLEX" SWITCHES

For Switches with Square Handles		For Locking Type Switches	
Cat. No.	Description	Cat. No.	Description
9921	.040-in. Brush brass	4921	.040-in. Brush brass
9922	.040-in. "Lacco" brass	4922	.040-in. "Lacco" brass
9923	.060-in. Brush brass	4923	.060-in. Brush brass
9924	.060 in. "Lacco" brass	4924	.060-in. "Lacco" brass
9925	Sand blast bakelite, screw type	4927	.100-in. Brush brass
9926	Sand blast bakelite, screwless		
9927	.100-in. Brush brass		



No. 4911 Switch and No. 4921 Plate

"Duplex" and "Triplex" Switches

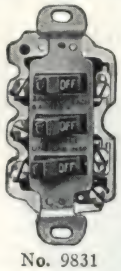
Common Feeds

All switches in the gang have a common terminal on one side which simplifies the wiring as compared to the ordinary three-gang installation.

Separate Feeds

Although common feed switches are desirable from the standpoint of facilitating installing, separate feed "Duplex" and "Triplex" Switches are furnished so that if trouble develops on one line the other circuit will not be affected. Brown toggle handles are standard.

No. 7821



No. 9831

No. 9821

RATINGS "DUPLEX" AND "TRIPLEX" SWITCHES

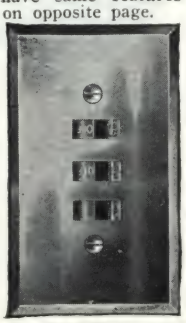
Units	125 volts	250 volts
Single pole	6	3
Double pole	10	5
Three-way	6	3
Four-way	3	1

Locking switches have same features and use key as shown on opposite page.

No. 8852 Plate with Switch

HUBBELL "DUPLEX" SWITCHES—TWO UNITS

With Lateral Operating Square Composition Handles			Locking Type Switches		
Cat. No.	Description	Feed	Cat. No.	Description	Feed
8821	2 Single pole units	Common	7821	2 Single pole units	Common
9821	2 Single pole units	Separate	4821	2 Single pole units	Separate
8823	1 Single pole and 1 3-way unit	Common	7823	1 Single pole and 1 3-way unit	Common
9823	1 Single pole and 1 3-way unit	Separate	4823	1 Single pole and 1 3-way unit	Separate
9824	2 3-way units	Separate	4824	2 3-way units	Separate
9809	1 Single and 1 double pole unit	Separate	4809	1 Single and 1 double pole unit	Separate
9810	1 Double pole and 1 3-way unit	Separate	4810	1 Double pole and 1 3-way unit	Separate
9811	1 Single pole and 1 4-way unit	Separate	4811	1 Single pole and 1 4-way unit	Separate
9812	1 3-way and 1 4-way unit	Separate	4812	1 3-way and 1 4-way unit	Separate
9813	2 Double pole units	Separate	4813	2 Double pole units	Separate



No. 8853 Plate with Switch

HUBBELL "TRIPLEX" SWITCHES—THREE UNITS

With Square Composition Handles			Locking Type Switches		
8831	3 Single pole units	Common	7831	3 Single pole units	Common
9831	3 Single pole units	Separate	4831	3 Single pole units	Separate
8833	2 Single pole and 1 3-way unit	Common	7833	2 Single pole and 1 3-way unit	Common
9833	2 Single pole and 1 3-way unit	Separate	4833	2 Single pole and 1 3-way unit	Separate
9814	2 Single and 1 double pole unit	Separate	4814	2 Single and 1 double pole unit	Separate

No. 7852 Plate with Switch

HUBBELL SINGLE PLATES FOR "DUPLEX" SWITCHES WITH SQUARE COMPOSITION HANDLES

8842	Sand blast bakelite, screwless, with under-plate No. 8844
8852	.060-in. Brush brass
8952	.050-in. "Lacco" brass
8854	Sand blast bakelite, screw type
8856	.040-in. Brush brass
8857	.040-in. "Lacco" brass
For Locking Type Switches	
7852	.060-in. Brush brass

HUBBELL SINGLE PLATES FOR "TRIPLEX" SWITCHES WITH SQUARE COMPOSITION HANDLES

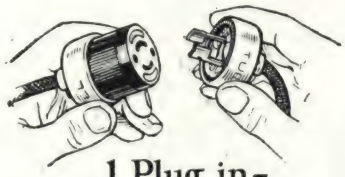
8843	Sand blast bakelite, screwless, with under-plate No. 8844
8853	.060-in. Brush brass
8953	.0 0-in. "Lacco" brass
8855	Sand blast bakelite, screw type
8858	.040-in. Brush brass
8859	.040-in. "Lacco" brass
For Locking Type Switches	
7853	.060-in. Brush brass

No. 8965

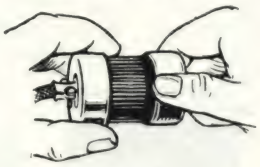
No. 7853 Plate with Switch

Continued on next page

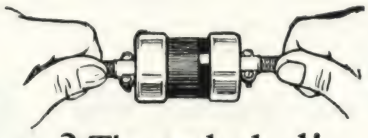
HUBBELL TWO, THREE AND FOUR-WIRE "TWIST-LOCK" FLUSH RECEPTACLES AND CAPS



1. Plug in-



2. Twist-



3. They're locked!

The use of "Twist-Lock" Flush Receptacles as standard equipment offers the assurance of permanent contact. The construction of the blade combined with the locking feature adds unlimited strength.

Plug the "Twist-Lock" cap into the flush receptacle, give it a slight turn, and the two are securely locked together. A twist of the wrist and they are locked—a twist of the wrist and they are unlocked. A "Twist-Lock" Flush Receptacle with a locking cap offers a decided advantage over any other means of electrical connection, for use in industrial plants, garages or other places where the connection is continually subjected to strain, severe or constant vibration.

A new National Electrical Code rule recommends installation of polarized and grounded devices to protect the users of portable motor driven tools and equipment. Many industrial plants, equipping with three and four-wire protective devices in compliance with this rule, are specifying "Twist-Lock" devices to end the work-interrupting and disconnection nuisance which troubles users of portable equipment. "Twist-Lock" devices never part in the middle of a job, no matter how hard the cord is yanked about. A lock-fast connection is made by a twist of the cap.

Hubbell "Twist-Lock" devices cover the majority of rating requirements on the work for which they were designed. "Twist-Lock" devices are polarized to meet the demands of the new National Electrical Code rule.

"Twist-Lock" Cord Connectors, Surface and Flush Motor Plugs interchangeable with the devices listed are also available.

No. 7102 or No. 9102

No. 7311

No. 7411

No. 7217

No. 7210

No. 7517

No. 7310

No. 7417

No. 7410

HUBBELL "TWIST-LOCK" DEVICES

Cat. No.	Description	Cord hole, diam., in.	Amperes, 250 volts
	Two-wire "Twist-Lock" Devices		
7102	Composition "Cord Grip" cap, steel covered, cadmium plated	9/16	10
●*7210	Porcelain flush receptacle		10
●‡7216	Porcelain flush receptacle with 3¼-in. box cover attached		10
●‡7217	Porcelain flush receptacle with 4-in. box cover attached		10
7238	Composition "Cord Grip" cap, steel covered, cadmium plated	5/8	10
9102	Polarized, steel covered composition cap	5/8	10
9103	Polarized, steel covered composition cap	9/16	10
	Three-wire "Twist-Lock" Polarized Devices		
*7310	Porcelain flush receptacle		20
7311	Composition "Cord Grip" cap, steel covered, cadmium plated	23/32	20
‡7517	Porcelain flush receptacle with 4-in. box cover attached		20
	Four-wire "Twist-Lock" Polarized Devices		
7410	Porcelain flush receptacle		20
7411	Composition "Cord Grip" cap, steel covered, cadmium plated	23/32	20
‡7417	Porcelain flush receptacle with 4-in. box cover attached		20
7421	Single, .060-in. brush brass plate for No. 7410		
7422	3-gang, .060-in. brush brass plate for 2 No. 7410		

*Fits standard single convenience outlet plates. Supporting screwholes spaced 3 3/32 in.

‡Standard finish of covers is cadmium finish. Black japan covers may be had on special order at no advance in price.

●All 2-wire female "Twist-Lock" devices are furnished polarized; but may be used with male non-polarized devices to make up a non-polarized device.

Polarization of 2-wire "Twist-Lock" devices is accomplished by having one blade with a longer arc than the other; i.e., one blade is wide and the other narrow, engaging in corresponding slots in the receptacle.

Continued on next page

HUBBELL CONVENIENCE OUTLETS

Two, Three and Four-wire Polarized and Heavy Duty Flush Receptacles for Home and Industrial Use

Hubbell approved convenience outlets and flush receptacles are constructed of the best grade of porcelain and composition procurable to meet the exacting requirements demanded in both industrial and home installations. Increased current carrying capacity, greater strength and ruggedness are built into Hubbell Receptacles to withstand the daily strain, severe service and other deteriorating elements. Porcelain receptacles are constructed of a special, highly glazed porcelain, terminals are of heavy phosphor bronze and for industrial requirements, caps are made of tough composition encased in a steel armor. Contact blades on caps are fabricated from heavy gauge brass, or on the higher capacity devices—copper.

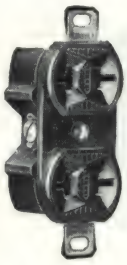
The variety of devices in this group as illustrated and described below, and on the next page, offers an unusual selection for the architect to choose the particular wiring devices to meet his most varied specification.

Two-wire Receptacles

No. 7550

No. 5547 or 5850

No. 5566 or 5552



No. 7575

No. 6257 or 5890

No. 7135 or 7136

No. 6282

No. 6283

No. 7260 or 7137

No. 7270, 7271, 7272 or 7273

HUBBELL TWO-WIRE FLUSH RECEPTACLES

Cat. No.	Description	Finish	Amperes 125 volts	Amperes 250 volts
5547	Single, top wired, black porcelain		15	10
5552	Single, top wired, black porcelain, polarized		.....	20
5566	Single, top wired, black porcelain, polarized		15	10
5850	Single, top wired, brown composition		15	10
5890	Duplex, top wired, brown composition		15	10
6257	Duplex, top wired, black porcelain		15	10
6282	Single, side wired, black porcelain, with 2¾-in. round brass plate	Brush brass	15	10
6283	Single, side wired, black porcelain, with 3⅝-in. round brass plate	Brush brass	15	10
7135	Single, side wired, black bakelite, with 3¼-in. steel box cover	Black japan or Cadmium plated	15	10

Cat. No.	Description	Finish	Amperes 125 volts	Amperes 250 volts
7136	Single, side wired, black bakelite, with 4-in. steel box cover	Black japan or Cadmium plated	15	10
7137	Duplex, side wired, black bakelite, with 4-in. steel box cover		15	10
7260	Duplex, side wired, black bakelite, with 3¼-in. steel box cover		15	10
7270	No. 5566 with 3¼-in. steel box cover		15	10
7271	No. 5566 with 4-in. steel box cover		15	10
7272	No. 5552 with 3¼-in. steel box cover		.....	20
7273	No. 5552 with 4-in. steel box cover		.....	20
7500	Single, side wired, black porcelain		15	10
7525	Duplex, side wired, black porcelain		15	10
7550	Single, side wired, brown bakelite		15	10
7575	Duplex, side wired, brown bakelite		15	10
7590	Single, side wired, brown bakelite, with wide ears		15	10
7595	Duplex, side wired, brown bakelite, with wide ears		15	10
7890	Duplex, top wired, brown composition, with wide ears		15	10

The above receptacles without plates attached have supporting screwholes spaced 3$\frac{9}{32}$ in. on centers and will fit standard single and duplex convenience outlet plates. Standard two-wire attachment plug caps will fit any of the above receptacles provided with double T-slots.

For polarized caps, see page 6.

Three-wire Polarized Receptacles

For description, see table at top of next page

No. 6051, 7189, 9051 or 6810

No. 7051

No. 7275 or 7277

No. 7051 Assembled

Continued on next page

HUBBELL THREE-WIRE POLARIZED FLUSH RECEPTACLES

Cat. No.	Description	Amperes 125 volts	Amperes 250 volts	Cat. No.	Description	Amperes 125 volts	Amperes 250 volts
6051	Single, top wired, black composition	15	10	7275	No. 6051 with 4-in. steel box cover attached*	15	10
6810	Single, top wired, black porcelain		20	7277	No. 6810 with 4-in. steel box cover attached*		20
**7051	Duplex, side wired, brown composition	15	10	9051	Single, top wired, black porcelain	15	10
7189	Single, top wired, black composition with ground shunt to bridge	15	10				

*Finish is black japan or cadmium plated.
**Fits standard duplex receptacle plate.
Note: The above single receptacles without plates attached have supporting screwholes spaced $3\frac{9}{33}$ in. on centers and will fit standard single convenience outlet plates.
For plug caps of corresponding capacity to fit the above receptacles, see page 6.

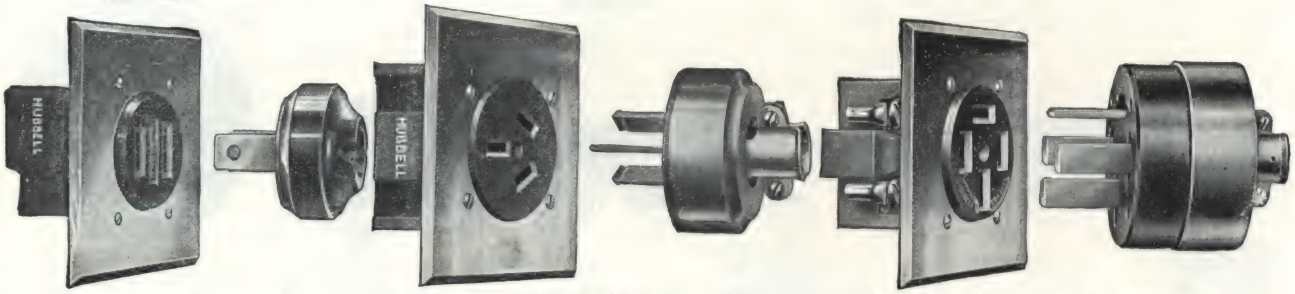
HEAVY DUTY POLARIZED FLUSH RECEPTACLES

Two, Three and Four-wire, 30 and 60-ampere and Four-wire, 20-ampere

No. 7250

No. 7251

No. 7279



No. 7070 Receptacle
No. 7072 Plate
No. 7071 Cap

No. 7112 or 7512 Receptacle
No. 7114 Plate
No. 7113 or 7513 Cap

No. 7301 or 7294 Receptacle
No. 7114 Plate
No. 7303 or 7296 Cap

HUBBELL HEAVY DUTY FLUSH POLARIZED RECEPTACLES AND ACCESSORIES

Cat. No.	Description	Amperes, 250 volts	Cat. No.	Description	Amperes, 250 volts
7070	2-wire, black porcelain, flush receptacle	30	7279	No. 7250 receptacle with 4-in. outlet box cover attached; black japan or cadmium plated finish	20
7071	2-wire, black porcelain cap for No. 7070 ($\frac{25}{32}$-in. cord hole)	30	7294	4-wire, black porcelain, flush receptacle	30
*7072	.060-in. brush brass plate for No. 7070		7295	4-wire, angle "Cord Grip" cap for No. 7294	30
7112	3-wire, black porcelain, flush receptacle	30	7296	4-wire, straight "Cord Grip" cap for No. 7294	30
7113	3-wire, composition "Cord Grip" cap for No. 7112	30	7301	4-wire, black porcelain, flush receptacle	60
*7114	.060 brush brass plate for No. 7112, No. 7301, No. 7512 or 7294		7302	4-wire, composition, "Cord Grip" angle cap for No. 7301	60
7127	2-wire, composition "Cord Grip" cap for No. 7070 ($\frac{5}{8}$ to 1-in. cord hole)	30	7303	4-wire, composition, "Cord Grip" straight cap for No. 7301	60
‡7250	4-wire black composition, flush receptacle	20	7512	3-wire, black porcelain, flush receptacle	60
			7513	3-wire, "Cord Grip" straight cap for No. 7512	60

*2-gang size plate $4\frac{1}{2}$x$4\frac{5}{16}$ in. for one receptacle.
‡Standard single convenience outlet plates will fit No. 7250.
For 4-wire cap for No. 7250, see No. 7251 on page 6. Also illustrations above.
Note: Soldering lugs on Nos. 7301, 7302 and 7303 accommodate No. 4 wires. Nos. 7302 and 7303 caps are steel covered, cadmium plated, with cord grips accommodating cords up to $1\frac{1}{4}$ in. in diam.

Suitable Fittings for Hubbell Polarized Flush Receptacles

For 2 and 3-wire, 30-ampere Receptacles

Appleton Electric Co.—19025, 19026, 19010, 19011 boxes. GSC-2 cover on GSB-2 box. 8486 cover on 4-SJ-½, 4-SJ-¾, 4-SJD-½, 4-SJD-¾, 4-SJD-1 boxes. 8469 and 8469-A covers on 4-S-½, 4-S-¾ and "4-S Special" boxes. 14097 cover on Type FS two-gang Unilet fits No. 7070 only. 14098 cover required for No. 7112.

Jefferson Electric Co.—102G and 102GS covers on 101, 102 and "102 Special" 4-in. square boxes. 110G cover on 110 and 111-4$\frac{11}{16}$ boxes. 160 sectional box. 322 cover on 302 box.

Crouse-Hinds Co.—Two-gang FS series condulets. Covers for use with 7070 on these condulets are S-612 surface type. SS-612, flush type. Covers for use with 7112 on these condulets are S-622, surface type and SS-622, flush type.

National Metal Moulding Co.—24K, 24KK and 24KL covers on 2400, 2401, 2402, 2403, 2404, 2405 and 2410 boxes. 25K cover on 2500, 2501, 2514, 2515 and 2590 boxes. 30C2 cover on 3002 and 3012 boxes. 4230 and 4231 boxes.

Pratt Chuck Co.—52C18 and 52C21 covers on 51151 and 52151 boxes.

Taplet Mfg. Co.—Two-gang FS series Taplets. Hubbell plate Nos. 7072 and 7114 will fit above Taplets.

General Electric Co.—SP52C17 and SP52C18 covers on SP51151 and SP52151 4-in. square boxes. SP6751 cover on SP6733 box.

Steel City Electric Co.—2GC cover on 2G box and catalogue Nos. 52C17, 52C18, 52C19 on 51151 and 52151 boxes and 72C18 cover on 72171 box.

Thomas & Betts—32 (box and cover complete).

For No. 7301 and 7294, 30 and 60 ampere—250-volt, 4-wire Receptacles

Adalet Mfg. Co.—HHE-605 combination box and cover, dead end or E type. HHC-605 combination box and cover, straight through or C type.

Appleton Electric Co.—FS series Unilets with 2-gang Unilet extension and 14098 cover for surface or flush work. 4SJD boxes with special cover for flush work.

Crouse-Hinds Co.—FSC-32 condulet body with EXF-12 extension. S-622 surface type cover and SS-622 flush type cover.

Steel City Electric Co.—0221 box with 0231 concealed cover and 0232 surface type cover.

Continued on next page

HUBBELL POLARIZED ATTACHMENT PLUG CAPS

Representative Types for Use with Hubbell Receptacles of Corresponding Capacity

No. 7092, 7058 7199 or 7241

No. 5567

No. 6730

No. 5553, 6156

No. 6720

No. 7055

No. 7089

No. 7251

TWO, THREE AND FOUR-WIRE POLARIZED ATTACHMENT PLUG CAPS

Cat. No.	Description	Cord hole, size, in.	Amperes 125 volts	Amperes 250 volts
5553	2-wire, porcelain, brass covered	1/2	.....	20
5567	2-wire, porcelain, brass covered	13/32	15	10
6156	2-wire, composition, brass covered	1/2	.....	20
6720	2-wire, composition	1/2	.....	20
6730	2-wire, composition	13/32	15	10
7055	3-wire, composition, steel covered, "Cord Grip"	9/16	15	10
7058	2-wire, composition, steel covered, "Cord Grip"	5/8	.....	20
7089	3-wire, composition, steel covered, "Cord Grip"	5/8	.....	20
7092	2-wire, composition, steel covered, "Cord Grip"	9/16	15	10
7199	2-wire, composition, steel covered, "Cord Grip"	19/64	15	10
7241	2-wire, composition, steel covered, "Cord Grip"	5/8	15	10
7251	4-wire, composition, steel covered, "Cord Grip"	23/32	.....	20

HUBBELL "SWITCH-TAPS" AND MISCELLANEOUS WIRING ACCESSORIES

No. 2139

No. 7192

No. 427 or 428

No. 4104

Nos. 7317 and 7280 Assembled

No. 7163 with No. 7211 Plate

HUBBELL "SWITCH-TAPS" AND MISCELLANEOUS WIRING ACCESSORIES

Cat. No.	Description
427	Porcelain pilot light receptacle with 125-volt lamp
428	Porcelain pilot light receptacle with 250-volt lamp
2137	Single, brush brass plate, .040 in. for No. 2139
2138	2-gang, brush brass plate, .040 in. for No. 2139
*2139	Single radio outlet receptacle
2141	Single, brush brass plate, .060 in. for No. 2139
2142	Single, sand blast finish, bakelite plate for No. 2139
2143	Single, ribbed finish, bakelite plate for No. 2139
2144	Single, screwless, bakelite plate with under-plate for No. 2139
*2145	Duplex radio outlet receptacle
2146	Single, brush brass plate, .040 in. for No. 2145
2147	2-gang, brush brass plate, .040 in. for No. 2145
2149	Single, brush brass plate, .060 in. for No. 2145
2150	Single, screwless, bakelite plate with under-plate for No. 2145
4100	Keyless, brass covered, ceiling receptacle for 3¼ and 4-in. outlet boxes—660 watts, 250 volts
4102	Keyless, brass covered, ceiling receptacle for 3¼ in. outlet box—660 watts, 250 volts
4104	Pull, brass covered, ceiling receptacle for 3¼ and 4 in. outlet boxes—250 watts, 250 volts
‡7163	Porcelain "Switch-Tap"
‡7164	Porcelain "Switch-Tap"
7192	Porcelain, pilot light receptacle with 125-volt lamp
**7280	Combination "Switch-Tap" and pilot light in one-piece porcelain box
**7281	Combination "Switch-Tap" and pilot light in one-piece porcelain box
7314	2-gang, brush brass plate, .040 in. for No. 7280 and No. 7281
7315	2-gang, "Lacco" brass plate, .040 in. for No. 7280 and No. 7281
7316	2-gang, brush brass plate, .060 in. for No. 7280 and No. 7281
7317	2-gang sand blast finish, bakelite plate for No. 7280 and No. 7281
9317	2-gang, ribbed finish, bakelite plate for No. 7280 and No. 7281

‡A combination switch and outlet, two in one. It is recommended for use in any place where a switch control is required for a ceiling light and electric service from a convenience outlet. With No. 7163, a quarter turn of the tap which is a switch and the lights are on. A quarter turn to the left and the switch is off. The double T-tap is wired independently and is alive at all times. It is small enough to fit any standard single gang outlet box. Switch—5 amperes, 250 volts; receptacle—10 amperes, 250 volts or 15 amperes, 125 volts. The No. 7164 is a combination of double T-slot receptacle, controlled by a double pole switch. In this hook-up the switch is used exclusively for the purpose of controlling the double T-slot outlet. The switch mechanism is regularly furnished not grounded. If desired with ground shunt to frame, suffix the letter G. Face of receptacle regularly furnished brown; black may be had at same price. Standard single convenience outlet plates will fit Nos. 7163 and 7164.

*These receptacles are installed flush in the wall or baseboard and used for radio ground or aerial connection, batteries or as an outlet for radio headpieces or loud speakers. Standard finish of plates is brush brass. Depth of receptacle base 1 in. Screwhole spacings standard same as tumbler switches.

**No. 7280 "Switch-Tap" is arranged for independent control of a distant light. Tap is alive at all times. The pilot light actuates in conjunction with the switch. No. 7281 tap of "Switch-Tap" is controlled by switch. The pilot light actuates in conjunction with the switch. The pilot light lamp furnished with these receptacles is 2 c.p., 125 volts, clear, with candelabra base, G-8 type. No. 7280 rating: receptacle—10 amperes, 250 volts; switch—5 amperes, 250 volts; pilot light, 75 watts. No. 7281 rating: receptacle—10 amperes, 250 volts, pilot light 75 watts.

Continued on next page

HUBBELL SCREWLESS BAKELITE PLATES AND ACCESSORIES

Switch and outlet plates are purely utility devices designed to cover a gaping hole and electrical mechanism. Like other utility devices in which attractive appearance of necessity must be limited, switch and outlet plates should be made inconspicuous.

The Hubbell plate finishing service enables the architect to provide screwless plates of bakelite finished to exactly match the background to which they are affixed. Textured plaster, wood grains, marbles, any color tone or material can be faithfully reproduced on screwless plates. You only need submit a sample or specify color and material to be simulated.

Clients will enthusiastically approve these matching screwless plates which do not mar attractive walls and woodwork. The perfect insulation provided by the bakelite plate, the absence of projecting screw-heads, and the automatic aligning installation feature which saves costly building-up when walls are uneven, are other unique characteristics of screwless plates which appeal to the architect and his client.

These plates are molded of genuine bakelite and have no screws or other external fastenings to mar their finish and beauty. The absence of metal screws insures perfect insulation of plate surface from mechanism.

Screwless plates are regularly furnished in brown. Black bakelite plates supplied when desired without extra charge.

Screwless bakelite plates may also be had in attractive special finishes to match color scheme of rooms. Sample of finish should accompany order.

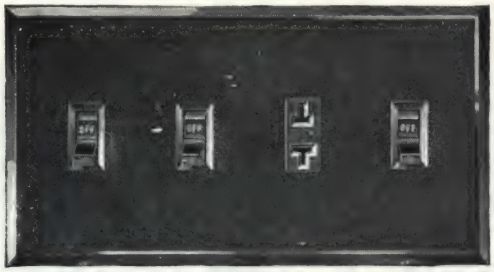
These plates save time in installing. No building-up of switches or outlet to bring them up to plaster line. Switches and outlets are wired in usual way. Then, while still out of wall box metal under plate is secured to them by screws, after which they are fastened to wall box in regular way. Switches or outlets are quickly drawn up to plaster line, and into strict alignment, by simply adjusting under plate screws.

The screwless cover plates are snapped into position after painting and papering. No screws to bother with.

Cadmium finished steel under plate supplied with each cover plate without extra charge.

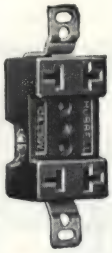
No. 7194 No. 7193 No. 7195

No. 7168



No. 7167 (with Devices Assembled for Illustration)

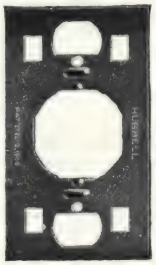
No. 7125



No. 7126

No. 7098 Assembled

Rear of Plate Showing Spring Holding Clips



Under Plate for Single Cover Plate, Either Switch or Receptacle

No. 7096

No. 7097 Assembled

SCREWLESS BAKELITE PLATES AND ACCESSORIES

Cat. No.	Description
2144	Single plate for single radio receptacle No. 2139
2150	Single plate for duplex radio receptacle No. 2145
7096	Single plate for single receptacle No. 7125
7097	Single plate for duplex receptacle No. 7126
7098	Single plate for square handle switches
*7125	Single convenience outlet, 10 amp., 250 v., 15 amp., 125 v.
*7126	Duplex convenience outlet, 10 amp., 250 v., 15 amp., 125 v.
7144	2-gang blank plate
7151	2-gang plate for square handle switch and 1 No. 7125 receptacle
7152	2-gang plate for 2 square handle switches
7153	3-gang plate for 3 square handle switches
7154	Single plate for single telephone outlet
7155	Single plate for double telephone outlet
7156	3-gang plate for 2 square handle switches and 1 No. 7125 receptacle
7157	3-gang plate for 1 square handle switch and 2 No. 7125 receptacles
7158	2-gang plate for 1 square handle switch and 1 No. 7126 duplex receptacle
7160	2-gang plate for 1 round convenience outlet and 1 No. 7126 duplex receptacle
7167	4-gang plate for 2 square handle switches, 1 No. 7125 receptacle and 1 square handle switch
7168	Tool for removing plates
‡7193	Bullseye jewel insert
‡7194	Blank insert
‡7195	Telephone outlet insert
7211	Single plate for standard Convenience Outlet or "Switch-Tap"
7242	4-gang plate for square handle switch
7320	2-gang plate for single telephone outlets
7321	3-gang plate for single telephone outlets
7322	2-gang plate for double telephone outlets
7323	3-gang plate for double telephone outlets
**8842	Single plate for "Duplex" switches
**8843	Single plate for "Triplex" switches
**9926	Single plate for "Uniplex" switches

*Hubbell Composition Convenience Outlets for screwless bakelite plates. These convenience outlets are designed for use with Hubbell screwless bakelite plates only, and regularly furnished in brown throughout.

Black composition may be had when so specified at no advance in price.

**For "Uniplex," "Duplex" or "Triplex" Switches with square operating handles only.

‡Hubbell Interchangeable Inserts for screwless bakelite plates. These inserts fit the single convenience outlet opening for No. 7125 receptacle in screwless bakelite plates. By their use the flexibility of screwless bakelite plates is enhanced and they afford economical substitution for future contingencies.

Continued on next page

HUBBELL BRASS FLUSH PLATES

Hubbell Brass Flush Plates are made in .100-in. solid brass, struck-up .060 and .040-in. brass to accommodate all flush devices of our manufacture, and also for other special installations as illustrated below. Although flush plates are identified by catalogue numbers they may be specified also by letter symbols in gangs or combinations, with the thickness of the metal desired indicated.

The standard finish on brass flush plates is brush brass, but they are also furnished in "Lacco" finish, which is a sprayed finish similar to brush brass but not as expensive.

Brass plates may be supplied in all types of electro-plated finishes and sprayed-on enamels in various colors.

They may be made also with round corners and beveled edges; with extension edges; with square corners and square edges (not beveled) and in special sizes to meet unusual conditions.

Spacings on Hubbell Brass Flush Plates—Plates for push button switches, toggle switches, convenience outlets, 10 and 20-ampere polarized receptacles, three-wire receptacles, etc. have screwholes spaced 2⅜ in. on centers. Plates for attaching directly to outlet boxes have screwholes spaced 2⅜ in. on centers and are furnished with adapters to 3$\frac{9}{32}$ in. spacing. Gang plates are spaced 1$\frac{13}{16}$ in. on centers horizontally, and 3⅝ in. on centers vertically.

The plates characterized below may be furnished in gangs up to and including eight gangs in .040 or .060-in. metal, and in various combinations. The dimensions of these plates in gangs or combinations are as follows:

PLATE DIMENSIONS

Number of gangs	Height, in.	Width, in.	Number of gangs	Height, in.	Width, in.
Horizontal Gangs*					
1	4½	2¾	7	4½	13⅝
2	4½	4$\frac{9}{16}$	8	4½	15$\frac{7}{16}$
3	4½	6⅜	9	4½	17¼
4	4½	8$\frac{3}{16}$	10	4½	19$\frac{1}{16}$
5	4½	10	11	4½	20⅞
6	4½	11$\frac{13}{16}$	12	4½	22$\frac{11}{16}$
Vertical Gangs—Tandem**					
2	8⅛	2¾	4	15⅜	2¾
3	11¾	2¾	5	19	2¾

*For plates beyond 12 gangs, add 1$\frac{3}{16}$ in. per gang.
**For plates beyond 5 gangs, add 3⅝ in. per gang.

A — For Push Switch

B — For All Hubbell Round Handle Toggle Switches

C — With Round Bullseye for Pilot Light Receptacle

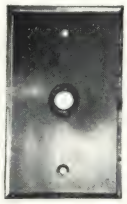
D — For Outlet Box

G — For Single Convenience Outlets and All Other Standard, 2, 3, and 4-wire Flush Receptacles with Round Faces

H — For Duplex Convenience Outlets

J — *Double Hinge Cover. For No. 5579 Convenience Outlet

L — For "Uniplex" Switch, Locking Type

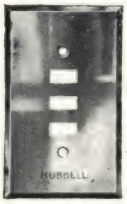


M — For Telephone Outlet, One Bushing

N — For Telephone Outlet, Two Bushings

P — For Square Handle Toggle Switch

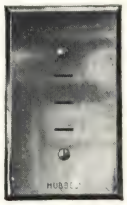
Q — For "Duplex" Switch with Square Handles



R — For "Triplex" Switch with Square Handles

T — With Rectangular Bullseye for Pilot Light Receptacle

U — For "Duplex" Switch, Locking Type

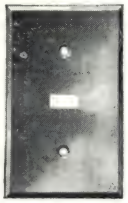


V — For "Triplex" Switch, Locking Type

W — For Single Radio Outlet No. 2139

X — For Duplex Radio Outlet No. 2145

Y — For No. 7410 4-wire "Twist-Lock" Receptacle Only



Z — For "Uniplex" Switch with Square Handle

*Only supplied in solid brass.

ILLUMINATION

Beardslee Chandelier Mfg. Co. D5970
Benjamin Electric Mfg. Co. D5890–5892
Consolidated Lamp & Glass Co. D5971
Copper and Brass Research Assn. D5972
Davenport-Taylor Mfg. Co. D6045
Day-Brite Reflector Co. D5893–5895
Duplexalite Div. of the Miller Co. D5973–5977
Efcolite Corp. D5978
Electric Service Supplies Co. D5898
Erikson Electric Co. D5896–5897
Flexlume Corp. D6046
Franklin Pottery, Inc. D5979
Garden City Plating & Mfg. Co. D5899–5903
General Electric Co. D5904
Gillinder Brothers, Inc. D5980
Gleason-Tiebout Glass Co. D5981
Graybar Electric Co. D5982
Guth, Edwin F., Co. D5983
Herwig Co., Inc. D6033
Holophane Co., Inc. D5984–5987
Industrial Arts D5988
Ivanhoe Div. of the Miller Co. D5906–5907
Kopp Glass, Inc. D5989
Lang's Daylight, Inc. D5905
Macbeth-Evans Glass Co. D5991–6014
Midwest Metal Art Div., The Newman Mfg. Co. D5990
Ochiltree Electric Co. D5908–5912
Pass & Seymour, Inc. D6015
Phoenix Glass Co. D6016
Pittsburgh Reflector Co. D5913–5962
Planetlite Co., Inc. D6017
Price Brothers, Inc. D6047
Quadrangle Mfg. Co. D6018–6019
Rawson & Evans Co. D6048
Reflector & Illuminating Co. D5964–5969
Smyser-Royer Co. D6034–6044
Tork Clocks, Inc. D6049
Westinghouse Electric & Mfg. Co. D6020–6032
Wheeler Reflector Co. D5963

BENJAMIN ELECTRIC MFG. CO.

Benjamin Lighting Equipment for Commerce and Industry, Electrical Specialties, Signals, Panelboards and Cabinets

GENERAL OFFICES AND FACTORY

DES PLAINES (Chicago Suburb), ILL.

NEW YORK OFFICE, 247 West 17th Street CHICAGO OFFICE, 111 No. Canal Street SAN FRANCISCO OFFICE, 448 Bryant Street

For Benjamin-Starrett Panelboards and Cabinets, see Manufacturers' Index.

Products

The Benjamin line includes: Porcelain Enameled Reflectors and Specialties; Acidproof, Gasproof and Weatherproof Fixtures; Industrial Signals; Wiring Devices; Panelboards and Cabinets.

National Electrical Code Standard—with a few exceptions, all Benjamin sockets and receptacles are National Electrical Code Standard.

Leading electrical wholesalers in every city carry a stock of Benjamin Products and are in a position to render prompt service on inquiries and orders.

Benjamin "Type 79" Lighting Equipment

National Electrical Code Standard.

Benjamin "Type 79" units are composed of two complete assemblies; a hood with an easy-to-wire terminal base and a reflector assembly including the lamp holder and the diffusing globe. With one simple movement this complete reflector assembly can be put up or taken down as a unit for easy cleaning or relamping on the floor.

Glassteel Diffuser

Designed for the very best uniform, glareless illumination of upright and flat surfaces. Crysteel porcelain enameled steel reflector, finished white inside and outside—with porcelain lamp-holder, bayonet plate and opal glass globe. Cadmium plated hoods; pendent tapped ½ in.; ceiling type fits 4-in. standard outlet boxes.

Lamp, watts	Pendent hood fixture Cat. No.	Ceiling hood fixture Cat. No.	Diam. refl., in.
150, 200	7201	9201	18
300, 500	7202	9202	20
750, 1000	7203		24

Benjamin RLM Dome Reflector

For good general illumination of upright and flat surfaces. RLM Standard. Seamless, one-piece Crysteel porcelain enameled steel reflector—finished white inside and green outside. Porcelain lamp holder and bayonet plate. Hoods are identical with those described for Glassteel units above.

Lamp, watts	Pendent hood fixture Cat. No.	Ceiling hood fixture Cat. No.	Diam. refl., in.
75-100	7641	9641	12
150	7642	9642	14
200	7643	9643	16
300, 500	7644	9644	18
750, 1000	7645	9645	20

Benjamin Shallow Bowl Reflector

Seamless, one-piece Crysteel porcelain enameled steel reflector—finished green outside, white inside. Porcelain lamp holder and bayonet plate. Hoods are identical with those described above.

Lamp, watts	Pendent hood fixture Cat. No.	Ceiling hood fixture Cat. No.	Diam. refl., in.
50, 60	7437	9437	12
75, 100	7421	9421	12
150	7423	9423	14
200	7425	9425	16
300, 500	7509	9509	18

Benjamin Shock Absorbing Lamp Holders

Lengthen lamp life by counteracting vibration. Furnished when specified at 10¢ advance list.

Benjamin One-piece Equipment—Reflector-Sockets

National Electrical Code Standard

Uses—Weatherproof fixtures for either indoor or outdoor use. Each shape of reflector solves a definite lighting problem as explained below.

Construction—Seamless, Crysteel porcelain enameled steel reflectors, green outside and white inside. Easy-to-wire keyless porcelain socket is standard equipment, but if specified, pull chain, self-locking or shock absorbing sockets will be furnished with medium base fixtures at an advance in list price. X Style Separable Weatherproof fitting tapped ½-in. standard ¾-in. or bushed for drop cord if specified.

RLM DOME REFLECTOR-SOCKET

Lamp, watts	Uses	No.
50, 60	For good general illumination where it is desired to light both horizontal and vertical surfaces, 17½° angle of cut-off.	5640
75-100		5641
150		5642
200		5643
300, 500		5644
750, 1000		5645

BOWL REFLECTOR-SOCKET

Lamp, watts	Uses	No.
60, 50	Advantageous for the local lighting of machines and benches	6166
75-100		6161
150		6189
200		6169
300, 500		6173

ELLIPTICAL ANGLE REFLECTOR-SOCKET

Lamp, watts	Uses	No.
60, 75, 100	Especially practical for illumination from the side. Gives a wide side distribution as well as directing light to the front.	5522
150		5525
200		5526
300, 500		5537
750, 1000		5538

Benjamin Concentrating Type High Mounting Unit

National Electrical Code Standard.

Recommended for relatively narrow rooms where the mounting height is equal to or greater than the width of the room to be lighted. Also suitable for the lighting of outdoor locations. Special aluminum reflector with pendent cast hood (tapped ½ in.) or outlet box cast hood for 3¼ and 4-in. boxes. Hood and reflector finished green lacquer outside. Reflecting surface is a special aluminum oxide finish.

Cat. No.	Description	Lamp, watts
26120	Pendent Hood	750-1000-1500
26122	Outlet Box Hood	750-1000-1500

Continued on next page

Benjamin Two-piece Equipment—"Sturdox," Heavy Duty Threaded Fixtures

National Electrical Code Standard.

"Sturdox" reflectors are porcelain enameled steel, green outside, white inside. Both steel hoods and cast hoods are green paint enameled. Pendent hoods are regularly tapped for ½-in. iron pipe; outlet box hoods will fit 4-in. standard outlet boxes.

Sturdox Threaded Hoods

No. 9200

No. 9220

No. 9230

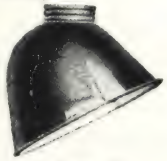
No. 9210

Kind of socket	Pendent type		Outlet box type	
	Cast Cat. No.	Steel Cat. No.	Cast Cat. No.	Steel Cat. No.
Medium base	9200	9210	9220	9230
Mogul base	9205	9215	9225	9235

Sturdox Threaded Reflectors Only

Dome RLM

Bowl



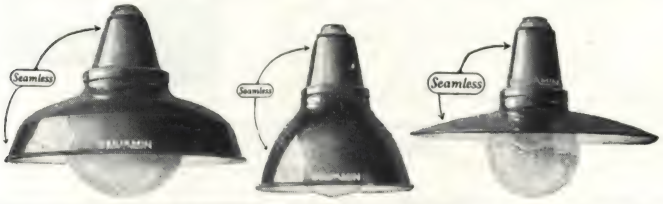
Angle

Lamp, watts	Dome Cat. No.	Bowl Cat. No.	Angle Cat. No.
75-100	26012	26108	.....
150	26014	26109	26210
200	26016	26110	26210
300, 500	26018	26112	26212
750, 1000	26020	.....	26214

Benjamin "1500 Series" Gas and Vapor Proof Equipment

National Electrical Code Standard.

A new line of one-piece, seamless, gas and vapor proof reflector units with separable fittings, porcelain socket and heavy glass inclosing globe. Fitting tapped for ½-in. conduit. Reflectors are of acid resisting Crysteel porcelain enamel, finished green outside, white inside.



Lamp, watts	Cat. No. with dome reflector	Cat. No. with bowl reflector	Cat. No. with flat cone reflector
75-100	1582	.....	1594
150	1584	1590	1596
200	1587	1590	1598
300, 500	1588	.....	.....

Benjamin Heavy Duty Gas and Vapor Proof Fixtures

National Electrical Code Standard.

Uses—For use in powder mills, benzol plants, paint manufactories, dyeing and cleaning establishments, garages, oil refineries, and other industries where hazardous atmospheric conditions prevail.

Construction—Cast iron hood tapped ½ in.; porcelain enameled steel reflector, green outside, white inside; easy-to-wire porcelain socket; screw threaded enclosing globe and holder.

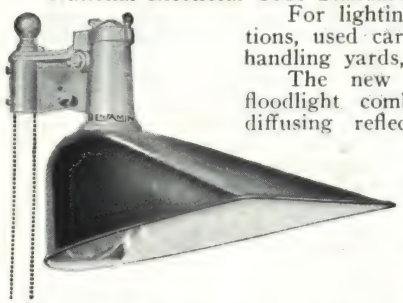
Angle

Lamp, watts	Cat. No. with dome reflector	Cat. No. with symmetrical angle reflector
75-100	6500	.....
150	6501	6510
200	6502	6510
300, 500	6503	6512

Dome

Benjamin Duo-Service Floodlight

National Electrical Code Standard.



For lighting: gasoline service stations, used car lots, coal and material handling yards, swimming pools, etc.

The new Benjamin Duo-Service floodlight combines a wide coverage diffusing reflector with an intensive beam floodlighting projector. This unit will provide uniform illumination of a surrounding ground area with the simultaneous high intensity floodlighting of an upright or flat surface within, close to, or at some distance from the area of general illumination. This high intensity floodlighting beam can be concentrated or spread by a simple screw adjustment. The unit is easily installed by simply slipping the bracket arm over 1½-in. pipe.

Porcelain enameled steel reflector, green outside, white inside. Chromium metal projector and heavy cast aluminum hood which includes a porcelain mogul base socket.

DUO-SERVICE FLOODLIGHT

Lamp, watts	Cat. No.	Description
750, 1000	5763	With projector
DIFFUSING FLOODLIGHT		
750, 1000	5765	Without projector

Benjamin Vaporproof Projectolite

National Electrical Code Standard. For uniformly lighting straight or rounded surfaces from a grazing angle. Vaporproof construction makes it particularly suitable for installation in hazardous locations. The powerful floodlight beam of the unit is broadened and flattened by a special lens which directs the greater amount of light to a point farthest from the light source and with a correspondingly smaller amount on the surfaces close to the unit. This makes for even illumination.

Construction—Metal reflector with heat-resisting lens, double felt gasket and metal cover band. Furnished with 10-ft. wire leads; all wiring enclosed. Inside finish is chromium; outside is green lacquer.

Cat. No.	Lamp, watts	Description
5613	300	Tapped ½ in.

The Benjamin Intensifier

National Electrical Code Standard.

A supplementary lighting unit designed to illuminate small areas to higher intensities than furnished by the general illumination.

Reflector of heavy gauge metal with steel neck containing keyless, easy-to-wire socket and focusing apparatus. Dusttight cover seals interior of intensifier. Outside finish is green paint lacquered; inside is chromium plated. Fitting tapped ½ in.

Cat. No.	Lamp, watts	Glass cover
5603	60, 75, 100	Clear
5604	150, 200	Frosted

Benjamin Dust Tight Glass Cover

A light-weight economical device that will give the reflecting surfaces of Benjamin reflectors protection against dust and dirt. Consists of a steel retaining band (cadmium finished), circular felt gasket and clear glass disc.

Cat. No.	To fit	Cat. No.	To fit
6408	8-in. reflector	6414	14-in. reflector
6409	9-in. reflector	6416	16-in. reflector
6410	10-in. reflector	6418	18-in. reflector
6412	12-in. reflector	6420	20-in. reflector

Continued on next page

Benjamin Sign Reflector

National Electrical Code Standard.

The new Benjamin sign reflector is easily installed—no conduit bends between reflector and sign. Easily wired, inconspicuous on the board and simple to clean. Shadows and scallops are eliminated along top of board due to the long straight-line cut-off and the Benjamin elliptical shape. Reflector is of Crysteel porcelain enamled steel, white inside, green outside. Fitting tapped for ½-in. conduit.

Lamp, watts	Cat. No.
100, 150	5570
150, 200	5571

Benjamin Emblem Sign Reflector

National Electrical Code Standard.

Developed for high intensity lighting of circular and similar small signs. No conduit bends; wired easily from top of reflector; neat and inconspicuous when installed. Hood is cast iron, cadmium plated to prevent corrosion. Side outlet of hood is tapped for ½-in. conduit. One-piece easy-to-wire porcelain socket. Reflector of Crysteel porcelain enameled steel, green outside and white inside.

Lamp, watts	Cat. No.
60	5736
75-100	5738

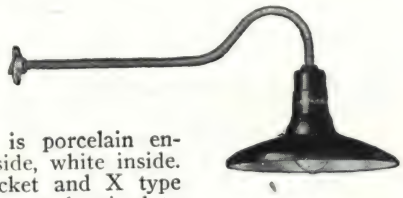
Benjamin "Type RR" Fluted Bowl Reflector

National Electrical Code Standard.

A heavy duty reflector particularly suited for outdoor use. Porcelain enameled steel reflector, green outside, white inside. Furnished with pendent steel porcelain enameled hood and a two-piece, easy-to-wire porcelain socket. Fitting tapped for ½-in. conduit.

Lamp, watts	Cat. No.	Diam. reflector, in.
300, 500	26474	14
750, 1000	26477	18

Benjamin Shallow Bowl Reflector Fixture with Gooseneck Support



National Electrical Code Standard.

Complete combination of standard shallow bowl reflector, gooseneck and pole or wall fitting. Reflector is porcelain enameled steel, green outside, white inside. Two-piece porcelain socket and X type fitting. All iron parts are galvanized to prevent corrosion.

Lamp, watts	Cat. No.	Diam. reflector, in.
25, 60	5449	12
75, 100	5419	12
150	5420	14
200	5422	16
300, 500	5421	18

Benjamin Suspension Fittings

Weatherproof fittings used in suspending reflectors from overhead cable supports. All iron parts are galvanized to prevent corrosion.

Cat. 6203

Cross Arm Fitting—With porcelain wire openings.

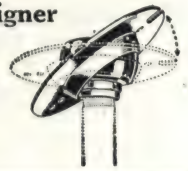
Cat. No.	Bottom thread	Top tapped
6203	¾ in.	¾ in.
6205	⅛ in.	¾ in.

Cat. 6031M

Suspension Fitting—With porcelain wire openings.

Cat. No.	Size tapped
6031	½ in.
6031M	½ in. male

Benjamin 45-Degree Ball Fixture Aligner



Outlet box cover Type No. 3380 aligner offers a means of hanging fixtures plumb, even where the slope is as great as 45 degrees. A suspension that will give under mechanical jars and shocks, thereby protecting fixture.

Cat. No.	Description
3380	For standard 3¼ and 4-in. boxes, tapped ½ in.

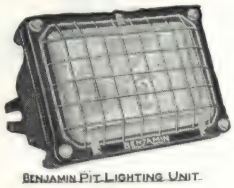
Benjamin Fibre Portable Hand Light

National Electrical Code Standard.

A non-conductive, 8-oz. shockproof, fibre portable light with adjustable hook. Socket floats on four flexible springs.

Cat. No.	Lamp, watts	Description
158	25, 60	Keyless
160	25, 60	Key

Benjamin Pit Lighting Fixture



Benjamin Pit Lighting Unit

National Electrical Code Standard.

A gas and vapor-proof unit especially suitable for lighting automobile or railroad service and repair pits. Suitable for either built-in or surface installations. New refracting glass cover concentrates a major portion of light on the underside of the vehicle over the pit. Consists of cast iron box and cover frame. Fixture cover is heat-resisting glass and can be supplied in either refractor or plain glass type. Glass cover mounted in cover frame is protected from breakage by a heavy tinned wire guard. Reflecting surface is porcelain enamel. Boxes tapped for ½-in. conduit at both ends.

Cat. No.	Lamp, watts	Glass cover
5710	100, 150	Plain
5715	100, 150	Refracting

Benjamin Industrial Howlers

No. 8346H

Designed for calls and warnings in factories, warehouses, yards, etc. Cast iron body; brass bell or conical projector rigidly attached to heavy pressed steel cover; gasket makes howler weatherproof.

INDUSTRIAL HOWLERS

Cat. No.	Description	Type of projector	Connection
	For Multiple Circuits		
8346 H	D-c., heavy duty weatherproof	Brass bell	½-in. conduit
	For Series or Multiple Circuits		
8346 H	A-c., heavy duty weatherproof	Brass bell	½-in. conduit
8357 A	A-c., heavy duty weatherproof	14-in. conical	½-in. conduit

Benjamin Motor Driven Howler

No. 8175

No. 8175—For use in such locations as steel mills, railroad shops, screw machine departments, etc., where a signal system must compete for attention with excessively loud manufacturing noises.

Body and projector are of heavy cast iron. Mounting bracket of steel. Special motor insuring correct power and revolutions per minute for code calling. Furnished with 14-in. leads. Finish is black enamel. 110 volts a-c. ½-in. conduit connection.

SINGLE PROJECTOR SIGNAL

Cat. No.	Voltage	Connection
8175	110 volts, 60 cycle, a-c.	½-in. conduit
8176	110 volts, d-c.	½-in. conduit
	DOUBLE PROJECTOR SIGNAL	
8180	110 volts, 60 cycle, a-c.	½-in. conduit
8181	110 volts, d-c.	½-in. conduit

THE DAY-BRITE REFLECTOR COMPANY

Manufacturers of "Day-Brite" Reflectors

3825 Laclede Avenue, ST. LOUIS MO

DISTRICT OFFICES

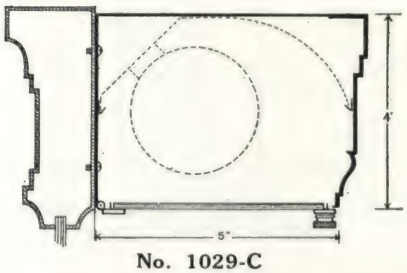
SALT LAKE CITY, UTAH	NEW ORLEANS, LA.	PORTLAND, ORE.	PITTSBURGH, PA.	FORT WORTH, TEX.
SEATTLE, WASH.	CHICAGO, ILL.	VANCOUVER, B. C.	ATLANTA, GA.	CINCINNATI, OHIO
WINNIPEG, MAN.	WASHINGTON, D. C	OMAHA, NEB.	OAKLAND, CAL.	BALTIMORE, MD.
BOSTON, MASS.	DENVER, COLO.	LOS ANGELES, CAL.	NEW YORK, N. Y.	INDIANAPOLIS, IND.
PHILADELPHIA, PA.	DETROIT, MICH.	ST. PAUL, MINN.	CALGARY, ALTA.	TORONTO, ONT.
	SAN FRANCISCO, CAL.	BUFFALO, N. Y.	CLEVELAND, OHIO.	

Day-Brite Line

The Day-Brite line of standard equipment is designed to meet general lighting conditions with fixtures designed for appearance, efficiency and economy of operation.

To insure satisfaction and assure best results, we offer to you the assistance of our representatives and engineers in the selection of the proper fixtures for your requirements.

Where special equipment is necessary, our Designing Department will gladly make suggestions and furnish drawings. This service is extended to you gratis and we suggest you avail yourself of this assistance.



No. 1029-C

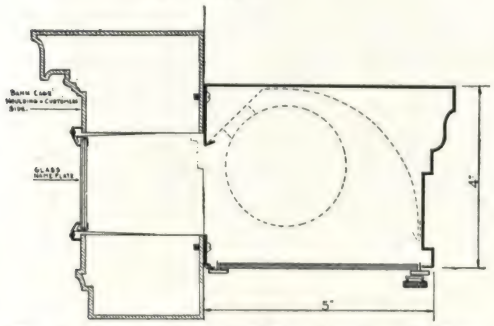
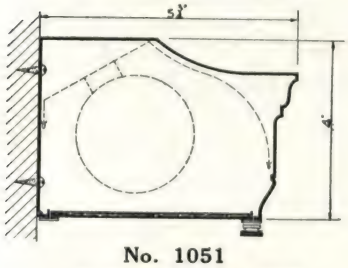


Fig. 1. Bank Trough Being Used with Combination Sign



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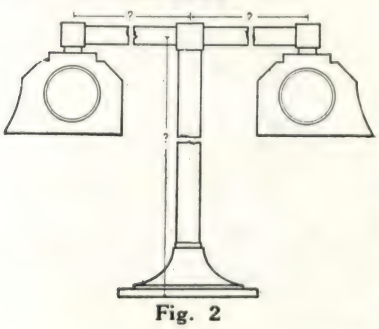


Fig. 2

Bank Lighting

No. 1029-C for Standard Lamps to 60 Watts—
Outer shell, bronze
Reflecting surface, steel porcelain enamel
Sockets, porcelain, single or twin
Glass frame, hinged type
Dimensions—height 4 in., width 5 in., length continuous

No. 1014-C for T-10 Tubular Lamps, Standard Base—
Outer shell, steel
Reflecting surface, steel porcelain enamel
Sockets, porcelain, single or twin
Glass frame, removable type
Dimensions—height 2¾ in., width 3½ in., length continuous

Fixture illustrated in Fig. 1 is designed to fit the standard bank cage cornice, as selected. Glass sign is illuminated from cage light.

No. 1081 Deal Plate Reflector—
For T-10 tubular or standard 25-watt lamps.
Outer shell, steel
Reflecting surface, steel porcelain enamel
Sockets, porcelain, single or twin
Dimensions, height 3½ in., width 3¾ in., length continuous

No. 1051 Check Desk Trough—
Outer shell, bronze or steel
Reflecting surface, steel porcelain enamel
Sockets, porcelain, single or twin
Standards, plain or ornamental, as desired
Dimensions—height (over all) 19 in., body only 4¾ in., width 6½ or 8 in. according to length, length continuous

Fig. 2 illustrates a double bracket mounting for check desk lighting, etc.

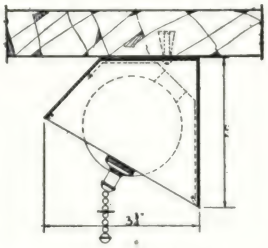
No. 1051 for Standard Lamps to 25 Watts—
Outer shell, drawn bronze moulding
Reflecting surface, steel porcelain enamel
Sockets, porcelain, twin
Glass frame, hinge type
Dimensions—height 3¾ in., width 4⅞ in., length 20 in.

Also made for lamps to 60 watts.

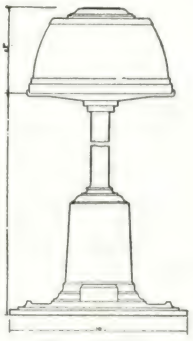
No. 1375 Bracket for Standard Lamp to 25 Watts—
Outer shell, bronze
Reflecting surface, steel porcelain enamel
Socket, porcelain, single
Dimensions—length 10 in., height 3½ in., width 5 in.

Write for catalogue for more complete data.

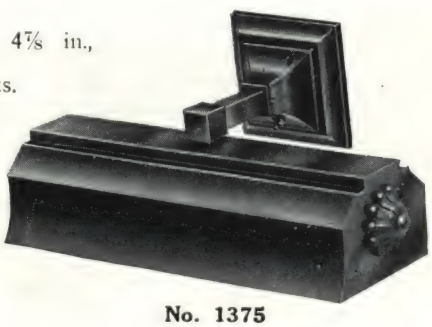
No. 1014-C



No. 1081



No. 1501



No. 1375

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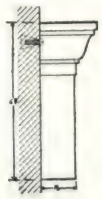
Interior Electric Signs

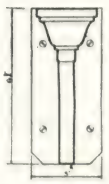
Interior electric signs are available in the thin and wide model types for both single and double face reading. In the thin model type only the clear plate glass can be used. This glass has the lettering sandblasted in the reverse side and gives a green lettered effect. The wide model type can be furnished in a variety of glass styles—such as white opal letters with bronze background, white letters with red or black background, red or green letters with dark background or cathedral glass.

No. 2600

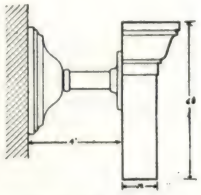
No. 2600 Sign is the thin model size 5x16 in., exclusive of top moulding. This type also comes in a 7x28 in. size



Flush Mounting of a No. 2700 Sign



End Mounting Arrangement



Extended Bracket Mounting

Exit Signs

No. 2730

Exit signs are furnished in four sizes and two styles, Figs. X and Y illustrate the surface and flush mounting types.

Outer moulding, drawn bronze; frame hinge type.

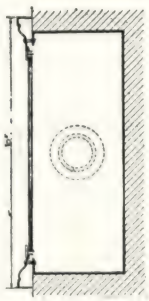


Figure X Flush Mounting

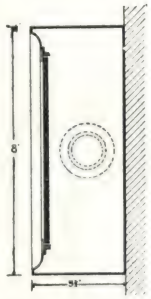


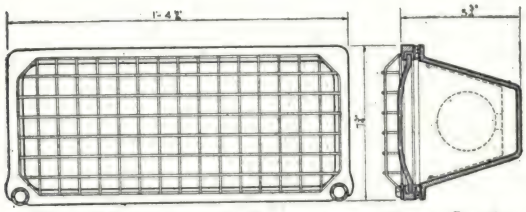
Figure Y Surface Mounting

FLUSH TYPE

Cat. No.	Size letter	Over all Trim, in.		Box Size, in.		
		Height, in.	Width, in.	Height, in.	Width, in.	Depth, in.
2730	5	8¾	13	7¾	12	3½
2731	6	9¾	14	8¾	13	3½
2732	7	10¾	15	9¾	14	3½
2733	8	11¾	16	10¾	15	3½

SURFACE TYPE

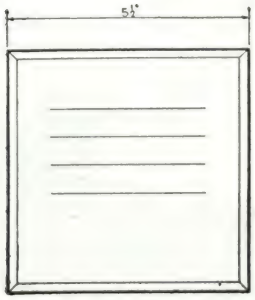
Cat. No.	Size letter	Over all size, in.		Depth standard lamp size, in.	Depth tubular lamp size, in.
		Height, in.	Width, in.		
2740	5	8¼	12½	3½	2¾
2741	6	9¼	13½	3½	2¾
2742	7	10¼	14½	3½	2¾
2743	8	11¼	15½	3½	2¾



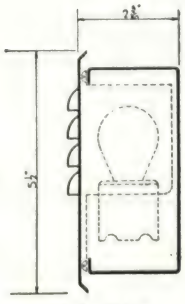
No. 5000. Pit Reflector

Cross Section Pit Reflector

Pit Reflector—Vaporproof and waterproof. Body is cast iron cadium plated to prevent rusting, for relamping entire top is removable, lens is protected with wire guard. Size over all, height 7 in., length 14 in., width 9 in. For two standard lamps to 100 watt.

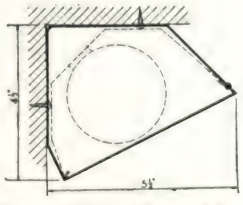


No. 5050. Aisle Lite



Aisle Lite

Cover size 8x8 in. with louvres; box size 6x6 in., for S-11 lamp



No. 1227. Cove Lite

Size, height 4½ in., width 5½ in., for lamps to 100 watts

For detail data on above items, write factory or nearest representative

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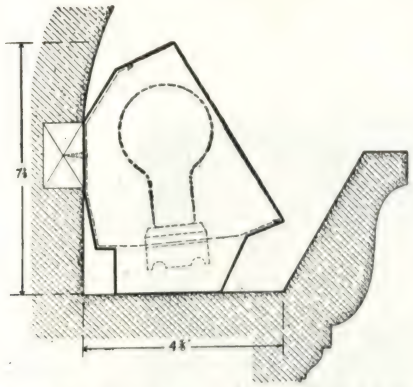
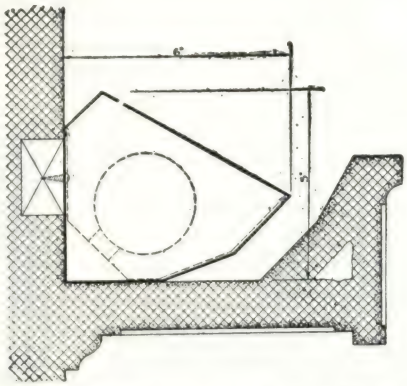
The following illustrations are to show applications primarily for work of this nature.

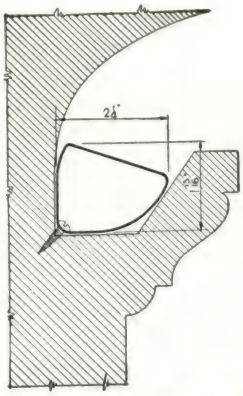
We advise the assistance of our Illuminating Engineers for recommendations.



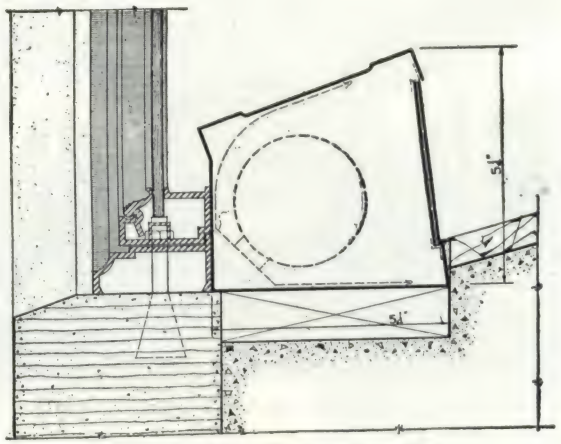
Cove Reflectors No. 1231 for Standard Lamps to 60 Watts



Cove Reflector No. 1241 for Standard Lamps to 100 Watts

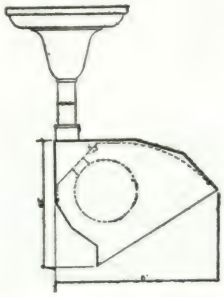


Cove Reflector No. 2150 for Standard Base Tubular Lamps



No. 1033. Window Foot-lite

Made of bronze or steel. Height 5 in., width 5¼ in., length continuous for standard lamps up to 100 watt



Trough Reflector for Overhead Mounting Designed for Lighting Art Galleries, and Large Murals on Theater, Auditorium or School Walls

For standard lamps to 150 watt

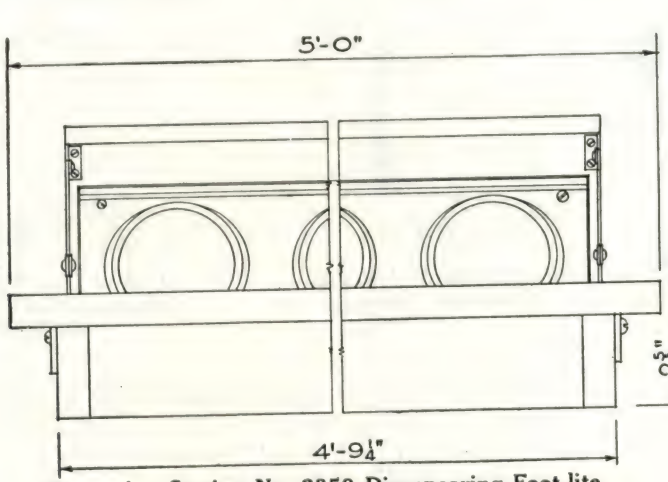


Figure A. Section No. 2350 Disappearing Foot-lite

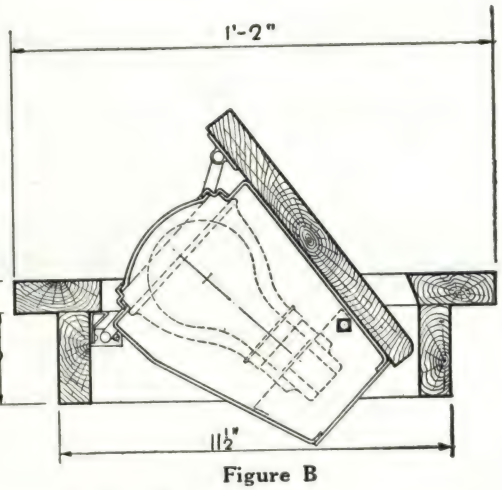


Figure B

Footlighting—Figures A and B illustrate the new Day-Brite disappearing Foot-lite for stage and show window lighting purposes. This fixture is furnished complete with a maple or oak housing in 5 ft. sections ready for installation. The roundels are removable for installing colored lens when desired, for standard lamps to 100 watt.

For actual size drawings of above write factory.

ERIKSON ELECTRIC COMPANY

Specialized Lighting Equipment

6 Power House Street

BOSTON, MASS.

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CLEVELAND, OHIO
COLUMBUS, OHIO
DALLAS, TEX.
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NEW YORK, N. Y.
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PITTSBURGH, PA.
PORTLAND, ORE.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
ST. LOUIS, MO.
ST. PAUL, MINN.
TOLEDO, OHIO
WASHINGTON, D. C.

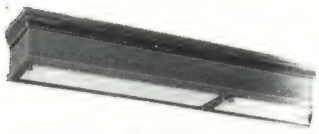
Bank Lighting

ERIKSON REFLECTORS

Erikson counter screen reflectors are designed to fulfill the requirements of each individual installation and represent the highest quality of both material and workmanship.

Counter Lighting from Cornice Reflector

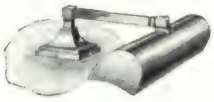
Designs are available for every application found in banks, including indirect general illumination, counters, files, desks, coupon booths, as well as a complete line of illuminating wicket and directional signs.



Counter Screen Reflector No. 1237

Wall Check Desk Reflector No. 609

Wicket Sign Type No. 2016

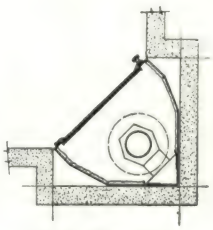


Tile Reflector No. 701

Church Lighting

Erikson chancel arch reflectors are designed to provide even illumination from a concealed source.

The reflectors run continuously immediately in back of the chancel arch and are carefully concealed from all points of view.



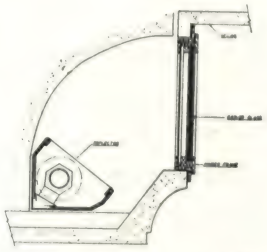
Arch Reflector No. 510

Store Lighting

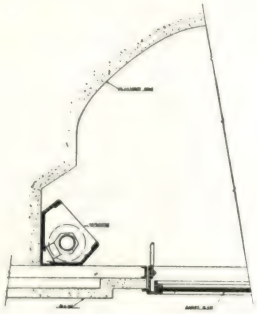
Erikson reflector equipment for illumination of modern store interiors is designed to meet each specific requirement.

This company has developed a complete line of equipment for the illumination of both vertical and flush type diffusing panels.

Illumination of Sales Room by Flush Type Diffusing Panels



Typical Detail for Vertical Panel Lighting

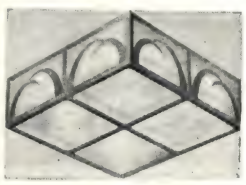


Typical Detail for Horizontal Diffusing Panel Lighting

Even illumination which reveals the beauty of the design as well as the texture of various types of carved and etched diffusing panels is assured through the use of Erikson reflector equipment.

Modern Ceiling Luminaires

This company also manufactures a complete line of modernistic type ceiling luminaires for stores, restaurants, auditoriums, etc.



Continued on next page

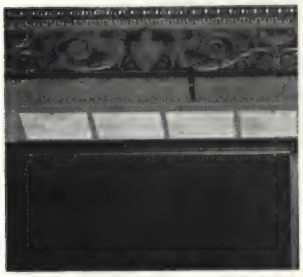
Show Window and Carved Glass Lighting

Erikson show window lighting equipment is of the continuous "built-in" type. The equipment consists of chromium plated reflectors and prismatic lenses mounted in a continuous housing, which add to the appearance of the window, as well as providing correct illumination on the displays without glare.

Lamson & Hubbard

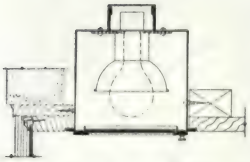
Indirect Lighting Equipment

Erikson indirect lighting equipment for all types of decorative glass illumination is based on nation wide experience.

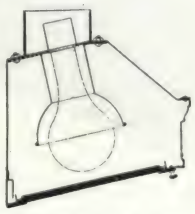


Close Up of Flush Type Window Lighting Equipment

Close Up of Exposed Type Window Lighting Equipment



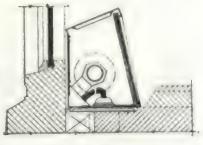
Cross Section of Flush Type Window Lighting Equipment



Cross Section of Exposed Type Window Lighting Equipment

Show Window Foot Lights

Erikson show window footlights are designed to eliminate all shadows and to increase the intensity of light in the lower section of the window. These reflectors employ prismatic control lenses and chromium plated reflecting surfaces.

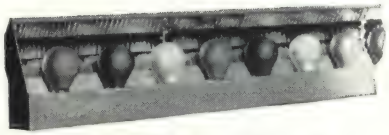


Cross Section of No. 350 Bronze Window Footlight

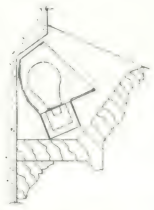
Theatre Lighting

Erikson indirect reflectors for theatre illumination are designed to provide even illumination and efficient lighting results. A large number of designs are available for special conditions.

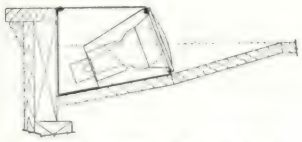
Concealed Lighting of Atmospheric Theatre



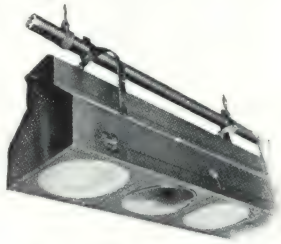
Cove Reflector No. 816



Reflector No. 816



Type "MS" Footlight



Type "M" Border Light

Erikson equipment represents the latest designs in stage lighting reflectors. Heat resisting color lenses and chromium plated reflectors afford permanency and efficiency.

Showcase Lighting

No. 5 Reflector

An Erikson Show Case Reflector is available for every type of show case equipment. The No. 5 illustrated above is the smallest continuous reflector available. Erikson Show Case Reflectors satisfactorily combine the three fundamental elements of correct design—*Beauty, Efficiency,* and the *Highest Quality of Construction.*

Catalogue

A comprehensive catalogue describing the application of special lighting equipment will be mailed on request.

ELECTRIC SERVICE SUPPLIES COMPANY

Manufacturers of Railway, Power and Industrial Electrical Material

HOME OFFICE AND PLANT
Seventeenth and Cambria Streets, PHILADELPHIA, PA.

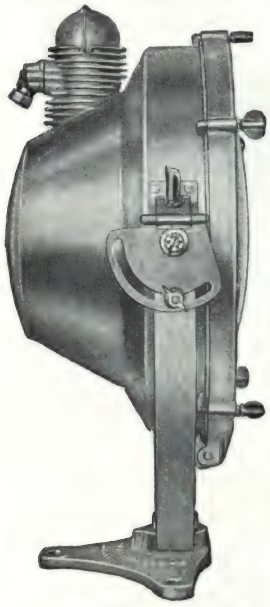
DISTRICT OFFICES
NEW YORK, N. Y., 50 Church Street
BOSTON, MASS., 88 Broad Street
CHICAGO, ILL., 111 No. Canal Street
SCRANTON, PA., 316 No. Washington Avenue
DETROIT, MICH., General Motors Building
PITTSBURGH, PA., Bessemer Building
CANADIAN AGENTS: Lyman Tube & Supply Co., Ltd., MONTREAL, TORONTO, VANCOUVER

Products

Golden Glow Floodlighting Projectors; Golden Glow Lantern Floodlights.

Golden Glow Projectors

Man marvels at spectacles produced by artificial light. By the brightness of its light the progress of a community is frequently measured. Institutions that use light boldly inspire confidence.



Golden Glow Floodlight Projector

With a fuller realization of the value of floodlighting as well as its possibilities, there have come new projector units, new lamps and new architecture which have greatly simplified the proposition.

It is no longer considered good practice to construct an elaborate structure to be visible only during the daylight hours. Today, because of the great expense and effort expended on the exterior appearance of the structure and the necessity of getting the greatest return from the building investment, it is necessary to make it visible to the public during pleasure hours as well as working hours by employing floodlighting.

Floodlighting very often greatly enhances the beauty of the exterior of the building, making it stand out in bold relief against the background of darkness, in many cases dominating all other buildings in the community. There is perhaps no other method which will so quickly bring into prominence a new or existing building.

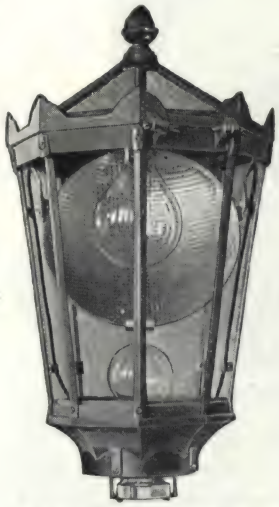
For these reasons architects generally are designing buildings with the thought of floodlighting them on completion and because floodlighting is a relatively new proposition this company is prepared to supply complete engineering service to architects to assist in working out the details of any floodlight project, large or small.

Golden Glow Projectors are constructed of pressed sheet aluminum and fitted with our well-known mirror glass reflectors making the complete units exceptionally durable. They are designed for highest efficiency and the reflectors being of glass will never tarnish or corrode. Many other unique and desirable features are embodied in their construction.

Write for current bulletin on Golden Glow Projectors.

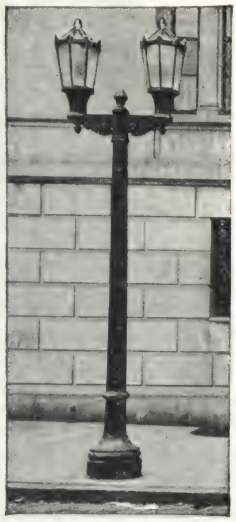
Golden Glow Lantern Floodlights

The Golden Glow Lantern Floodlight is a combination of street lantern and floodlight. It is an artistically designed street lantern in which a powerful lamp and reflector is ingeniously mounted, so that the unit provides a dual service. It projects a powerful beam of light on the object to be lighted, yet from all appearances is just an ornamental street lantern. It is, in fact, a complete floodlight unit mounted within the lantern.



Typical Golden Glow Lantern Floodlight

With glass panels removed showing reflector lamp mounted within



Standards Located at Curb-line

Electrical connections made directly to the house circuit

It provides modern floodlighting for locations where the installation of the ordinary type of floodlight unit would be unsightly and mar the architectural beauty of building and layout. It greatly enhances the beauty and attractiveness of the surroundings by day as well as at night. It makes possible the floodlighting of a building where the space available for lighting equipment is limited to a 10-ft. sidewalk. Its use, however, is limited to buildings, etc., of moderate height.

Write for complete catalogue.

Chicago Tribune Building, Chicago, Ill.
Floodlighted by 174 Golden Glow Projectors

Union Carbide & Carbon Building, Chicago, Ill.
Tower floodlighted by 104 Golden Glow Projectors

Floodlighting of a Bank Building Using Golden Glow Lantern Floodlights Installed at the Curb-line

ESTABLISHED 1898

GARDEN CITY PLATING & MFG. CO.

Lighting Reflectors

1430 South Talman Avenue, CHICAGO, ILL.

NEW YORK OFFICE AND WAREHOUSE, 133 Wooster Street

REPRESENTATIVES IN PRINCIPAL CITIES

For our pages on Ornamental Metal Work, Showcase Frames, Bank Counter Screens, Cage and Vault Work, Adjustable Shelving Hardware, Pullout Garment Carriers and Disappearing Door Hardware, see Manufacturers' Index

"Garcy" Lighting Reflectors

GARCY TRADE MARK REG.

Listed by National Board of Fire Underwriters.

Used in stores, banks, theatres, art galleries and public buildings throughout the country.

Made any size or shape, in straight or curved continuous troughs of any length, or short units for one or two lights.

Materials and Finish

Outer Shells—Made of steel, brass, or bronze, in any standard or special finish.

Linings—Usually made of highly polished chromium. If desired, porcelain, ripple aluminum, or ripple mirror can be furnished.

Diffusing Glass—Where diffusion is desired to avoid glare or specular reflection, or to achieve decorative effects, frosted glass is generally used. Lens or prism design glass can also be furnished.

Specifications

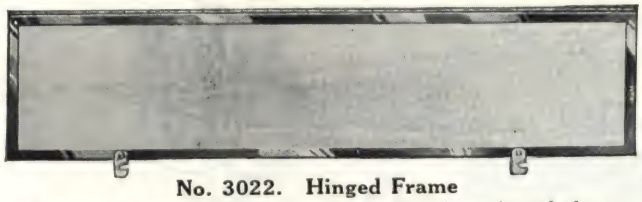
The following information should be included:
A—Material and finish of outer shell.
B—Kind of lining.
C—Spacing of sockets for lamps.
D—Length of reflector.
E—1, open face; or
2. with diffusing glass;
(a) to slide in and out;
(b) in hinged frame attached to reflector;
(c) In hinged frame separate from reflector;
(d) in stationary frame separate from reflector.
F—Type of switch, if any, and location.
G—Plain or mitered ends.
H—How fastened or hung:
1, with screwholes;
2, with chain and canopy;
3, with pipe and canopy;
4, with flanges to screw into recess, etc.

Literature

Write for Reflector Catalog, showing greater detail and additional designs for reflectors.

Hinged Frames or Doors

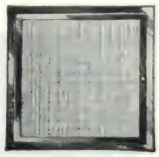
Made any size. Usually furnished with frosted diffusing glass. Can also be had with lens or prism design glass.



No. 3022. Hinged Frame

Furnished attached to reflector. Illustration shows frosted glass

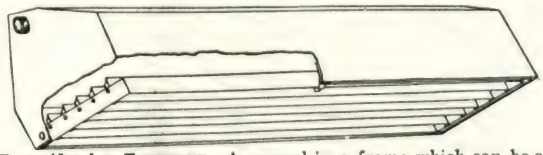
The No. 3023 type of frame is used with reflectors installed in a recess or above the ceiling. The outer frame attaches to the opening. The inner hinged frame provides access to the reflector. (Illustration shows lens design glass.)



No. 3023

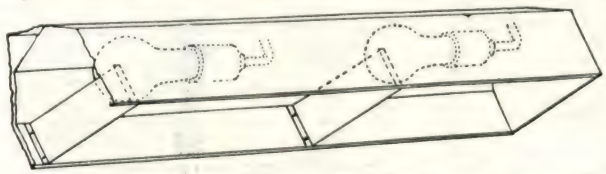
Louvers

Louvers can be furnished whenever it is necessary to eliminate spill light or hide the lamp filament from view in one direction.



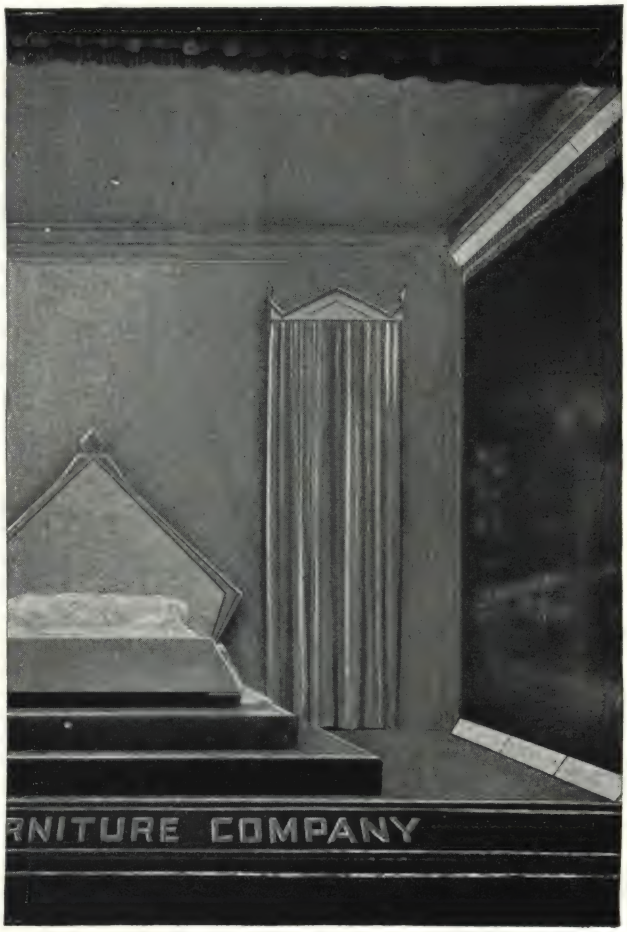
Lengthwise Louvers—Arranged in a frame which can be swung down, providing access to the lamps. Louvers can be adjusted after installation to the most effective angle.

Usually specified with open face window reflectors where the lamps are not otherwise shielded from view.



Crosswise Louvers—Usually specified with open face window reflectors for corner windows.

Store Window Lighting

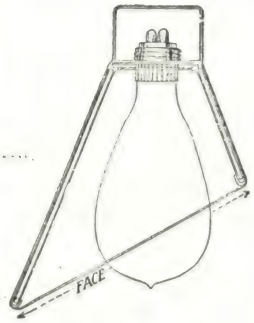


Typical Corner Window

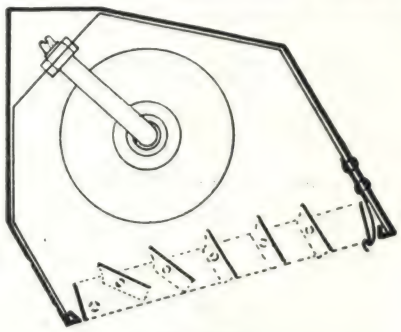
Equipped with overhead and footlight reflectors with diffusing glass face

Continued on next page

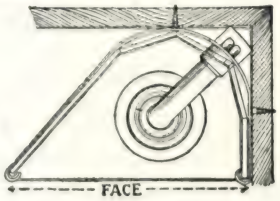
Overhead Window Reflectors



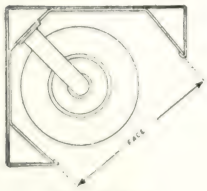
No. 3112



No. 6380
Illustration shows lengthwise louvers

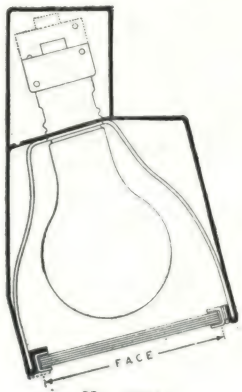


No. 3107



No. W3103

Sizes and shapes other than shown can be furnished

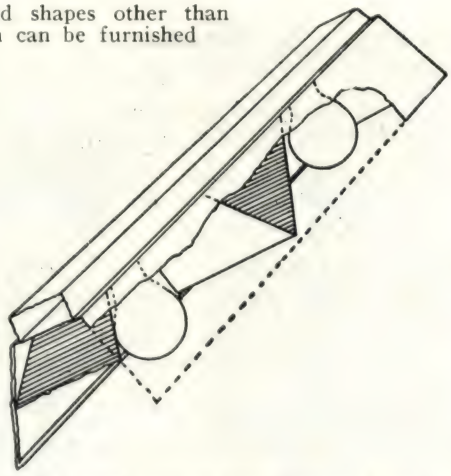


No. 3073

No.	Face, in.	Height, in.	Width, in.	Lamp Capacity, watts
P3107	3½	2⅝	4	60
Q3107	4½	3½	5	100
W3103	3½	3½	4	100
6380	7	6½	7¾	200
P3112	7	9	6¼	100
Q3112	8½	11¼	7¾	200
6308	3½	3⅜	3⅜	60
6309	4	3¼	3⅞	60
6310	5	4¼	4⅞	100
R3073	6½	9	6¾	100
T3073	4	7⅛	4⅞	60

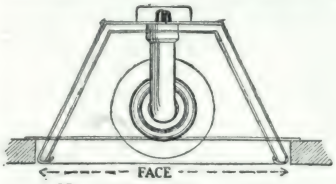
Nos. 3112 and W3103 in sizes listed are furnished open face only, or with crosswise louvers.

Other designs can be had with diffusing glass face, crosswise louvers or lengthwise louvers.

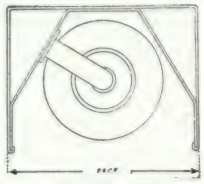


Nos. 6308, 6309 and 6310. Furnished with deflectors between lamps

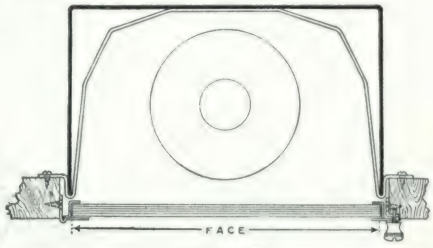
Overhead Island Window Reflectors



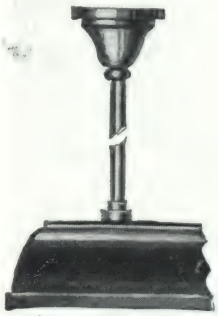
Nos. 6312, 6313 and 6314
Have apron ¾ in. from bottom to support reflector above recess



No. W3102



No. 3077
Section shows method of attaching reflector with separate hinged door into recess



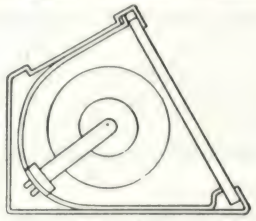
Nos. 6093, 6094
Shown with tube and canopy. Can also be furnished with chain

No.	Face, in.	Height, in.	Lamp capacity, watts
6312	3½	3⅜	60
6313	4	3¼	100
6314	5	4¼	150
W3102	4	3	100
R3077	6½	4½	150
T3077	4	4¼	100
6093	5	4	150

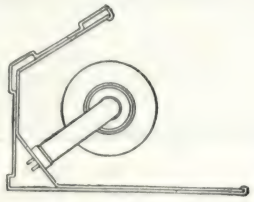
Deflectors, Diffusing Glass or Louvers can be furnished with any of these shapes.

Other sizes and shapes can be furnished.

Footlight Window Reflectors

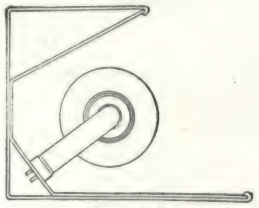


No. 3096

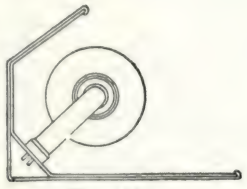


No. 3056

Name of Establishment in Raised Cast Bronze Letters Can Be Placed on Top of Reflector



No. 3053



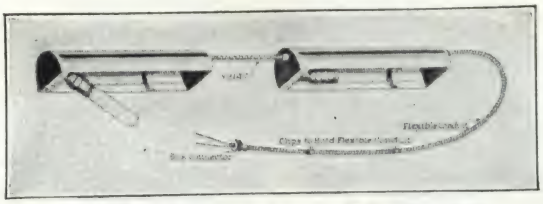
No. 3055

No.	Face, in.	Height, in.	Width, in.	Lamp capacity, watts
C3096	6½	3	2¾	150
3056	5	4	5¼	100
3053	4½	4	5¼	60
3055	5	3¾	5	150

Other sizes and shapes can be furnished.

Continued on next page

SHOWCASE AND WALLCASE LIGHTING



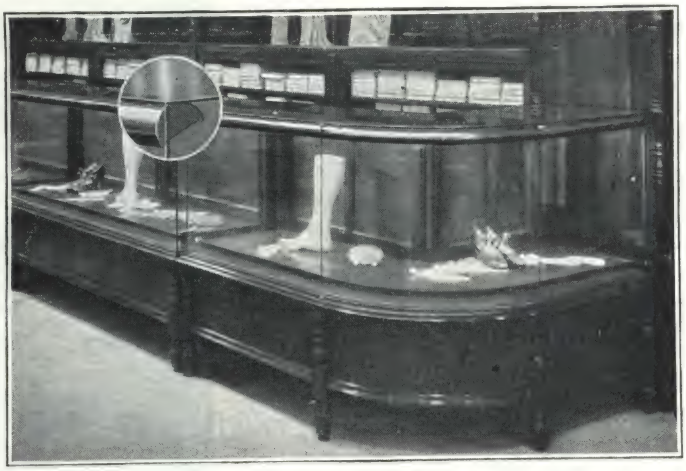
Unit Set Connected with B.X. Conduit

Reflectors are furnished complete with hanging clips for wood frame or all-glass showcase as required.

Tilting Sockets—An exclusive feature of "Garcy" showcase reflectors. Makes changing of lamps easy. Avoids breakage. Facilitates cleaning.

All reflectors are furnished completely wired and ready to hang. Unit sets are equipped with hangers and all fittings ready to install; continuous reflectors with elbow fitting for 3/8-in. tubing and additional wire at one end. Toggle switch, box and plate are included with unit sets connected with brass tubing, but not with other reflectors unless specified.

Standard finish, statuary bronze. Other finishes if desired.



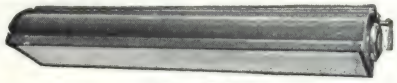
"Garcy" Continuous Reflectors (Straight and Curved) Installed in All-glass Showcases

Length, in.	Face, in.	Height, in.	Unit sets connected with brass tubing	Unit sets connected with B.X. conduit	Continuous reflectors *	Outer shell	Lining	Sockets	For lamps
8¼	2⅜	1⅝	3014	3010		Brass	Porcelain	Standard	T10 Tubular
			S3014			Steel	Porcelain		
			3015			Brass	Chromium		
			S3015	3011		Steel	Chromium		
As ordered	2	1½			3193S	Brass	Porcelain		
					3193L	Steel	Porcelain		
					3196S	Brass	Chromium		
					3196L	Steel	Chromium		
9¼	1½	1⅛	3305S		3301S	Brass	Chromium	Intermediate	T6½ Tubular
			3305L	3306L	3301L	Steel	Chromium		

*Continuous reflectors are furnished with lamp sockets spaced 18 in. on centers unless otherwise specified.

Reflectors for Mirrors in Fitting Rooms, etc.

No. 6630 is 18 in. long, 5⅛ in. wide, 4⅜ in. high with twin socket for two 100-watt lamps; removable diffusing glass and chain pull switch.



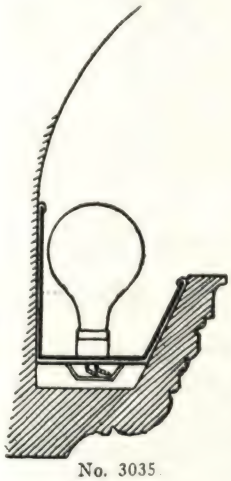
No. 6330

Other sizes and designs are available.

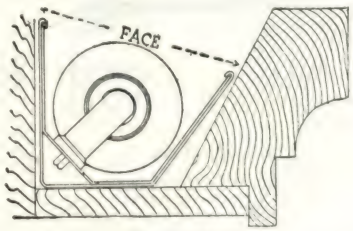
Indirect Lighting

The most evenly diffused illumination is obtained when concealed light sources are used to throw light on walls and ceiling. Reflectors concealed in coves and cornices are most effective for this purpose.

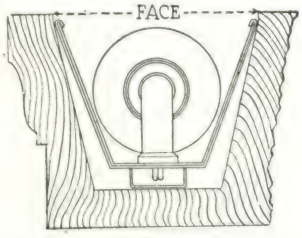
For best results, reflectors should be designed to fit the requirements of each individual installation.



No. 3035



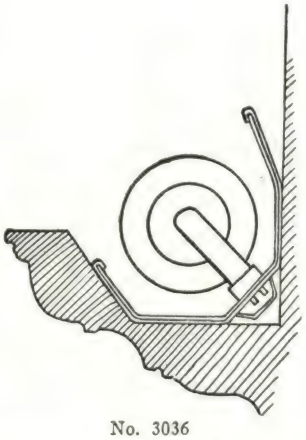
No. 3164



No. 3163

No.	Face, in.	Height, in.	Width, in.	Lamp capacity, watts
P3035	5	6	4	100
Q3035	6½	4	5	200
P3164	4¼	3½	4⅛	100
Q3164	5¼	4¼	5	150
P3163	4	3¼	3⅞	100
Q3163	5	4¼	4⅞	150
N3036	3½	3½	3½	60
P3036	4	3⅞	3	100
Q3036	5	5¼	4¼	150

Other sizes and shapes can be furnished.



No. 3036

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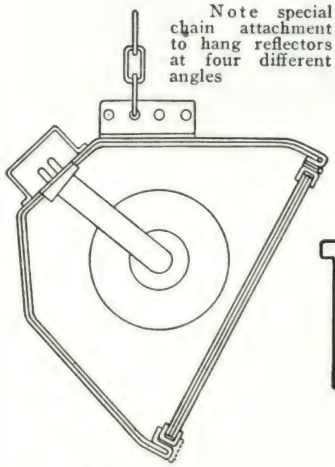
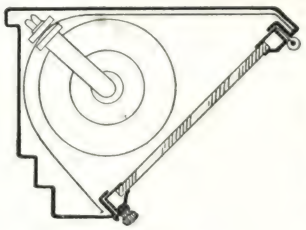
Overhead Lighting—Picture Galleries, Rug Displays, etc.

The lighting of pictures calls for great care to avoid specular reflections of the light source from the face of the pictures. This is practically impossible with any system of daylight illumination, but is easily done with properly placed "Garcy" reflectors. Our engineering department will gladly make recommendations or assist in the solution of lighting problems.



No. 3026

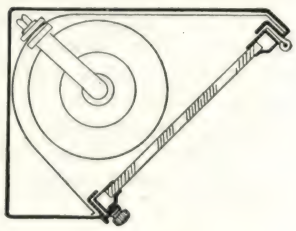


No. 6340

No.	Face, in.	Width, in.	Height, in.	Lamp capacity, watts
3026	6½	6¾	6½	150
6340	5	6⅝	4½	100
6341	5	6	4½	100

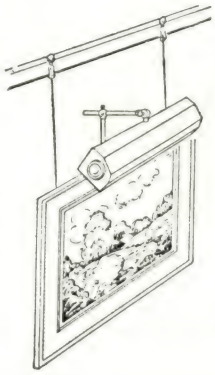
Reflectors are furnished in any lengths required to fasten directly to ceiling or beam, or with chain and canopy or pipe and canopy to hang from ceiling.

Other sizes and designs can be furnished.



No. 6341

Individual Picture Reflectors



With adjustable arms to attach to picture frames or wall.

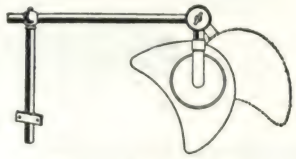
Furnished with 10 ft. of lamp cord, plug and pull chain socket or switch.

To determine proper size of reflectors—Reflector should be one-half to two-thirds the width of the canvas, and should project slightly more than one-third its height.

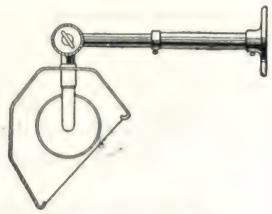
For paintings up to 42 in. high, excluding the frame, reflectors with tubular lamps will give efficient illumination; for larger pictures use the larger reflectors with standard lamps.

No.	Face, in.	Length, in.	Number of lights	Type of lamps
3068	4	10	1	100 watt
3069	4	18	2	100 watt
A3050	3½	10	1	60 watt
C3050	3½	18	2	60 watt
3002	2¼	8½	1	T10 Tubular
3049	2	18	2	T10 Tubular
A3054	4	10	1	60 watt
A3142	4	18	2	60 watt

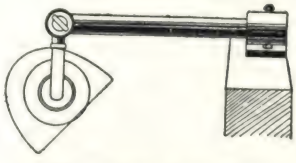
Any lengths, any number of lights can be furnished. Reflectors up to 18 in. long furnished with 1 arm; over 18 in. long with 2 or more arms depending on length.



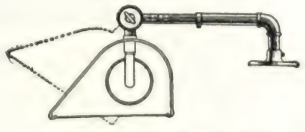
Extension Arm F
Reflector Nos. 3068, 3069
Arm extends to 12 in., raises to 10 in.



Extension Arm E
Reflector No. 3050
Arm extends to 18 in.



Extension Arm G
Reflector Nos. 3002, 3049
Arm extends to 12 in.

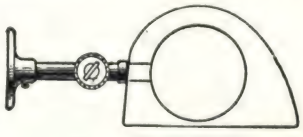


Extension Arm D
Reflector Nos. 3054, 3142
Arm extends to 18 in.

All arms have adjustable joints for adjusting reflectors to proper angle. Sizes other than listed can be furnished.

Reflectors for Coupon Booths

Adjustable for best lighting angle.
Outer shell usually made of brass, statuary bronze plated.

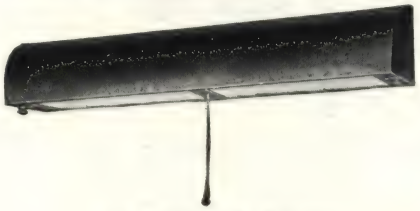


No.	Length, in.	Width, in.	For lamp
3047	8¼	2⅜	T10 Tubular
3048	10	3½	50 watt standard

Other sizes and designs can be furnished.

Continued on next page

Bank Counter Screen Reflectors



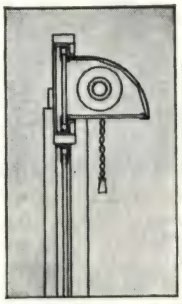
Bank Screen Reflector

To attach to wicket or cornice.

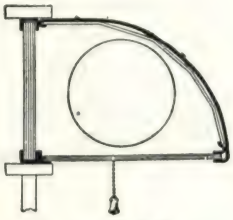
Usually made in 18-in. units with twin socket and removable diffusing glass. Also furnished in continuous lengths with lamps usually spaced 18 in. on centers.

No.	Width, in.	Height, in.	Lamp capacity, watts
3142	4	3¾	60
3143	5	4½	100

Other sizes and designs can be furnished.



Section Through Counter Screen Showing Reflector and Illuminated Sign



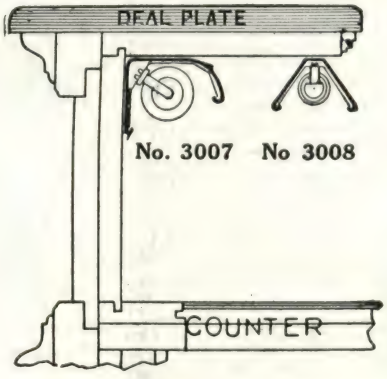
No. 3072
Wicket Reflector with Illuminated Sign

Letters are sandblasted on opal glass with dark background.

Any lettering.

Signs are removable to permit changing of lamps.

Sign is 3 in. high; reflector, 4 in. wide with diffusing glass bottom. Usually made 18 in. long with twin socket for 60-watt lamps and pull chain switch.



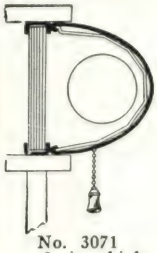
No. 3007 No 3008

TO ATTACH UNDER DEAL PLATES OR DEAL SHELF

No.	Face, in.	Height, in.	Lamp capacity, watts
3007	5	3	60 watt
3008	3½	2	T10 Tubular

Other sizes and designs can be furnished.

Illuminated Signs



No. 3071
2 in. high, usually made 18 in. long. For No. T10 standard socket tubular lamps

To attach to bank wickets.

Letters are sandblasted on opal glass with dark background.

Any lettering.

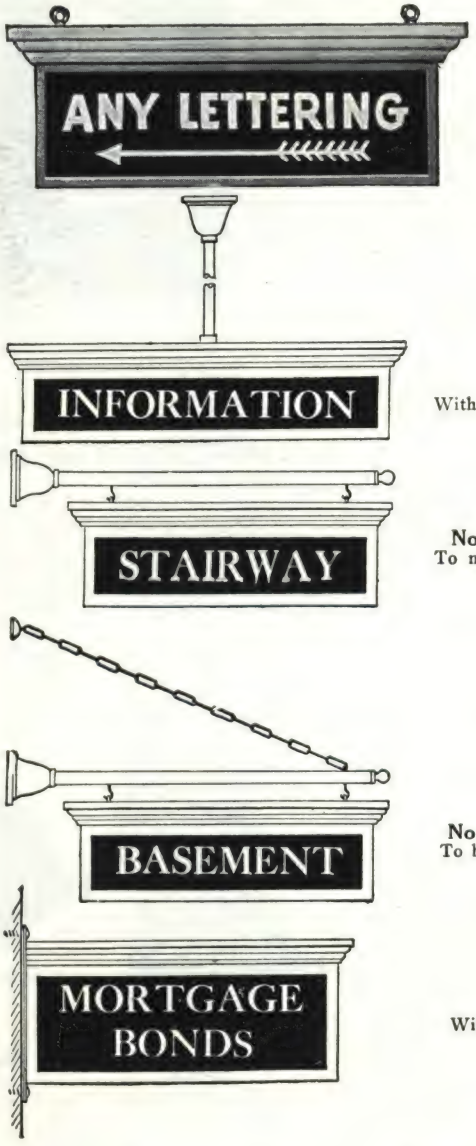
Signs are removable to permit changing of lamps.

Edgelite Signs

Any lettering or size. Single or double face. Glass is illuminated through edge. Light source is completely concealed. Highly effective.

Usually made with opal glass. Letters are raised and the background is sandblasted and finished in any Duco finish such as black, bronze, verdigreen, etc., or electro bronze plated to form a contrast to the white letters. These signs are effective even when they are not self-illuminated.

Edgelite signs can also be made with ¼-in. plate glass with the letters sandblasted into the back and backed up with a black metal plate to provide contrast. When illuminated, the effect is both striking and dignified.



No. 6363

These signs are usually furnished with clips for hanging as shown at left. Can also be had to suspend by chain or rod, to be placed flat or on edge against a wall, or inverted to stand on desk, ledge or counter

Furnished completely wired with silk cord and plug for connection. Used with standard socket tubular lamps

No. 6365. Sign
With pipe and canopy to suspend from ceiling

No. 6363. Sign
No. 3029. Hanging Arm
To mount at right angles to wall

No. 6363. Sign
No. 6370. Hanging Arm
To be used on signs over 18 in. long

No. 6364. Sign
With plate to attach at right angles to wall

GENERAL ELECTRIC COMPANY

Designers and Engineers of Floodlighting for Buildings
Manufacturers of Floodlighting Projectors

GENERAL OFFICE
1 River Road, SCHENECTADY, N. Y.

For Sales Offices, Service Shops and Associated Companies, see Section on Motors
For Other G-E Products, see Manufacturers' Index

FLOODLIGHTING AN IMPORTANT FACTOR IN MODERN BUILDING DESIGN

The architect's experience and taste enable him to prevail over the most disadvantageous site and surroundings—to adapt his design to the conditions imposed by adjacent structures and topography and, despite all, to impress his fabric with the effect and beauty of his conception. But he must contend with darkness. Night veils his creation—not only the fine details but, to a large extent, the general lines—and all its grace and power are lost during the hours when most men find their only leisure to admire the art of its design and to appreciate the embodied suggestions of the purpose for which it was erected.

Illumination engineers have arrived at a system of floodlighting that literally wrests buildings and monuments from the powers of darkness; that utilizes surrounding shadow to emphasize the charm and dignity of the structure; that gives nightly force to its eloquent message; that projects it against the sky and compels the admiring attention of throngs who must otherwise pass by in ignorance of its worth.

By the scientific control of floodlights it is possible either to bathe an entire building in their rays and make it a monument of white beauty or to pick out unusual architectural features for the study of those who appreciate artistic distinction. With the whole spectrum at command, tints may be introduced where they will be of effect and shadows may be cast that will give depth and significance to facade and colonnade.

These comprehensive applications of floodlighting have met such wide approval that many architects, builders, and owners are now deeply interested in designs and materials that will especially lend themselves to night illumination.

Union Terminal Building, Cleveland, Ohio, Floodlighted by G-E Projector

Architects, in particular, are bending their talents to the incorporation of structural details that will be in artistic keeping with floodlighting developments. They are adopting hitherto unused tints of terra cotta, brick, and stone for the sake of their fine effect under the concentrated beams of floodlighting projectors. Floodlighting has become an instrument of architectural art.

The Manifold Uses for Floodlighting

The possibilities, and the practical uses, of floodlighting are unlimited. Following are a few of the many applications that have been made both in architectural and industrial fields:

Monumental buildings	Towers
Business blocks	Gas filling stations
Building fronts	Automobile showrooms
Public buildings	Industrial plants
Athletic grounds	Grain elevators
Outdoor theatricals	Power stations
Winter sports	Prison walls
Monuments, fountains, etc.	Construction work

General Electric Company's Facilities and Service to Architects and Engineers

The GENERAL ELECTRIC COMPANY has specially equipped laboratories in which lighting specialists, engineers and artists, devote their skill and experience to new accomplishments in the technique of floodlighting—to new applications and new effects.

The Company offers the services of its specialists to co-operate with architects or engineers in planning exterior or interior illumination of either new or old structures.

G-E MOBILE COLOR LIGHTING

General Electric illuminating engineers have perfected a new and striking development in the art of decorative lighting. At the present time, this method has been applied principally to the projection of richly hued, ever-changing color designs upon architectural exteriors by means of floodlighting projectors, and upon interior areas of wall and ceiling by means of concealed MAZDA lamps. In both cases, operation and intensities are centrally controlled through a G-E Novalux Selsyn-Thyratron system.

This spectacular painting with light—with its possibilities of almost infinite change in design and tint—is accomplished by the use of floodlighting projectors with colored lenses for exterior illumination, and for interior applications, by color caps and aluminum collars about each lamp. While only three fundamental colors are used—red, green, and blue—their dimming and mixing permit many variations of orange, yellow, purple, cerise, and the pastel shades of red, blue, green, yellow and purple. The dimming of one series of lights as another comes on produces effects so surprising and yet so artistic that G-E mobile color lighting may easily revolutionize exterior illumination and the decoration of hotels, ballrooms, theaters, and public buildings.

Where this system is used for interior illumination, no lighting fixtures are needed, as the lights may be used for steady projection in white or in any color, as well as for mobile decoration. The walls are simply given an appropriate flat tint, the inconspicuous projectors are installed, and the compact control apparatus—either manual, automatic or combined—is located in any out-of-the-way corner.

The possibilities inherent in the mobile floodlighting of exteriors have already led architects to a serious consideration of terra cotta and like materials as a wall surface because of their superior reflecting qualities.

The control system involves principally the use of three devices—the Selsyn motor, the low-vacuum rectifying tube marketed under the trade name "Thyratron," and a new type of saturated-core reactor. The power apparatus can be placed in any desired location, since there are no mechanical connections, and only small currents and low voltages are required. The absence of energy-absorbing devices, such as resisters, gives high efficiency.

Among prominent installations may be mentioned those in the great ballroom of the St. George Hotel, Brooklyn, N. Y., in the dining room of Great Captain's Beach and Yacht Club, East Portchester, Conn., and the exterior of the Staley Administration Building at Decatur, Ill.

For complete information, refer to our nearest Sales Office.

Type L-29, with Clear Plain Lens

Type L-30, with Clear Lightly Stippled Lens

Standard Types of G-E Floodlighting Projectors

LANG'S DAYLIGHT, INC.

Manufacturers of Lang's Daylight Reflectors

1833 East 55th Street, CLEVELAND, OHIO

Products

WINDOW REFLECTORS, SHOWCASE REFLECTORS, RUG RACK LIGHTING UNITS—all made from a special glass slightly blued in its molten state to a scientifically determined degree. Numerous coatings of heavy pure silver, permanently protected by coatings of copper, form the reflecting surface.

Neater Installations

Neater installations are made possible with Lang's Reflectors due to their small size. They are more easily concealed as noted in the diagrams below. Their silver gray finish harmonizes well in any window where the reflectors are exposed.

Ronda No. 330

300 and 500-watt Lamp

Designed for high intensity lighting. This unit may be placed on centers as close as 10 in. Total height including holder, 10 in.; extreme width, 8⅛ in.; front to back, 8⅛ in.; back to center, 4 1/16 in.

Alda No. 620

100 and 150-watt Lamp

Designed for exceptionally deep windows and rug racks. Total height, 6½ in.; width, 4⅞ in.; front to back, 5¾ in.; back to center, 2⅝ in. Use Form "O" Holder.

Adenda No. 625

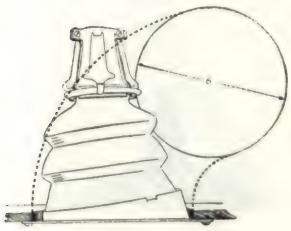
100 and 150-watt Lamp

For use in narrow windows, island windows, windows with glass backgrounds and those without backgrounds. Light source is entirely concealed. Total height including holder, 7 in.; extreme width, 5¼ in.; front to back, 5 in.; back to center, 2½ in.

Aldeen No. 101

25, 40 and 60-watt Lamps

Designed for wall cases, foot lighting, cove lighting and wherever small reflectors are needed.



Ceiling Ring No. 99

Where the ceiling remains flat, Ceiling Ring No. 99 is used. The reflector remains in its natural position, giving the maximum efficiency of light.

A Whiter Light

Lang's Daylight Reflectors filter the yellow rays from the light of a Mazda lamp and reflect a whiter light, which displays the color and texture of merchandise more effectively.

Light Distribution

The distinctive telescopic design of Lang's Daylight Reflectors makes it possible to distribute the light effectively in the window—to distribute the light where it is most essential.

Benda No. 260

150 and 200-watt Lamp

Designed for narrow windows, island windows, windows with glass backgrounds and those without background. The light source is very well concealed. Total height including holder, 8⅛ in.; extreme width, 5¾ in.; front to back, 5⅞ in.; back to center, 3 in.

Belda No. 220

150 and 200-watt Lamp

Designed for windows of average depth. May be spaced as close as 7 in. Total height including holder, 8½ in.; extreme width, 6¼ in.; front to back, 6⅛ in.; back to center, 2⅛ in.

Arda No. 680

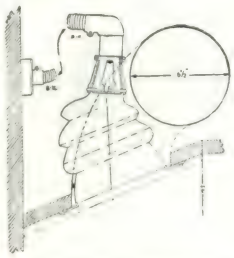
100 and 150-watt Lamp

Designed for windows of average depth, where 100 and 150-watt lamps are used. Total height including holder, 7¼ in.; width, 5 in.; front to back, 5 in.; back to center, 2½ in.

Verda No. 611

100 and 150-watt Lamp

For use where general distribution of light is necessary, such as over merchandise counters. Total height, 5¼ in.; diameter, 5 in. With 100-watt lamp, use Form "O" Holder; with 150-watt lamp, use Form "H" Holder.



Ceiling Ring No. 66

All reflectors can be furnished with Ceiling Ring No. 66 for installation where reflector is concealed. In this case the ceiling is slanted, which provides an exceptionally neat method of installation.

Complete catalogue mailed on request.

IVANHOE DIVISION OF THE MILLER CO.

Manufacturers of Industrial and Commercial Lighting Equipment

MERIDEN, CONN.

Products

INDUSTRIAL and COMMERCIAL LIGHTING EQUIPMENT: Porcelain Enameled Steel Reflectors and Holders, vaporproof, dustproof and weatherproof; Poster Board and Sign, Floodlighting and High Mounting Reflectors; Direct and Semi-indirect Enclosing Globes, and Standard and Safety Fixtures.

Uses of Ivanhoe Industrial Equipment

To meet all the requirements of industrial plants, the Ivanhoe line offers several types of standard reflectors for each type of lighting. These may be grouped, as they apply to three general classifications, namely, General Overhead, Group and Local.

Illumination requirements for General Overhead and Group lighting being such that the same reflectors are usually applicable to both classes of service, the following general classification may be made.

For General Overhead and Group Lighting—RLM standard dome reflectors; glassteel diffusers; standard bowl type reflectors; standard shallow dome type reflectors; glasstop reflectors; vaporproof reflectors; high mounting units and dust cover equipment.

For Local Lighting—Small angle type reflectors; small bowl type reflectors; sign and poster board reflectors and special service reflectors.

Heavy Duty 3¼-in. Threaded Neck Reflectors and Holders—This equipment is designed for use where conditions require the heaviest and most durable type of equipment. The reflectors are porcelain enameled steel (green outside and white inside) with heavy rolled copper thread securely locked in reflector. This construction is supplied in RLM, glassteel diffuser, bowl, angle and shallow dome type reflectors. Steel holders are green enameled outside and aluminum are natural finish. Cast iron holders are sherardized or green duco. Supplied for either medium or mogul base lamps.

HEAVY DUTY HOLDERS

Medium Base

M994
Cast Aluminum

18566
Porcelain Steel

18567
Cast Iron

Catalogue No.	Diameter Fitter, in.	Depth, in.
M994	3¼	2⅜
18566	3¼	3½
18567	3¼	3½

Mogul Base

MO994
Cast Aluminum

18576
Porcelain Steel

18577
Cast Steel

Catalogue No.	Diameter Fitter, in.	Depth, in.
MO994	3¼	2⅜
18576	3¼	4¾
18577	3¼	4¾

HEAVY DUTY REFLECTORS

RLM Dome Reflector

Bowl Reflector

Shallow Dome Reflector

Angle Reflector

Catalogue No.	Diameter, in.	Lamp watts
RLM Dome Reflectors		
18552	12	100
18554	14	150
18556	16¼	200
18558	18	300– 500
18559	21	750–1500
Bowl Reflectors		
18560	8½	100
18561	9½	150
18562	10	200
18563	12½	300– 500
18565	15¾	750–1500
Angle Reflectors		
18540	8½	60– 100
18541	10	150– 200
18542	12½	300– 500
18545	15¾	750–1500
Shallow Dome Reflectors		
18564	12½	40–60
18569	14	100
18575	15¼	150–200
18578	18	300–500

R Type Solid Top Reflector Complete with Socket

The Ivanhoe R Type Reflectors are supplied complete with medium or mogul base sockets.

These reflectors are supplied in the RLM dome, shallow dome, bowl and angle type and glassteel diffuser porcelain enameled steel, green outside and white inside.

Bowl Reflector

Shallow Dome Reflector

Continued on next page

Angle Reflector

RLM Dome Reflector

SOLID TOP REFLECTORS

Catalogue No.	Diameter, in.	Lamp watts
Bowl Reflector		
REB 60	7 1/2	50–60
REB 100	8 1/2	100
REB 150	9 1/2	150–200
REB 500	12 1/2	
REB 1000	15 3/4	
Shallow Dome		
RED 60	12 1/4	50–60
RED 100	14	100
RED 150	15 1/4	150–200
RED 500	18	300–500
Angle Reflector		
REL 100	8 1/4	60– 100
REL 150	10 1/2	150– 200
REL 500	12 1/2	300– 500
REL 1000	15 3/4	750–1500
RLM Dome		
REDD 60	12	60
REDD 100	12	100
REDD 150	14	150
REDD 200	16 1/4	200
REDD 500	18	300– 500
REDD 1000	21	750–1500

Ivanhoe Standard Glassteel Diffuser

For general or group lighting the Ivanhoe Glassteel Diffuser meets every requirement for the highest quality of illumination with high light output and low brightness recommended for printing plants, machineshops or other locations where close vision and rapid work must be accomplished with freedom from shadows and reflected glare from polished metal surfaces.

Of heavy porcelain enameled steel, white inside and out, with an enclosing globe of the finest quality Genco glass. Globe is held in place by a screwless safety holder. Also supplied with Trutint globe where work demanding color discrimination is necessary, as paint and dye works, textile mills, printing or engraving plants.

Made in 18, 21 and 24-in. sizes for lamps from 150 to 1000 watts.

The New Ivanhoe Dustproof Glassteel Diffuser—An outstanding development in industrial lighting equipment—the New Dustproof Glassteel Diffuser is basically the same as the standard glassteel diffuser, with such outstanding features as being entirely dustproof and lintproof, and reasonably vaporproof and fumeproof. These features are of definite advantage, for the cost of maintenance is materially decreased through this new construction, as only the exterior of the globe and the inside and outside of reflector need be cleaned regularly.

A threaded globe screws into an aluminum holder in the reflector and seats securely against an asbestos gasket, making the unit dustproof and lintproof.

High Mounting and Floodlighting Reflectors

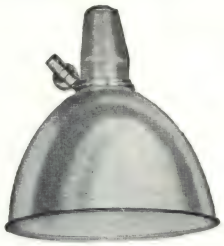
In many industrial interiors and outdoor locations it is necessary to mount the lighting equipment a considerable distance or height from the floor or working area.

To meet these conditions, Ivanhoe designed a complete line of flood and high mounting reflectors for lamps from 300 to 1500 watts and for mounting as high as 100 ft. They may be had for either pendant or angle mounting, as a sturdy, durable and well designed swivel may be had if desired. Crane bays, erecting floors, storage spaces, yards, athletic fields, parking or used car lots, swimming pools, beaches and tennis courts are only a few of the many locations that can be lighted successfully with these reflectors.

1065 Pendant

1064 Swivel

1066 Pendant



1067 Swivel

HIGH MOUNTING AND FLOODLIGHTING REFLECTORS

Catalogue No.	Diameter, in.	Lamp watts
High Mounting Reflectors		
865	18 1/2	300–1500
865 Swivel	18 1/2	300–1500
1064	16 3/8	300– 500
1064 Swivel	16 3/8	300– 500
1065	18 1/2	750–1500
1065 Swivel	18 1/2	750–1500
Flood Lighting Reflectors		
1066	14	300– 500
1066 Swivel	14	300– 500
1067	16 1/4	750–1000
1067 Swivel	16 1/4	750–1000

Vaporproof Units

This equipment was developed and is recommended for use in oil fields, refineries, flour mills, grain elevators and other industrial locations where protection from dust and vapor is essential from a safety standpoint.

These units consist of a cast aluminum holder and enclosing globe over which the reflector is fitted. A rubber gasket at the top of the socket and an asbestos gasket against which the globe seats seals lamp and electrical connections within the holder and globe.

Complete Units

Holder and Globe

COMPLETE; HOLDER, GLOBE AND REFLECTOR

No. 970	14 in.	100–150 watts
No. 972	16 in.	200 watts
No. 976	18 in.	300–500 watts
HOLDER, GLOBE AND SOCKET		
No. 971	5 1/4 in.	100–200 watts
No. 975	8 1/4 in.	300–500 watts

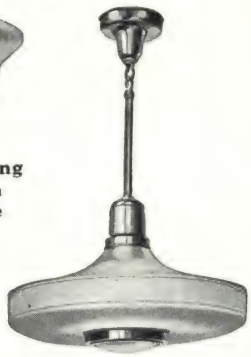
Ivanhoe Commercial Lighting Equipment

In addition to a complete line of industrial lighting equipment Ivanhoe offers a complete line of commercial lighting glassware and fixtures.

Shown here are a few typical types of Ivanhoe direct and semi-indirect lighting units. A wide selection of enclosing globes in various sizes and contours for direct lighting and semi-indirect lighting together with a wide variety of fixtures in the standard and safety fixture types are available.

Ivanhoe Plain Suspension Fixture and Plain Trojan Glassware

Ivanhoe Plain Ceiling Fixture and Plain Trojan Glassware



Suspension Fixture and Keldon Glassware

OCHILTREE ELECTRIC CO.

Manufacturers of "Covelite" for Exterior Floodlighting

505 Liberty Avenue, PITTSBURGH, PA.

SALES REPRESENTATIVES

ATLANTA, GA., Marshall C. Whitman, Bona Allen Building
BALTIMORE, MD., W. B. Masland Co., 105 E. Franklin Street
BOSTON, MASS., Detweiler-Bell Co., 101 Milk Street
BUFFALO, N. Y., H. H. Mallon, 350 So. Elmwood Avenue
CINCINNATI, OHIO, H. C. King, 622 Broadway
CLEVELAND, OHIO, Handel-Davies Co., 202 Chester-Twelfth Building
DALLAS, TEX., Lighting & Specialty Co., 2205 Leonard Street
DENVER, COLO., Wesco Co., 7th and Lawrence Streets
DETROIT, MICH., James D. Carr, 137 E. Elizabeth Street
INDIANAPOLIS, IND., Scott-Jaqua Co., 31 E. Georgia Street
LOS ANGELES, CAL., Frank E. Hastings, 201 Transportation Building
LOUISVILLE, KY., Nicholson Electrical Sales, 214 Keller Building
MILWAUKEE, WIS., A. J. Singer, 315 National Avenue
PHILADELPHIA, PA., Hopkin Bros., Inc., 235 So. 8th Street
SALT LAKE CITY, UTAH, Raymond Ackerman, 318 Dooly Block
SEATTLE, WASH., Lyman D. Morgan, 245 Securities Building
ST. LOUIS, MO., Geo. H. Wacker Co., 2647 Washington Avenue
ST. PAUL, MINN., C. O. Kindy, 1236 Lincoln Avenue
TORONTO, ONT., Wilson Illumination Co., Ltd., 186 Adelaide Street, W.
WASHINGTON, D. C., W. B. Masland Co., 3220 Connecticut Avenue, N. W.

Description

"Covelite" is a lighting system with individual mirrored glass reflectors, scientifically spaced in a compact metal housing with reflectors secured to individual removable front plates made in lengths to fit the building, easy to install, easy to maintain.

Covelite

TRADE-MARK REGISTERED

Penn Central Light & Power Co., Altoona, Pa.

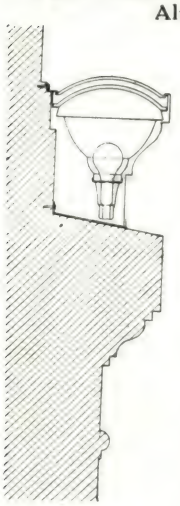
"Covelite" uses standard lamps eliminating the possibility of lamps getting out of focus or equipment being moved when cleaned—insuring an even distribution of light at all times.

The light source is concealed from view yet the building is evenly illuminated with glareless, intense, attention - compelling light.

"Covelite" is furnished in two types: one weatherproofed for use where equipment is subject to all weather conditions and the light projected upward with a cover plate having heat-resisting glass lens weatherproofed over each outlet; the other non-weatherproof, where equipment is placed under the overhang of a building or at the outside of a coping of a building throwing the light downward.

"Covelite" is constructed of either galvanized steel or 16-ounce copper.

Ogee or egg mouldings can be had on face of either type of equipment.



Application Coraopolis Savings & Trust Co.

Weatherproof Covelite

For lighting the exterior of buildings either in white or colored light. This equipment is constructed so that it can be placed on a small ledge on the building and be secured to the building by means of flat iron brackets bolted to equipment and building.

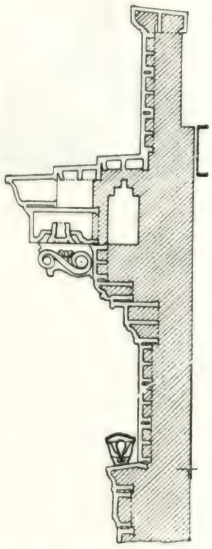
Brackets are not furnished with equipment.

Weatherproof Covelite equipment is for use where light is to be projected upward and equipment is subject to all weather conditions, generally being placed where rain and snow fall directly on equipment.

The weatherproof lenses over each reflector in "Covelite" are of the highest grade heat-resisting glass obtainable.

On the concentrated type of equipment an inside color lens of natural color heat-resisting glass, held in place by a color frame of the same grade of heat-resisting glass as the outside lens, is used.

On the semi-concentrated equipment natural color heat-resisting glass lens are weather-proofed in top cover eliminating inside color lens.



Application Penn Central Light & Power Co.

Coraopolis Savings & Trust Co., Coraopolis, Pa.
Press. C. Dowler, Pittsburgh, Pa., Architect

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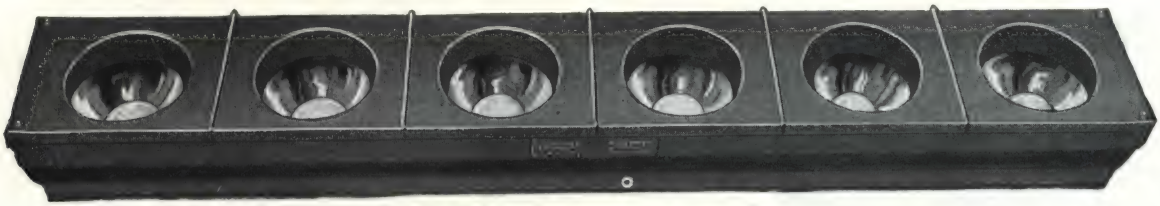
EXTERIOR FLOODLIGHTING (WEATHERPROOF EQUIPMENT)



(Patented United States and Canada)

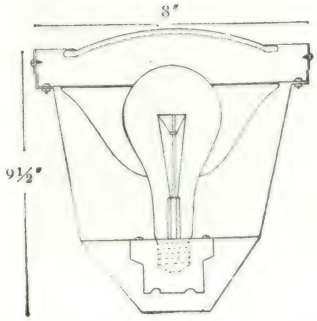
E40GW "Covelite" Semi-concentrating Type Reflectors

For use where a portion of the building not exceeding 15 ft. in height is to be lighted. Natural color heat-resisting glass lenses, weatherproofed, in amber, blue, clear, green or red, furnished with equipment. No supports.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
E40GW8	A23	100	8
E40GW12	A23	100	12
E40GW15	A23	100	15
E40GW18	A23	100	18

Note: Above equipment can be had for use with 50-watt A21 lamp, same spacing of outlets as 100 watts.



E40GW

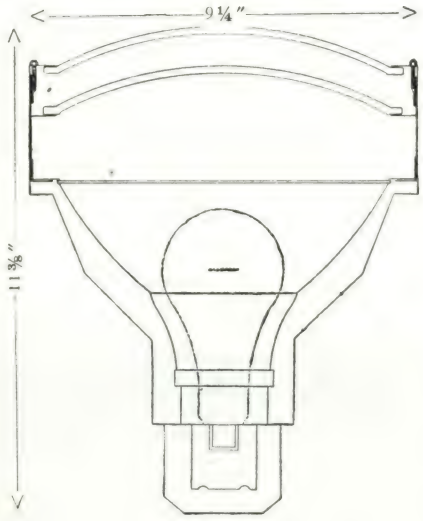
C100W "Covelite" Concentrating Type Reflectors

For use where the light is to be projected on the building not exceeding 25 ft. in height. Clear heat-resisting glass lens, weatherproofed, furnished with equipment. Inside color frames and natural colored heat-resisting glass lenses in amber, blue, green or red, extra. No supports.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
C100W10½	A23	100	10½
C100W12	A23	100	12
C100W15	A23	100	15
C100W18	A23	100	18
C100W24	A23	100	24

Construction of either galvanized iron or 16-oz. copper.



C100W

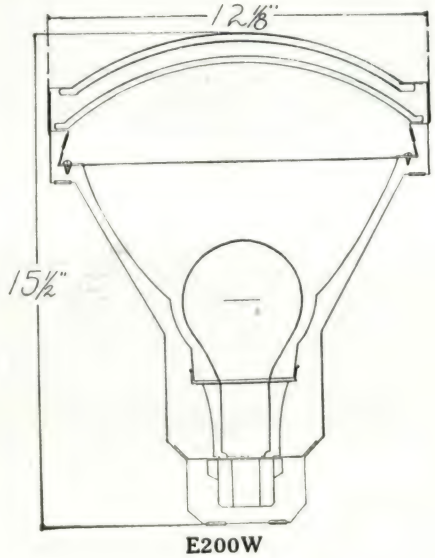
E200W "Covelite" Concentrating Type Reflectors

For use where the light is to be projected on the building not exceeding 35 ft. in height. Clear heat-resisting glass lens, weatherproofed, furnished with equipment. Inside color frames and natural colored heat-resisting glass lenses, in amber, blue, green or red, extra. No supports.

WEATHERPROOF "COVELITE" EQUIPMENT

Cat. No.	Type lamp	Size lamp, watts	Spacing, in.
E200W13	PS30	200	13
E200W15	PS30	200	15
E200W18	PS30	200	18
E200W24	PS30	200	24
E200W30	PS30	200	30

Construction of either galvanized iron or 16-oz. copper.



E200W

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"COVELITE" FOR EXTERIOR FLOODLIGHTING (NON-WEATHERPROOF)

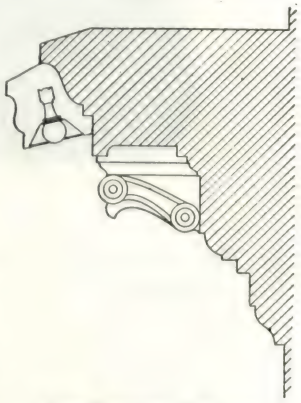
Forbes National Bank, Pittsburgh, Pa.

Non-weatherproof "Covelite"

For use where equipment is placed under the overhang of a building such as gasoline stations or at the outside of the coping of a building as used on the Forbes National Bank where the light is projected downward. No cover plates are used with non-weatherproof "Covelite."

This type of equipment is made for 90° or surface mounting, as E40G, E40R, E15B where a facial board is placed in back of equipment: or with straight side and flush mounting, as E40GS, E40RS, E15BS where equipment is to be inset in ceiling or where the angle of projection is other than 45°.

Flush mounting equipment is used on Forbes National Bank; surface mounting on the Gulf Refining Company and Sun Oil Company filling stations.



Application Forbes National Bank

Non-weatherproof "Covelite" equipment is ideal for lighting picture galleries, stock quotation boards border lights in small theaters, fronts of store buildings, etc.

The reflectors used in non-weatherproof "Covelite" are of the semi-concentrated type and give a fairly wide distribution of light. The reflectors are secured to the individual removable front plates assuring reflectors to be in proper alignment with the receptacle at all times. Lamps or reflectors need not be removed for cleaning.

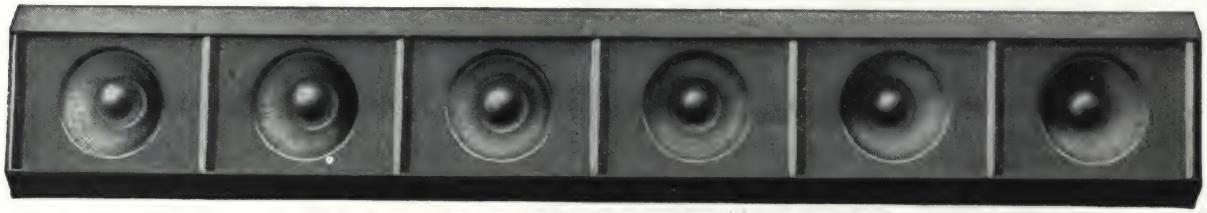
Construction

"Covelite" equipment is constructed in lengths to fit the building. By removing the individual front plates, easy access can be had to the interior of equipment. By punching a hole, by means of nail or drill, through the sides, equipment can easily be secured to the building on filling station. Flat iron brackets bent to conform to the contour of "Covelite" and the building, can be used for supporting equipment where used at the outside of copings. No supporting brackets furnished with equipment.

"Covelite" equipment is listed and passed by the Underwriters' Laboratories, Inc.

One of the 112 Sun Oil Company Stations Lighted by "Covelite"

One of the 342 Gulf Refining Company Stations Lighted by "Covelite"



"Covelite"—Patented in the United States and Canada

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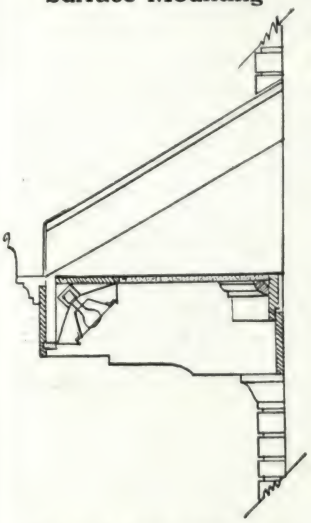
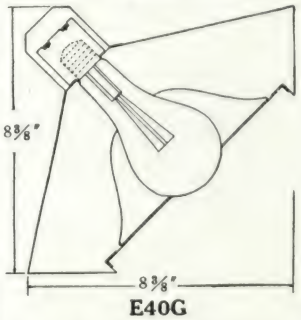
"COVELITE" FOR EXTERIOR FLOODLIGHTING (NON-WEATHERPROOF)

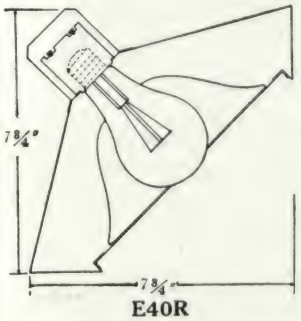
Surface Mounting



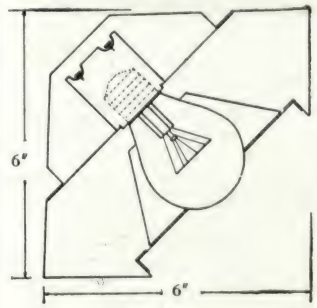
Typical Application for Filling Station
90° angle mounting



E40G



E40R



E15B

Covelite

TRADE-MARK REGISTERED

Information Required

Exact dimensions of building, extent of overhang, depth of facial board, material of which building is to be constructed, color of material, whether galvanized iron or copper, spacing of outlets, size of lamps, radii of eyebrows, degree of angles at miter and catalogue number of equipment.

Specifications

Housing either galvanized steel or 16-ounce copper; mirrored glass reflectors, lengths as required; straight or mitered sections; wired or unwired; one shop coat of paint on galvanized steel, crated.

"Covelite" costs no more than ordinary lighting equipment; easy to install; easy to maintain.

"COVELITE" RECOMMENDED FOR USE ON BUILDINGS OF DARK MATERIALS—RED BRICK OR CONCRETE

Catalog No.	Type lamp	Size lamp, watts	Spacing, in.
Surface Mounting			
E40G8	A23	100	8
E40G12	A23	100	12
E40G15	A23	100	15
E40G18	A23	100	18
E40G24	A23	100	24
Flush Mounting			
E40GS8	A23	100	8
E40GS12	A23	100	12
E40GS15	A23	100	15
E40GS18	A23	100	18
E40GS24	A23	100	24

"COVELITE" RECOMMENDED FOR USE ON BUILDINGS OF MEDIUM COLORED MATERIALS—BUFF BRICK OR STUCCO

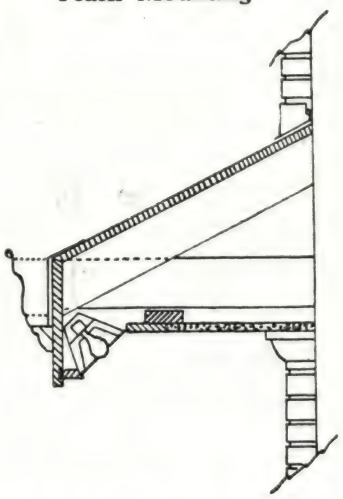
Catalog No.	Type lamp	Size lamp, watts	Spacing, in.
Surface Mounting			
E40R8	A21	50	8
E40R12	A21	50	12
E40R15	A21	50	15
E40R18	A21	50	18
E40R24	A21	50	24
Flush Mounting			
E40RS8	A21	50	8
E40RS12	A21	50	12
E40RS15	A21	50	15
E40RS18	A21	50	18
E40RS24	A21	50	24

"COVELITE" RECOMMENDED FOR USE ON BUILDINGS OF LIGHT COLORED MATERIALS—WHITE STUCCO OR WHITE BRICK

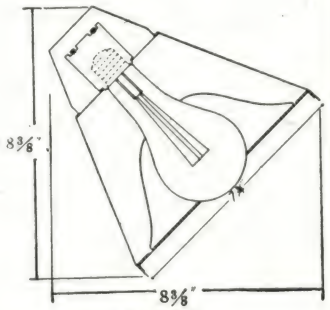
Catalog No.	Type lamp	Size lamp, watts	Spacing, in.
Surface Mounting			
E15B8	A19	25	8
E15B12	A19	25	12
E15B15	A19	25	15
E15B18	A19	25	18
E15B24	A19	25	24
Flush Mounting			
E15BS8	A19	25	8
E15BS12	A19	25	12
E15BS15	A19	25	15
E15BS18	A19	25	18
E15BS24	A19	25	24

Listed by Underwriters' Laboratories, Incorporated

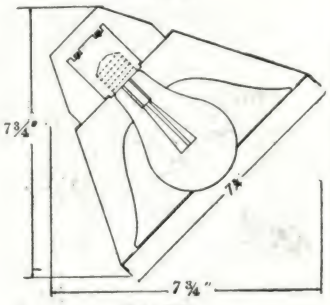
Flush Mounting



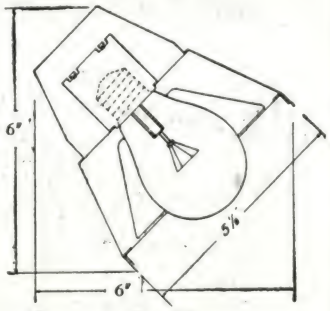
Typical Application for Filling Station



E40GS



E40RS



E15BS

"COVELITE" FOR EXTERIOR FLOODLIGHTING

Continued on next page

"COVELITE" FOR MOBILE COLOR LIGHTING

Covelite

TRADE-MARK REGISTERED

"Covelite" for mobile color lighting is for use where a moving, or changing of colored light is desired for the exterior of a building.

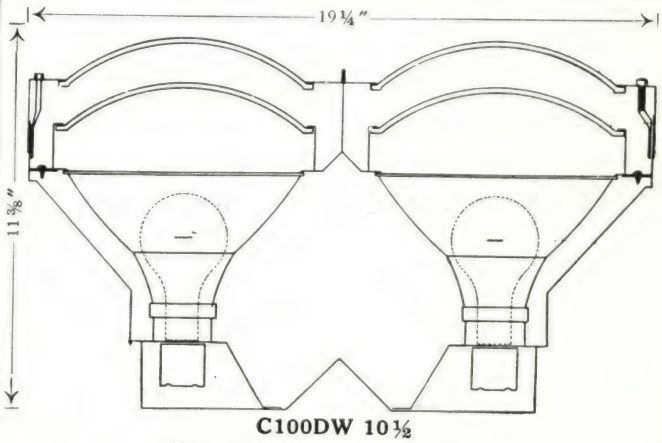
"Covelite" offers an ideal publicity medium for owners and operators of public buildings. The unusual effect of changing green to amber, amber to red, red to white, and their combinations is attractive and causes much comment. To obtain these results "Covelite" should be used in conjunction with either flashers or cycle dimmers.

"Covelite" is so constructed that the reflector and lens are in one housing, the reflectors being held in place by means of individual removable plates supported to the exterior of housing, keeping them in exact position at all times, and eliminating the possibility of lamps getting out of focus when cleaning or replacing lamps.

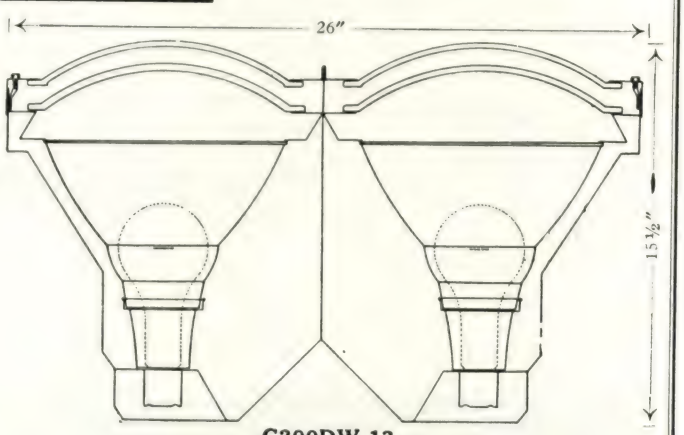
The clear heat-resisting lenses are weatherproofed in sectional removable top covers giving easy access to lamps and reflectors. Between the clear lens and the reflectors is placed a frame with natural colored heat-resisting glass lens as the color medium. Lenses used in "Covelite" are of the best grade of heat-resising glass obtainable.

"Covelite" for mobile color lighting is manufactured in two sizes—for use with 100-watt lamps, outlets 10½-in. centers, or for use of 200-watt lamps, outlets on 13-in. centers.

Construction—Double row of outlets; housing 16-oz. copper; concentrating reflector; clear heat-resisting glass lenses weatherproofed; inside color frames; inside color lenses of natural color heat-resisting glass in amber, blue, green, and red; wired—each color separate. Moulding or supports extra.



C100DW 10½
100-watt, A23 lamp. 10½-in. centers



C200DW 13
200-watt, PS30 lamp. 13-in. centers

Listed by Underwriters' Laboratories, Incorporated

Service

We are equipped to furnish architects and general building contractors with layout and detailed drawings of "Covelite" equipment recommended for their buildings when plans stating dimensions of ledges, height to be lighted, materials of which building is to be constructed, width of overhang, and color of light to be used. Our representatives will be glad to serve you when installations are being made.

Facilities

"Covelite," on account of various sizes, types, spacing of outlets and lengths of equipment, is constructed for each individual job. No materials carried as stock items for immediate shipments.

With our modern machinery, experienced mechanics, and railroad facilities, we can furnish quick service on shipments of "Covelite" equipment.

Information Required for Estimate

To avoid delay and insure intelligent inquiries for estimates, we will require the following information:

Exact dimensions of building including ledges, overhangs, heights, radii, color of materials, color of light, moulding for weatherproof equipment, if desired, constructed of galvanized steel or copper, spacing of outlets, size of lamps, angle of projection of light and catalogue number of equipment.

"COVELITE" FOR MOBILE COLOR LIGHTING

Permaflectors

The silver-plated glass reflectors with the PERMANENT *reflecting surface*

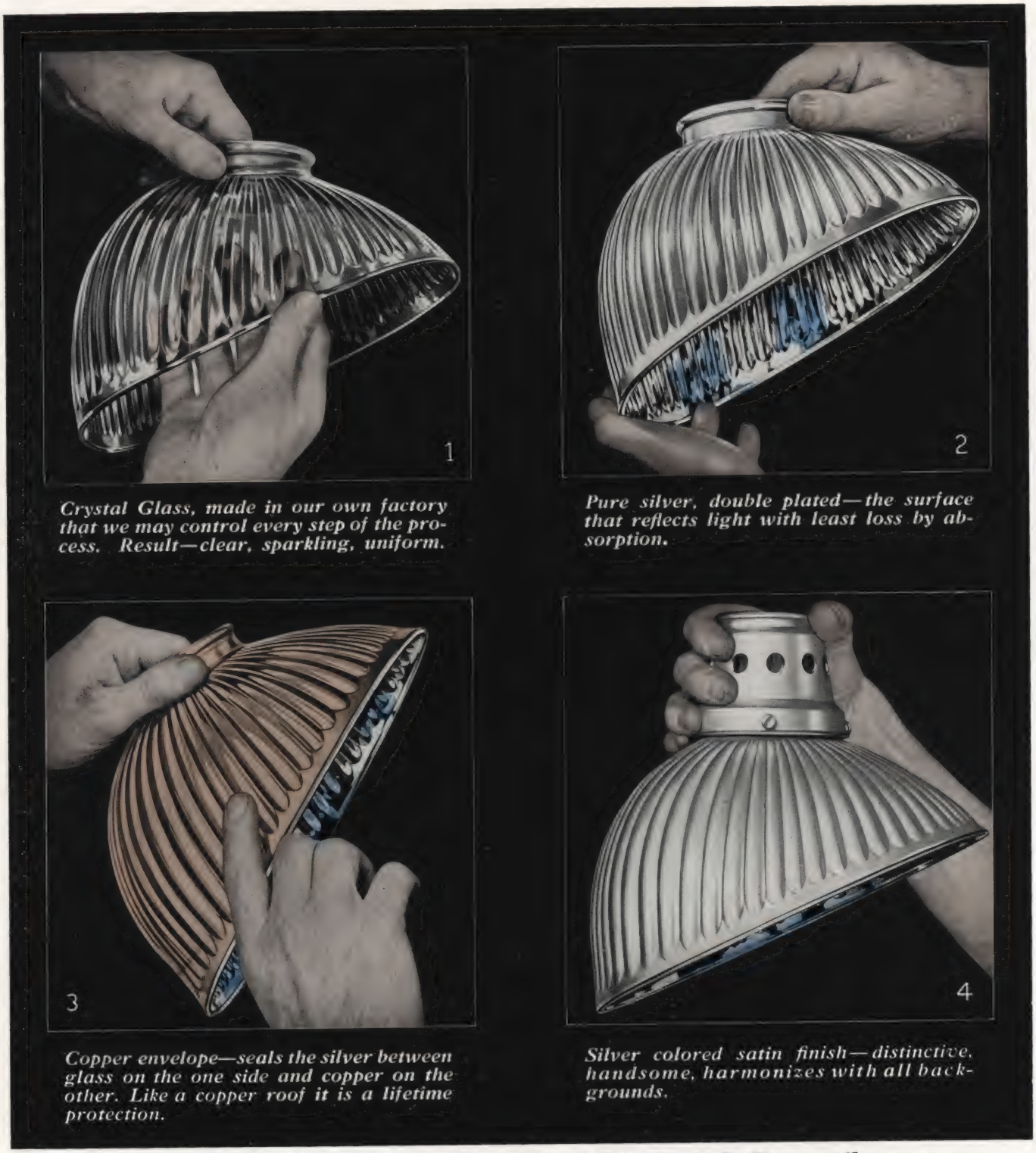
MADE ONLY BY

LOCAL REPRESENTATIVE

Pittsburgh Reflector Co.

304 ROSS STREET - PITTSBURGH, PA.

New York City: General Motors Building
Chicago: Merchandise Mart



Crystal Glass, made in our own factory that we may control every step of the process. Result—clear, sparkling, uniform.

Pure silver, double plated—the surface that reflects light with least loss by absorption.

Copper envelope—seals the silver between glass on the one side and copper on the other. Like a copper roof it is a lifetime protection.

Silver colored satin finish—distinctive, handsome, harmonizes with all backgrounds.

Outstanding Distinctive Features of Pittsburgh Permaflectors

The complete Permaflector — the glassware as well as the application of the reflecting surface and protective finish — is made in the Pittsburgh Reflector Company's own plant under the closest supervision and inspection. Permaflectors are unconditionally guaranteed for ten (10) years. The illustrations above show clearly the four major steps in the process of manufacture.

1. The Glassware — Permaflector glassware is of the highest quality of tough, accurately-blown, clear crystal glass.

2. The Reflecting Surface — Silver-plating on the outside of the glass — for commercial uses, the most efficient reflecting surface yet produced — when protected by the Pittsburgh method it retains permanently its original bright luster.

3. The Copper Protecting Coat — Over the silver-plated reflecting surface is applied, by an exclusive secret process, a thin tough sheet of copper. This permanently seals the silver and protects it from abrasion and positively prevents tarnishing, discoloration, checking and peeling.

4. The Satin Silver Finish — Over the copper protective surface is applied a satin silver finish, attractive and distinctive — a finish of neutral tone which harmonizes admirably with all surrounding materials and fitments.

Continued on next page

PITTSBURGH REFLECTOR COMPANY

Manufacturers of Permaflector Silvered Glass Reflectors

304 Ross Street, PITTSBURGH, PA.

BRANCHES

NEW YORK, N. Y., J. J. McPARLAND, Manager, General Motors Building—Telephone, Circle 7055-6

CHICAGO, ILL., J. J. KIRK, Manager, 1157-8-9 Merchandise Mart—Telephone, Superior 0970

FACTORY REPRESENTATIVES

ATLANTA, GA., WHITMAN & KETHLEY, Bona Allen Building
BALTIMORE, MD., W. B. MASLAND CO., 105 E. Franklin Street
BOSTON, MASS., DETWEILER-BELL CO., 101 Milk Street
BUFFALO, N. Y., H. H. MALLON, 350 S. Elmwood Avenue
CINCINNATI, OHIO, H. C. KING, 622 Broadway
CLEVELAND, OHIO, HANDEL-DAVIES CO., 202 Chester-Twelfth Building
DALLAS, TEX., THE LIGHTING AND SPECIALTY CO., 2205 Leonard Street
DENVER, COLO., WESCO CO., 7th and Lawrence Streets
DETROIT, MICH., JAMES D. CARR, 141 E. Elizabeth Street
INDIANAPOLIS, IND., SCOTT-JAQUA CO., 202 Indiana Terminal Warehouse, 31 E. Georgia Street
KANSAS CITY, MO., MERVIN SIMONS, Keystone Building, 1320 Main Street
LOS ANGELES, CALIF., FRANK E. HASTINGS, 201 Transportation Building, 7th and Los Angeles Streets
LOUISVILLE, KY., NICHOLSON ELECTRICAL SALES, 214 Keller Building
MILWAUKEE, WIS., A. J. SINGER, 315 National Avenue
PHILADELPHIA, PA., HOPKIN BROS., INC., 235 S. 8th Street
SALT LAKE CITY, UTAH, RAYMOND ACKERMAN, 318 Dooly Block
SEATTLE, WASH., L. D. MORGAN, 240 Securities Building
ST. LOUIS, MO., GEO. H. WACKER CO., 2647 Washington Boulevard
ST. PAUL, MINN., C. O. KINDY, 1236 Lincoln Avenue

Products

"PITTSBURGH" PERMAFLECTOR SILVERED GLASS REFLECTORS, in more than 50 different designs and shapes.

Adaptability

Adapted to every economic illumination need. Reference to the index below gives the major specific uses.

The Company—Its Experience and Facilities

More than two decades of continuous successful specialization in the development, manufacture and application of this product. All Permaflector units, including glassware, are made in our own factory under experienced supervision. Every step in the manufacturing processes is constantly under our control. Rigid inspection is complete assurance that only perfect units which will fulfill our guarantee are merchandised.

Complete stocks of Permaflectors are available at all branch offices for immediate local delivery. Adequate factory warehouse stocks of all standard products are maintained for prompt, one-day shipping service.

The Fourteen Year Record

That "Pittsburgh" Permaflectors invariably stay bright is proven by the history of the past 14 years. Although the heat of the Type "C" lamp places great stress and strain upon the reflecting surface and the reflector backing, Permaflectors have successfully passed every test—the heat test in the laboratory, the heat test in the baking ovens after the finish is applied (350 degrees for four hours) and last, but by no means least, the actual practical test in scores of thousands of installations throughout the world.

Not even 1/1000 of 1 per cent—not even one in 100,000 of all the "Pittsburgh" reflectors made since August 1st, 1916—has ever been reported as having the backing crack, check or peel or the silver reflecting surface tarnish or darken.

Guarantee

We unconditionally guarantee that the backing of "Pittsburgh" Permaflector Silvered Glass Reflectors will not crack, check or peel and that the silver reflecting surface will not tarnish for a period of 10 years from the date of purchase.

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Engineering Service

For more than two decades we have specialized in the lighting of show windows and in other fields of special illumination. During this varied experience we have accumulated a fund of information valuable in the solution of illumination problems. This information is available, without obligation, for the solution of all problems relating to the lighting of show windows, color lighting, spot lighting, foot lighting, indirect cove lighting for theaters, churches, libraries, courtrooms and other public buildings as well as homes, direct and indirect lighting, industrial lighting, lighting through skylights, outdoor floodlighting, etc.

Our experienced corps of illuminating engineers are constantly available to the architect for prompt and comprehensive service.

Scope of This Catalogue

This catalogue contains complete, detailed information for the convenience of the architect on all the standard products of the PITTSBURGH REFLECTOR COMPANY. On preceding page is a complete index of subject matter and units. Page numbers both in the index and in cross references refer to Permaflector page numbers as given at the bottom of each page. To secure the most practical and economical results we strongly recommend consultation with our branch offices, particularly at the time plans and specifications are in the course of preparation.

Other Publications

Other publications of this company, sent free to any architect on request, are described on Permaflector Page 48.

The Fundamentals of Good Lighting

Good lighting (efficient illumination) is dependent on five basic elements, namely:

(1) Proper size and type of lamps;
(2) Proper location and spacing of units;
(3) Permanent effectiveness of the reflector;
(4) Proper design or shape of the reflector;
(5) Correct installation of the lighting unit.

Varying requirements of application and intensity create problems often difficult of solution. Obviously the type of reflector is of paramount importance if permanence of effectiveness and maximum economy are to be maintained.

Reflectors—Technical Information

Reflecting surfaces are divided into two major classes—the diffuse and the specular.

The diffuse reflecting surface, typified by the familiar porcelain or white enamel, or stippled surfaces, simply spreads or scatters the light in many directions, without accurate control.

Specular reflectors not only reflect light, but control it accurately—direct the light where it is wanted—and thus minimize the waste of electric current.

Some light is lost by absorption whenever it falls upon any kind of a surface, just as some water is lost by absorption when it falls upon even a hard surface, such as a concrete road.

But it is well known to engineers, as well as to the science of optics, that silver plated glass absorbs less light than any other kind of a surface which it is practicable to use for commercial reflectors.

A polished silver surface has a very high "reflecting coefficient"—about 95%. That is, it reflects or returns all but about 5% of the light it receives.

But unprotected silver tarnishes quickly—darkens and loses its reflecting power—and so cannot be used.

When silver is protected by glass, as in the case of mirrors, the silver surface itself has a coefficient as high as 92%.

The coefficient for silver plated glass is reduced to perhaps 87% by the absorption of some of the light in passing through the glass itself.

A polished silver surface can be protected with lacquer—due to its cheapness this has been tried as a substitute for glass. But though the lacquer is apparently transparent when new, it has been found that the reflecting coefficient of the lacquer-protected silver, even when new, is only about 75%. Moreover, the lacquer is easily scratched. But the serious objection to it is that lacquer darkens with time, eventually reducing the coefficient to less than half its original value.

Freshly polished nickel has a coefficient of 60%, falling off rapidly by tarnishing.

For ready comparison, we give the established coefficients of reflection of various surfaces, in tabular form.

Approximate Coefficients of Reflection

Polished silver, unprotected, new, darkens rapidly	95%
Silver surface, plated on glass	92%
Silver plated glass	87%
Silver surface lacquered, new	75%
Silver surface lacquered, old, as low as	35%
Nickel, freshly polished, tarnishes rapidly	60%
Aluminum and aluminum alloys, less than	60%
Stainless steel, not over	40%
Chromium, not over	65%

From this engineering data—the particular efficiency and adaptability as a reflecting surface of silver plated glass is established.

It is not sufficient, however, to select any silver plated glass reflector. Unless the silver plating is properly protected, the silvered reflecting surface will gradually deteriorate until it has no more value than aluminum, stainless steel, or other similar surface.

There is *one* silvered glass reflector which *does stay bright*—the reflecting surface of which does not tarnish or discolor.

Permaflectors stay bright—at the end of longest periods of observation (14 years) the reflecting surface has proven to be just as bright, just as efficient, as when they were first installed.

Permaflectors—An Economic Achievement

Description—Permaflectors are the silver-plated glass reflectors with the permanent reflecting surface, made only by PITTSBURGH REFLECTOR COMPANY.

We have now completed 14 years of a remarkable manufacturing record. Although "Pittsburgh" Permaflectors are unconditionally guaranteed for ten years against the common faults of silvered glass reflectors, of all the "Pittsburgh" reflectors made since we began using our secret coppering process on August 1st, 1916—not even one in one hundred thousand has ever been reported to us as defective.

When Type "C" lamps came on the market in 1915, trouble began for manufacturers of silvered glass reflectors. The greater heat of the new lamp caused the backing to crack, check or peel and the silvered reflecting surface to tarnish or darken.

After a long series of experiments we perfected a process which we have thus far kept secret, whereby we lay a thin sheet of copper over the silver plating. This seals the silver between the glass and the copper.

It is permanent—the silver stays bright!

Economical—It is not sufficient that a reflector

Continued on next page

installation be efficient when first installed. Initial effectiveness of lighting is important, of course, but it is of the utmost importance that this efficiency be maintained.

Reflectors which turn dark from the heat of the lamp are worthless; and replacements, even if without charge for the new reflectors, in no way indemnify the user for the waste of electric current for which he pays, but which is not converted into useful lighting; nor does replacement compensate for sales lost by reason of the decreased lighting.

Darkening of the reflecting surface can easily lessen the output of light from reflectors 10%, 20% and in extreme cases even 30% to 50%. This may amount to two or three dollars—even four or five dollars per year per lamp—from which nothing whatever is received in return. But most important to many—deterioration in lighting lessens sales and cuts down profits.

Not only is the "Pittsburgh" ten-year guarantee an agreement to replace any goods of defective manufacture—but this thirteen-year history of perfection in manufacture is assurance that replacements will not be needed; that the initial lighting satisfaction will be fully maintained throughout a period of a great many years and that the lighting installation will cost the user least per year.

Distinctive Finish—"Pittsburgh" Permaflectors have always been distinctly superior in efficiency, in brilliance and permanence of the reflecting surface, in durability of the backing and assurance against need of replacement. They are equally distinctive in appearance. The silver color satin finish has many advantages both to the user and to the trade.

This silver color makes the reflector less conspicuous when not concealed by valance or sign; it harmonizes more universally with the variety of colors found in show window ceilings and backgrounds; it is suggestive of light, silver and glass; and unlike the enamel heretofore used for reflector backing, this silver color will not darken under the heat of the Type "C" lamp.

A Complete Line—The Permaflector line includes more than 50 different designs—a correctly shaped unit for practically every need in the lighting of show windows, cove lighting, direct and indirect lighting, flood-lighting and color lighting. There is scarcely any lighting problem which Permaflectors will not help solve.

For Show Windows

Where our Engineering Department can be of assistance, the following data are required:

A rough pencil sketch of the floor plan of the windows to be lighted, marking on the sketch (a) length of the glass; (b) distance from glass to background; (c) from floor to ceiling; (d) from floor to transom bar; (e) height of background; (f) state nature of the display.

For ready reference, particularly for the simpler jobs, the table given on Permaflector Page 7 will be found helpful in the selection of the right type of Permaflectors.

Lighting of Transparent Sign and Display Through Use of Permaflector No. 102

For Lighting Transparent Sign and Display

Permaflector No. 102 and 112 (Page 12) is designed specifically for the lighting both of a transparent sign or valance and of the window display. This remarkable reflector satisfactorily lights many windows, such as in drug stores and cigar stores, in which heretofore the lighting of the display has been sacrificed in order to light the transparent sign or valance.

For Cove Lighting

Where our Engineering Department can be of assistance, the following data are required:

Room sizes and cross-section details; or state size of room, height of ceiling, distance from floor to cove and from cove to ceiling. The shape and size of the cove is of the utmost importance—we will be glad to assist in establishing its most effective size and shape.

Permaflector Cove Lighting

Daylight Reflections

The most difficult problem in show window lighting is perhaps that of daylight reflections. There are many windows where such reflections may be noted. In exceptional cases, such reflections may be so great that displays cannot be seen under ordinary window lighting in daytime.

Although it is impracticable to overcome the worst of such reflections entirely by means of artificial lighting, the reflections can be lessened to a great extent by means of increased intensities; by color lighting, by use of the right backgrounds; and by awnings.

Ofttimes a change in the color of the background in the show window will accomplish a great deal. The darker the background the more the plate glass becomes like a mirror; the lighter the background the less apparent are the reflections.

Use of an awning or marquise is frequently of great help, and color lighting quite often proves effective in lessening objectionable reflections, particularly the use of the amber color.

It is important, therefore, to reduce the objectionable reflections as much as possible by means of light-colored backgrounds, awnings and color lighting in order that the intensity of artificial lighting required be kept to a practicable wattage.

Continued on next page

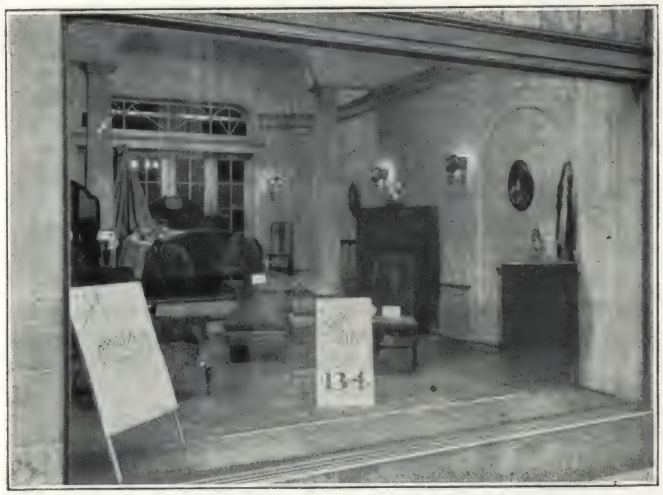
Flexible Lighting

Where it is necessary to use high wattage to overcome daylight reflections, it may be better to use flexible lighting rather than the 500 watt reflectors. Large windows, of course, are the exception to this rule.

By flexible lighting, we mean an installation of "Pittsburgh" Permaflectors in two, or three, rows on close centers, each row wired alternately on two circuits, using 100, 150 or 200 watt lamps, usually supplemented by Windo-Spots or Windo-Floods.

Daytime Reflections in an Unlighted Show Window

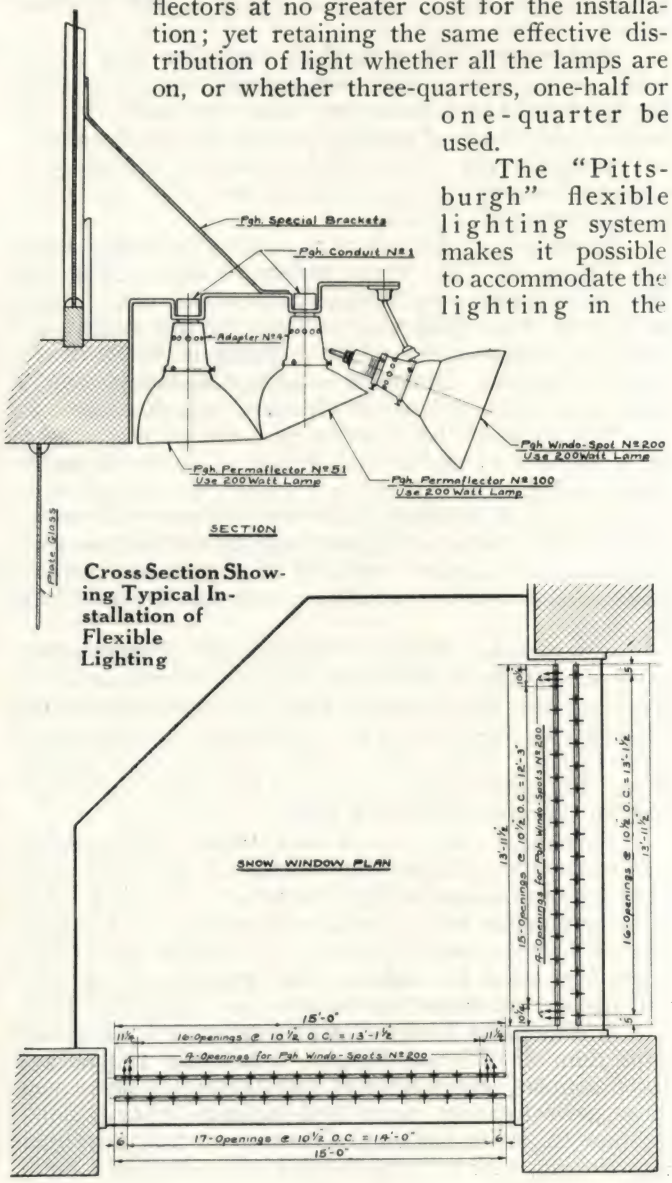
Same Window with Ordinary Artificial Lighting



And the Same Window with "Pittsburgh" Flexible Lighting—Reflections Almost Entirely Eliminated

With the "Pittsburgh" flexible lighting almost as much wattage can be used as with the 500 watt reflectors at no greater cost for the installation; yet retaining the same effective distribution of light whether all the lamps are on, or whether three-quarters, one-half or one-quarter be used.

The "Pittsburgh" flexible lighting system makes it possible to accommodate the lighting in the windows to meet the varying conditions of the day and of the season—five or more levels of illumination are available at the touch of a switch.



Cross Section Showing Typical Installation of Flexible Lighting

By using half the reflectors in one row, a level of illumination may be had sufficient for window lighting at different times and under different conditions.

By using all the reflectors in one row the lighting is adequate for any window at night.

When higher levels of illumination are required, as during certain hours of the day, all lamps in one row and half in the second may be lighted; or all the lamps in both rows of reflectors; or all in both rows, together with one or more Windo-Spots, if maximum lighting is required.

These advantages of the flexible system of lighting are obvious.

Distribution Curves

The performance of each reflector is indicated by the light distribution curve. For window reflectors the full line curve gives distribution in the plane perpendicular to the plate glass, dotted curve is for the plane parallel with the glass.

Continued on next page

CHART FOR SELECTING PROPER PERMAFLECTORS FOR SHOW WINDOW LIGHTING

HEIGHT OF SOLID BACKGROUND — FEET

HEIGHT - FLOOR TO PERMAFLECTORS - FEET	DEPTH - GLASS TO BACKGROUND - FEET	1	2	3	4	5	6	7	8	9	10	12	14	16
4	1	C-100	C-100	55	110									
4	2	55	55	110	110									
4	3	55	55	110	110									
4	4	55	110	110	110									
5	1	C-100	C-100	55	55	110								
5	2	C-100	55	55	110	110								
5	3	55	55	55	110	110								
5	4	55	55	110	110	110								
5	5	55	55	110	110	110								
6	1	C-100	C-100	C-100	55	55	110							
6	2	C-100	C-100	55	55	110	110							
6	3	C-100	55	55	55	110	110							
6	4	55	55	55	110	110	110							
6	5	55	55	55	110	110	110							
6	6	55	55	110	110	110	110							
7	1	C-100	C-100	C-100	52-55	52-55	52-55	100-110						
7	2	C-100	C-100	52-55	52-55	52-55	100-110	100-110						
7	3	C-100	52-55	52-55	52-55	52-55	100-110	100-110						
7	5	52-55	52-55	52-55	52-55	52-55	100-110	100-110						
7	7	52-55	52-55	100-110	100-110	100-110	100-110	100-110						
8	1	C-100	C-100	C-100	C-100	52-55	52-55	52-55	100-110					
8	2	C-100	C-100	C-100	52-55	52-55	52-55	100-110	100-110					
8	4	52-55	52-55	52-55	52-55	52-55	100-110	100-110	100-110					
8	6	52-55	52-55	52-55	52-55	100-110	100-110	100-110	100-110					
8	8	52-55	52-55	52-55	100-110	100-110	100-110	100-110	100-110					
9	1	C-100	C-100	C-100	C-100	52-55	52-55	52-55	52-55	100-110				
9	2	C-100	C-100	C-100	52-55	52-55	52-55	52-55	52-55	100-110				
9	3	C-100	C-100	52-55	52-55	52-55	52-55	52-55	100-110	100-110				
9	5	52-55	52-55	52-55	52-55	52-55	52-55	100-110	100-110	100-110				
9	7	52-55	52-55	52-55	52-55	100-110	100-110	100-110	100-110	100-110				
9	9	52-55	52-55	52-55	100-110	100-110	100-110	100-110	100-110	100-110				
10	1	C-200	C-200	C-200	C-200	52	52	52	52	52	100			
10	2	C-200	C-200	C-200	52	52	52	52	52	100	100			
10	4	C-200	C-200	52	52	52	52	52	100	100	100			
10	6	52	52	52	52	52	52	100	100	100	100			
10	8	52	52	52	52	52	100	100	100	100	100			
10	10	52	52	52	100	100	100	100	100	100	100			
12	4			551-555	551-555	551-555	551-555	551-555	551-555	551-555	500	500		
12	6			551-555	551-555	551-555	551-555	551-555	551-555	500	500	500		
12	8			551-555	551-555	551-555	551-555	551-555	500	500	500	500		
12	10			551-555	551-555	551-555	551-555	500	500	500	500	500		
12	12			551-555	551-555	551-555	500	500	500	500	500	500		
14	4				551-555	551-555	551-555	551-555	551-555	551-555	551-555	551-555	500	
14	6				551-555	551-555	551-555	551-555	551-555	551-555	551-555	500	500	
14	8				551-555	551-555	551-555	551-555	551-555	551-555	500	500	500	
14	10				551-555	551-555	551-555	551-555	551-555	500	500	500	500	
14	12				551-555	551-555	551-555	551-555	500	500	500	500	500	
14	14				551-555	551-555	500	500	500	500	500	500	500	
16	6					551-555	551-555	551-555	551-555	551-555	551-555	551-555	500	500
16	8					551-555	551-555	551-555	551-555	551-555	551-555	500	500	500
16	10					551-555	551-555	551-555	551-555	551-555	551-555	500	500	500
16	12					551-555	551-555	551-555	551-555	500	500	500	500	500
16	14					551-555	551-555	500	500	500	500	500	500	500
16	16					551-555	551-555	500	500	500	500	500	500	500

Example—Assume a window 8 ft. high (floor to Permaflectors), 6 ft. deep (glass to background), solid background 8 ft. high.

Referring to first column, find 8 ft. height and 6 ft. depth; then run across horizontally to column corresponding to 8 ft. solid background; either the 100 or the No. 110 Permaflector may be used. In general, for a window of these dimensions, it would be preferable to use No. 100 Permaflector as this permits the use of the 200-watt lamp. For selection of adapter required see Permaflector Page 20.

Space reflectors 10½ to 14 in. on centers for 200 watts and less; for 300 and 500 watts, space 14 to 18 in. on centers.

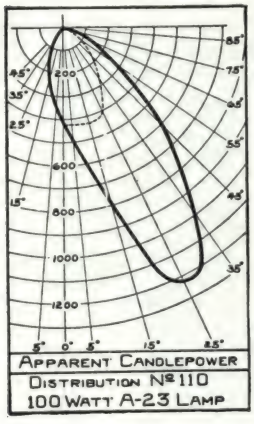
Continued on next page

Permaflector No. 110

Application—For low, deep show windows, 4 to 9 ft. high, in which trim is carried up to the level of the reflectors. In the plane perpendicular to the plate glass, it illuminates to 95 degrees above nadir on trim side.

Also for wall cases, interior bulletin boards, paintings, cove lighting in theaters, churches, etc.

Spacing—Usually spaced 12 in. on center; may be spaced as closely as 9 in. When so spaced, good distribution may be had with only every other unit burning. Should be wired with alternate outlets on separate circuits.



Flush Mounting Ring—(Permaflector Page 19.)

Color-Lighting—(See Permaflector Page 21. Color-Lite No. 5.)

Lamps—100-watt, A-23 and 150-watt clear.

Holder—2¼ in. Form "O." (See Permaflector Page 20.)

Opening Circular Diameter—8½ in.

Dimensions—

Height with Adapter No. 1256, 150-watt position, 8 in.

Height with Adapter No. 1256, 100-watt position, 7¼ in.

Slope of Reflector opening, 25 degrees above horizontal.

Receptacles should be spaced 5½ in. to center from glass—minimum, 3½ in.

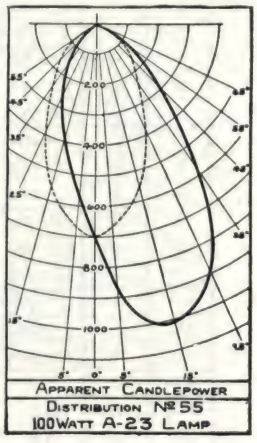
Permaflector No. 55

Application—For medium size shallow windows, 4 to 9 ft. high; medium high trim; island windows; or windows with upper part of background of glass. Concentrating; light cuts off between 65 and 70 degrees.

Exceptional concentration in the 5 to 35 degree angle, insuring effective illumination on the floor of the shallow window for which this reflector is intended.

Also for borders and strips on theater stages, indirect side wall urns and coves, side walls of galleries when placed over skylights.

Spacing—Usually 12 in. on center; may be spaced as closely as 9 in.



Flush Mounting Ring—(Permaflector Page 19.)

Color-Lighting—(See Permaflector Page 21. Color-Lite No. 5.)

Lamps—100-watt, A-23 (inside frosted) and 150-watt clear.

Holders—2¼ in. Form "O." (See Permaflector Page 20.)

Opening Circular Diameter—8½ in.

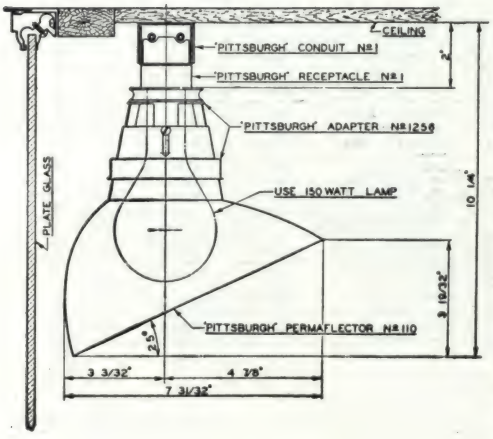
Receptacles—Should be 5½ in. to center, from glass—minimum, 3½ in.

Dimensions—

Height with Adapter No. 1256, 150-watt position, 6$\frac{11}{16}$ in.

Height with Adapter No. 1256, 100-watt position, 5$\frac{13}{16}$ in.

Lamps Recommended

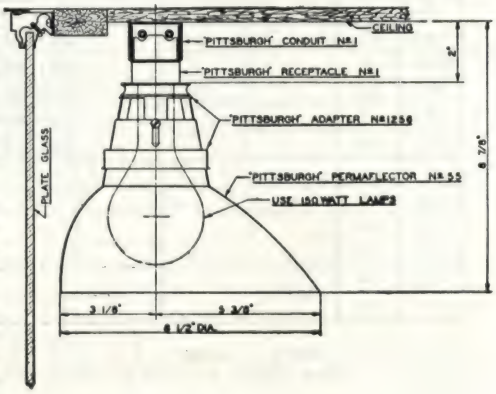


For side streets of small cities, 100-watt lamps on above spacings recommended; main streets of small cities, 150-watt lamps; side streets of large cities, 150-watt; main streets of large cities usually require the use of 200-watt lamps for which Permaflectors Nos. 100, 51 or 52 would be required. See Permaflector Pages 9 and 10.)

To combat daylight reflections effectively, use Flexible Lighting. (See Permaflector Page 6.)

Diagrams show Adapter No. 1256, extended 150-watt position.

Illustrations show Adapter No. 1256, compressed 100-watt position. For installing these Permaflectors in a trough, see Permaflector Page 16; for flush mounting, see Permaflector Page 17.



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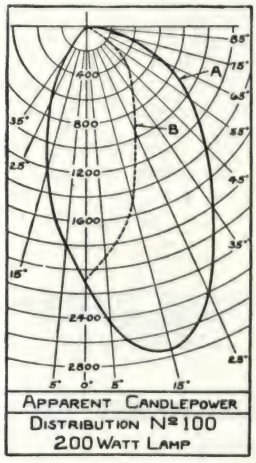
Permaflector No. 100

Designed particularly for windows 7 to 10 ft. high, having a depth (plate glass to background) ranging from one-half to three-fourths the distance from floor to reflector. Light flux 0° to 90°. Strong concentration of light between 5° and 25° gives high floor illumination near the plate glass, the area most distant from the reflector. Ideal for windows in which the trim is carried high. Also works well in deeper windows.

Other Uses—Also useful for lighting of rug racks, sales booths of garment manufacturers, interior bulletin boards, interior sales displays, paintings, indirect lighting from coves, for theater border and proscenium lights.

Spacing—For uniform distribution of light over the trim, should be spaced 12 in. on center; may be spaced as closely as 10½ in. When so spaced good light distribution may still be had when every other unit only is on. Windows should be wired with alternate outlets on separate circuits.



Size of Lamp—150-200-watt clear. Change from one size lamp to another requires merely adjustment of holder adapter. (See Permaflector Page 20.)

Flexible Lighting—(See Permaflector Page 6.)

Color Lighting—(See Permaflector Page 21.)

Flush Mounting Ring—(See Permaflector Page 19.)

Holder—2¼ in. Form "O" (See Permaflector Page 20.)

Dimensions—

Height with Adapter No. 1234, 150-watt position	8 7/16 in.
Width	9 1/8 in.
Front to back	8 1/2 in.
Center to back	3 5/8 in.

Receptacles should be 5½ in. to center from glass; minimum 3¾ in.

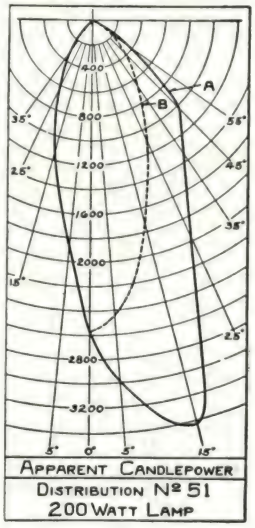
Permaflector No. 51

Designed especially for high shallow windows 7 to 10 ft. high; medium high trim; island windows or windows with upper part of glass. Concentrating; light cuts off sharply on 55° line.

Exceptional concentration of light in the 5° to 25° angle, insures effective illumination on the floor of the high and shallow windows for which this reflector is intended.

Other Uses—Also useful for borders and strips on theater stages, indirect side wall urns and coves, side walls of art galleries when placed over skylights.

Spacing—For uniform distribution of light over the trim, should usually be spaced 12 in. on center; may be spaced as closely as 10½ in. When so spaced good light distribution may still be had when every other unit only is on. Windows should be wired with alternate outlets on separate circuits.



Size of Lamp—150-200-watt clear. Change from one size lamp to another requires merely adjustment of holder adapter. (See Permaflector Page 20.)

Flexible Lighting—(See Peramflector Page 6.)

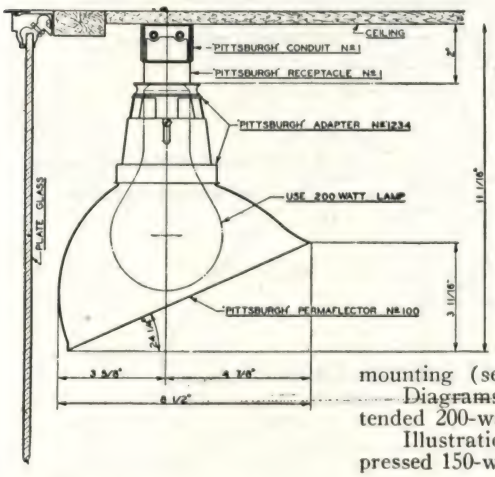
Color Lighting—(See Permaflector Page 21.)

Holder—2¼ in. Form "O." (See Permaflector Page 19.)

Dimensions—

Height with Adapter No. 1234, 150-watt position	8 1/8 in.
Width	9 3/8 in.
Front to back	9 5/8 in.
Center to back	3 7/8 in.

Receptacles should be 5½ in. to center from glass—minimum 4 in.



Lamps Recommended

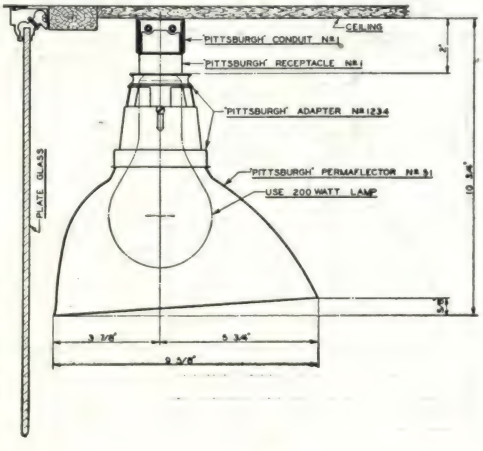
For side streets of small cities, 100-watt lamps on above spacings are recommended; for main streets of small cities, 150-watt; for side streets of large cities, 150-watt; for main streets of large cities, 200-watt.

To combat daylight reflections effectively, use Flexible Lighting (see Permaflector Page 6) or Permaflector No. 500, 551 or 555 with 300-500 watt lamps.

For installing these Permaflectors in a trough (see Permaflector Page 16); for flush mounting (see Permaflector Page 17).

Diagrams show Adapter No. 1234, extended 200-watt position.

Illustrations show Adapter No. 1234, compressed 150-watt position.



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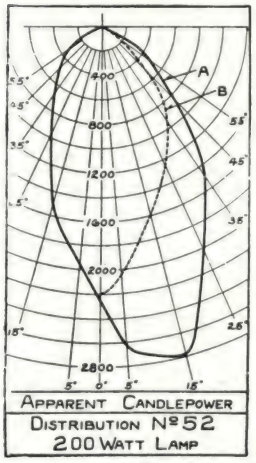
Permaflector No. 52

For same general class of windows as No. 51, but designed especially for inserting in ceiling; bottom of reflector is level and can be installed flush with ceiling.

Other Uses—Also useful for lighting automobile show rooms, show windows having open backs as in grocery stores, and for small store windows of other types. The illumination will carry to a line on the floor of the window a distance of 1.6 times the height of the reflector above the floor. For example, if the reflectors are mounted 10 ft. above the floor the light will carry back 16 ft. from the plate glass on floor of window.

Spacing—For uniform distribution of light over the trim, reflectors should usually be spaced 12 in. on center; may be spaced as close as 10½ in. When so spaced good light distribution may still be had when every other unit only is on. Should be wired with alternate outlets on separate circuits.

Size of Lamps—150-200-watt clear. Change from one size of lamp to another requires merely adjustment of holder adapter. (See Permaflector Page 36.) For side streets of small cities, 100-watt lamps on above spacings are recommended; for main streets of small cities, 150-watt; for side streets of large cities, 150-watt; for main streets of large cities, 200-watt.



Flush Mounting Ring—(See Permaflector Page 19.)

Flexible Lighting—To effectively combat daylight reflections, use Flexible Lighting (see Permaflector Page 6) or Permaflectors Nos. 500, 551 or 555 with 300-500 watt lamps.

Color Lighting—(See Permaflector Page 21.)

Holder—2¼ in. Form "O." (See Permaflector Page 21.)

Dimensions—
Height with Adapter No. 1234, 150-watt position 7 17/32 in.
Width ..... 9 in.
Front to back..... 9½ in.
Center to back..... 3½ in.
Receptacles should be 5½ in. to center from glass; minimum 4 in.

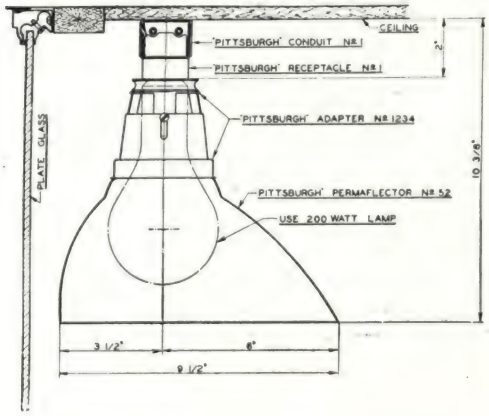


Diagram to left shows Adapter No. 1234, 200-watt position. For 150-watt lamp same adapter in compressed position should be used.

For installing in a trough (see Permaflector Page 16); for flush mounting (see Permaflector Page 17).

Permaflector No. 555

Similarly to Permaflector No. 551, it is designed for high shallow windows; medium high trim; island windows with upper part of background of glass. Not recommended for windows less than 8 ft. high.

Intended primarily for flush mounting service; bottom of reflector is level and, although having asymmetric distribution, the mouth of the reflector is circular.

From the distribution curve, it will be noted that there is an exceptional concentration of light in the five-degree to twenty-five-degree angles, which insures effective illumination on the floor of the high and shallow windows for which the reflector is intended.

Spacing—Should be installed 15 in. on centers, which will permit burning each alternate unit without making the distribution of light uneven when it is desirable to cut light in half. In small cities 300 lamps may be used; in large cities, 500-watt.

Special Comments—One large reflector should not be used where several small ones are required. To do so results in lack of uniform illumination on the trim with undesirable shadows; and where every other reflector is lighted this condition is aggravated.

When in doubt whether to use a single row of large reflectors or the Pittsburgh flexible lighting, the Permaflector Engineering Department should be consulted.

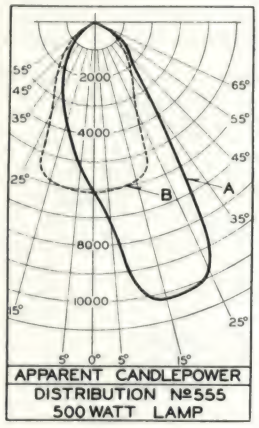
Flush Mounting Rings—See Permaflector Page 19.

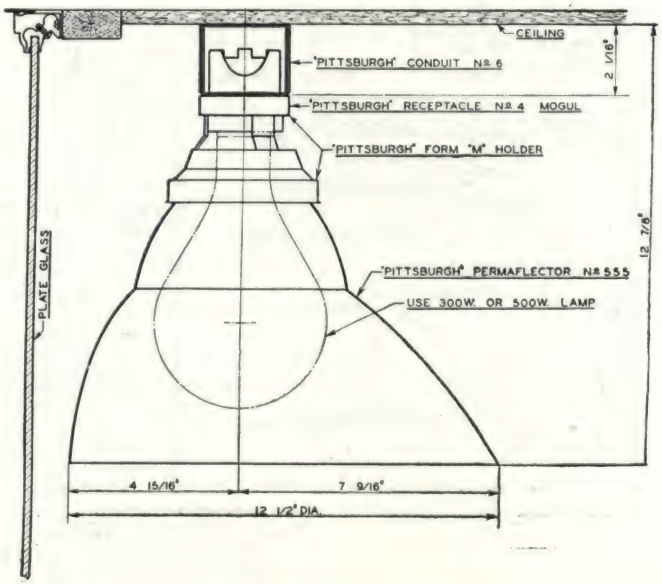
Lamps—For use with 300-500-watt lamps.

Dimensions—
Height, 10¾ in. Diameter, 12½ in.

Receptacles—6 in. on center from glass line.

When used on Conduit No. 6, discard box cover and attach receptacle and holder to conduit. (See Permaflector Page 14.)





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Permaflector No. 500

Distribution wide spreading. Designed for large deep windows in which the trim is carried up high. Since it is designed for use with the 300 and 500-watt lamp, it will find its principal use in exceptionally large windows where high intensity lighting is necessary as combating daylight reflections. Not recommended for windows less than 8 ft. high.

Spacing—Should be installed 15 in. on center which will permit burning each alternate unit without making the distribution of light uneven when it is desirable to cut the light in half. In small cities, 300-watt lamps may be used; in large cities, 500-watt lamps.

Special Comment—There is a tendency toward use of one large reflector where several small ones should be used, resulting in lack of uniform illumination on the trim and undesirable shadows. There also seems to be an idea that large lamps and reflectors are necessary to get high intensity in window lighting. This is not correct—see Permaflector Page 6, "Flexible Lighting."

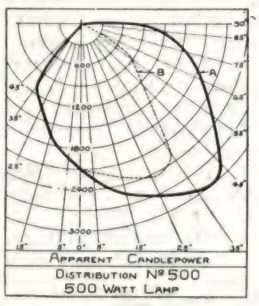
Flush Mounting Ring—(See Permaflector Page 19.)

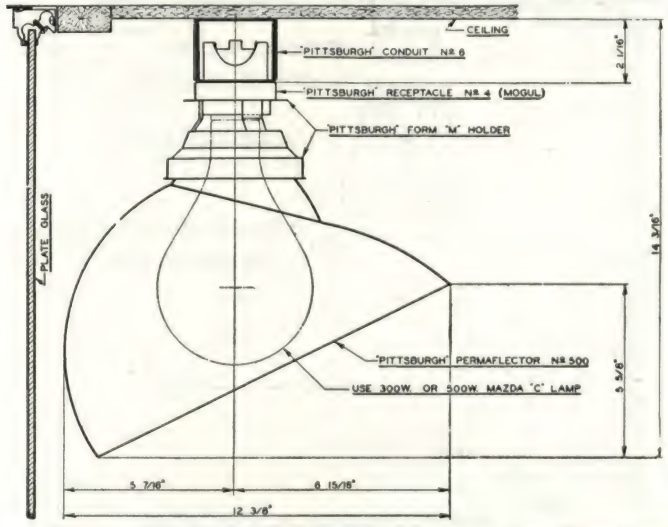
Lamps—For use with 300-500-watt lamps.

Dimensions—

Height	12 1/8 in.
Width	12 in.
Front to back	12 3/8 in.
Center to back	5 7/16 in.

Receptacles 6 in. to center from glass. (When used on conduit, discard box cover and attach receptacle and holder to conduit which is shipped punched ready to receive them). (Permaflector Page 14.)





For installing these Permaflectors in a trough (see Permaflector Page 16); for flush mounting (see Permaflector Page 17).

Permaflector No. 551

Distribution similar to No. 51. In general designed for exceptionally high windows where high intensity lighting is necessary as for combating daylight reflections. Not recommended for windows less than 8 ft. high.

Spacing—Should be installed 15 in. on center, which will permit burning each alternate unit without making distribution of light uneven when it is desirable to cut light in half. In small cities 300-watt lamps may be used; in large cities, 500-watt.

Special Comment—One large reflector should not be used where several small ones are required. To do so results in lack of uniform illumination on the trim with undesirable shadows; and where every other reflector is lighted this condition is aggravated.

When in doubt whether to use a single row of large reflectors or the "Pittsburgh" Flexible Lighting the "Pittsburgh" Engineering Department should be consulted. (Page 4.)

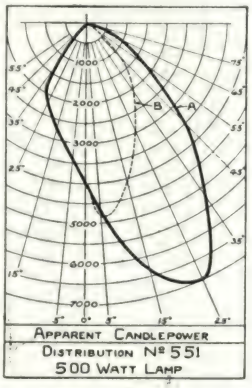
Flush Mounting Ring—(See Permaflector Page 19.)

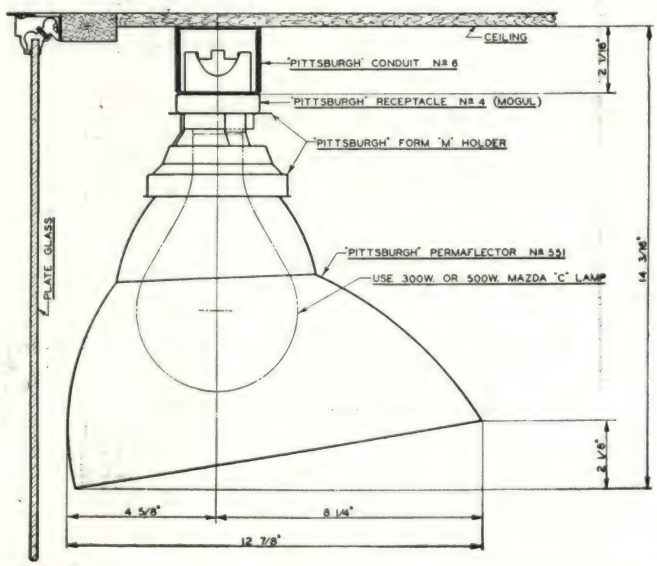
Lamps—For use with 300-500-watt lamps.

Dimensions—

Height	12 1/8 in.
Width	12 in.
Front to back	12 7/8 in.
Center to back	4 5/8 in.

Receptacles, 6 in. to center from glass. (When used on conduit No. 6, discard box cover and attach holder to conduit which is shipped punched ready to receive them.) (See Permaflector Page 14.)





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Permaflector No. 102

Designed specifically for dual service—lighting of both transparent sign and the window display. Certain stores, particularly drug and cigar stores, use signs painted along the top edge of the plate glass. Where it is possible to install with bottom of reflectors above top of sign, regular "Pittsburgh" window reflectors will effectively light both sign and display. But where top of sign is at level where reflectors must be mounted, it has not been possible heretofore to effectively light both.

Spacing of Reflectors—For even lighting of transparent sign or valance, with receptacles on which reflectors are mounted approximately level with top of sign, use following:

SPACING FOR DUAL SERVICE

With maximum depth of sign, in.	Receptacles should be distant from the glass, in.	Maximum spacing between reflectors, in.
12	6	12
13	7	14
14	8	16
15	9	18
16	10	20
17	11	22
18	12	24

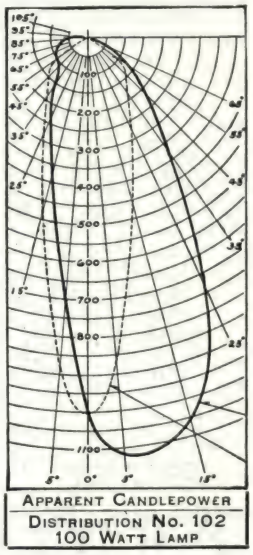
Ordinarily spacing between reflectors should not exceed 12 in., excepting where general standard of window lighting is very low or in the case of very small show windows.

Lamp—100-watt A-23; 150-200-watt clear. Unless otherwise ordered, furnished with Adapter No. 1256 (for A-23 100-watt and 150-watt clear). (See Adapters, Permaflector Page 20.)

Holder—2¼ in. Form "O."

Dimensions—

Height with Adapter No. 1256, 150-watt position 8⅛ in.
Width ..... 9⅞ in.
Front to back..... 9½ in.
Center to back..... 4 in.



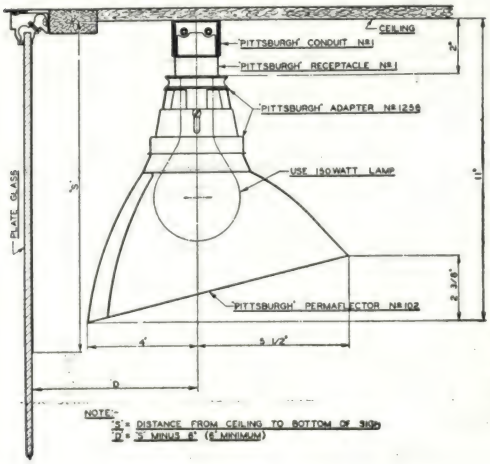


Diagram to left shows Adapter No. 1256, 150-watt position.

For 100-watt A-23 lamp same adapter in compressed position should be used.

For 200-watt lamp use Adapter No. 1234 extended as in diagram to right.

Permaflector No. 112

No. 112 is a companion to Permaflector No. 102, brought out especially for windows in which this dual lighting service is required and which have no background, or have transparent glass in the upper part of the background.

For such windows, No. 112 will be better suited, because it completely conceals the lamp from view from within the store when installed in such open back or transparent back windows.

Obviously it does not light up as high on the background as No. 102; hence 102 will be the preferred one for use in totally enclosed windows where it is necessary to light up from floor to ceiling on the background.

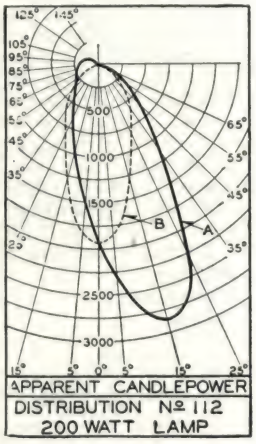
Ordinary transparent or translucent glass reflectors installed in a show window will waste light in the entire upper hemisphere in order to illuminate a small patch of sign. Permaflectors No. 102 and 112, through the medium of a transparent glass panel on the rear section of the reflector, efficiently illuminate the sign but do not waste light in the upper directions other than the sign.

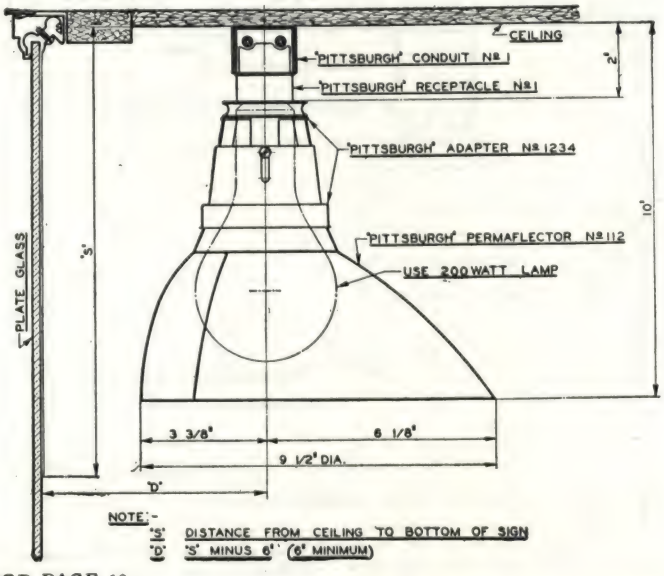
Note the distribution curves, herewith, showing how the sign lighting is accomplished without appreciable loss of "punch" in the main beam.

The spacing of Permaflector No. 112, lamp sizes and holders, are same as for No. 102.

Dimension—Height 5¼ in.

Diameter—9½ in. (circular).





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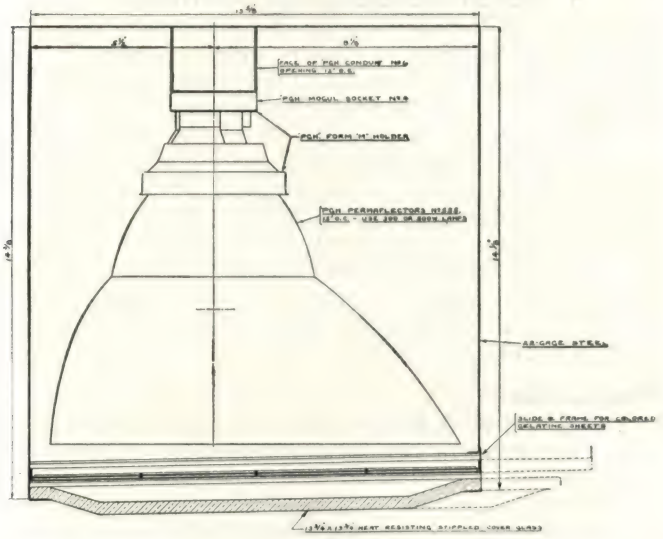
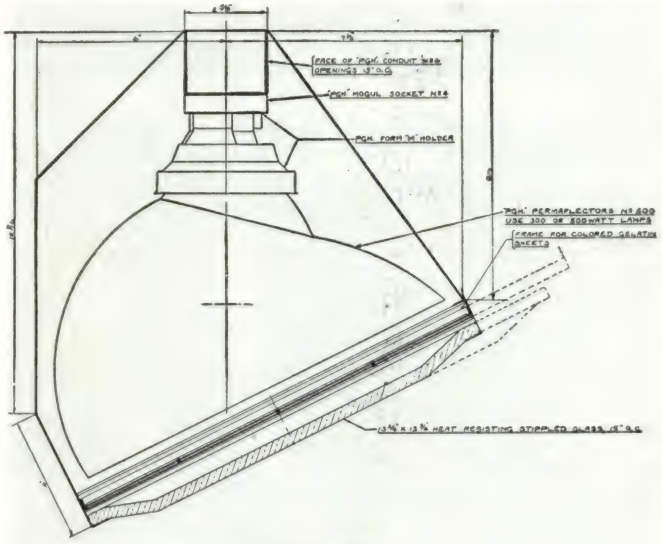


WL-555



WL-500

ENCLOSED WINDOW PERMAFLECTORS

There is a limited demand for window lighting equipment of the enclosed type. Such equipment is sometimes desired for large department store windows, particularly corner windows and arcade windows.

Pittsburgh enclosed Permaflectors have been developed to satisfy this want. Nos. WL-500 and WL-555 illustrated herewith consists of a continuous metallic troughing in which are installed 500-watt Permaflectors spaced 15 in. on centers. Beneath each Permaflector is installed a square convex heat resisting stippled glass plate, the purpose of which is to completely conceal the lamp filament from view. It accomplishes this purpose effectively without materially affecting the light distribution from the Permaflectors. In other words, Pittsburgh Enclosed Permaflectors provide efficient window illumination of correct distribution from enclosed equipment, as will be noted from an examination of the light distribution curves of each of these units, shown below.

To make easy access to the Permaflectors and lamps, the heat resisting stippled glass plate is suspended below each Permaflector in a guide which enables one to slide the glass plate forward as shown by the dotted lines. The guides hold the plates in place by gravity.

Another set of guides for supporting frames to contain colored gelatine sheets, to provide colored illumination when same is desired, are also incorporated in the unit. The color frame slides forward in the same manner as the glass plate.

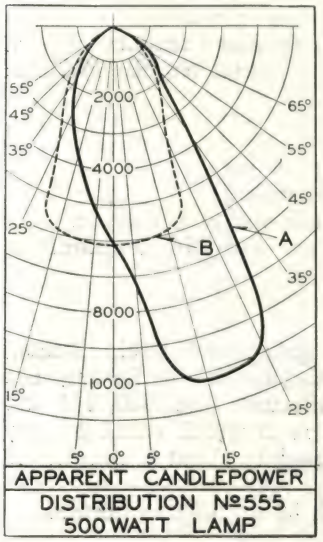
Enclosed window Permaflectors No. WL-500 and No. WL-555 are custom built for show windows. In order that they may be effectively used, provision for their installation should be made by the architect when working up the detailed designs of the show windows.

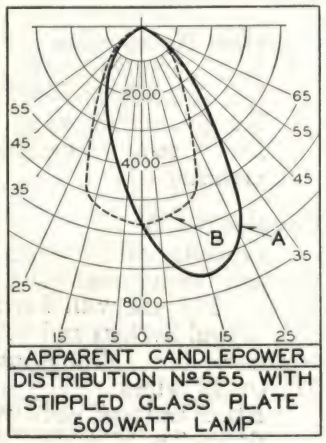
From the architect's plans our engineering department will prepare the detailed design of the required type of enclosed window Permaflectors for the particular windows.

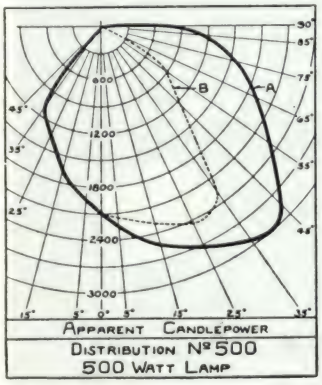
While enclosed lighting equipment of this kind has been specified primarily for large windows requiring high intensity of illumination, smaller windows requiring the use of 100, 150, and 200-watt lamps, may be similarly equipped. Space does not permit illustration of this smaller equipment, but our engineering department may be consulted at any time by the architect interested therein.

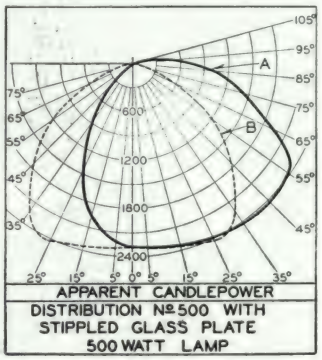
Herewith is a list of the square convex heat resisting glass plates available:

Plate No.	Size in inches	Description	For use with	
			Permaflector No.	Size of lamp, watts
1	13⅝ square	Stippled inside	500, 551, 555	300–500
2	13⅝ square	60° spread ribbed inside	C-500	300–500
3	17⅞ square	Stippled inside	I-1000, I-505	300, 500, 750, 1000
5	10½ square	Stippled inside	51, 52, 100, C-201	150–200
6	8½ square	Stippled inside	C-100, 55, 110	100–150
7	7 square	Stippled inside	I-60, P-75, P-101, P-151	100–150









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"EASY-TO-INSTALL" CONDUIT

"Easy-to-Install" Conduit in combination with Permaflectors constitutes "a window lighting system." Conduit, receptacles, holders and Permaflectors, all finished in silver colored satin finish, harmonize.

This conduit provides a time and money-saving method of installing lamps in show windows, especially when close centering of the lamps is needed. Quickly installed, being fastened to ceiling by screws going through conduit or supported on brackets.

"Easy-to-Install" Conduit avoids necessity of cutting through ceiling or wall for each receptacle and makes it possible to space lamps properly to get even light distribution. Made to order to fit each job.

Conduit No. 1

Consists of 20 gauge galvanized steel channel fitted with the necessary porcelain receptacles *not wired* and with or without holders for Permaflectors.

Wiring is very simple; the back member being lifted off, the binding screws in the receptacles are exposed; can then be quickly wired.

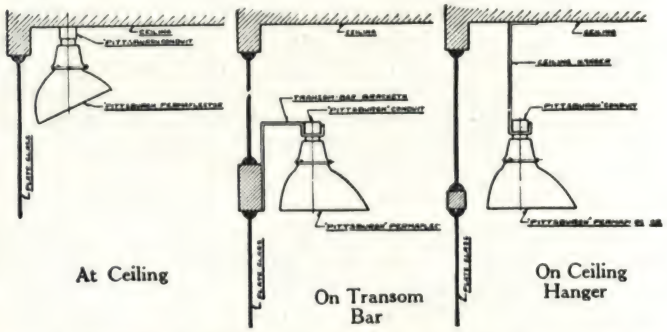
When Show Window Permaflectors Nos. 100, 51, 52, 55 and 110 are furnished with conduit, holders are not required, the adapters furnished on these reflectors being attached directly to the conduit.

Conduit No. 1 is also used in cove lighting with Reflectors Nos. 100, 51, 52, 71, 55, 110, 25, 26, 27 and 28.

Size—1⅜ in. high, 1¾ in. wide. Blank ends or ends with ½-in. hole, furnished as desired, no charge for splicings. Accommodates six No. 12 wires.

Brackets

When ordering transom bar brackets or ceiling hangers, length must be given.



Transom bar bracket standard size has vertical members 10 in. long and holds conduit 5½ in. from face of transom bar to center line of conduit.

Ceiling hangers made in standard lengths of 6, 8, 10, 12, 14, 16, 18 and 20 in. Special lengths available made to order.

Porcelain Receptacles

No. 1, medium base (as shown).
No. 2, medium base (as shown).
No. 3, medium base, angle socket (as shown).
No. 4, mogul base, for use with No. 6 conduit or B-3 assembly.

Conduit No. 6

Consists of 20 gauge galvanized steel channel, punched to accommodate Mogul No. 4 Socket, not wired. For use with Permaflectors Nos. 500, 551 and 555, Mogul Sockets and holders of which attach directly to the conduit. Will accommodate about 6 circuits, or 12 No. 12 wires.

Blank ends, or ends with ½-in. hole, as desired.

Size—2¾ in. wide, $2\frac{1}{16}$ in. high.

Continued on next page

Conduit No. 2

Similar to Conduit No. 1. Size, however, is but $\frac{13}{16}$ by $1\frac{3}{16}$ in., for use only with "Pittsburgh" Angle Sockets, with "Pittsburgh" Reflectors No. P-40, No. P-75, No. P-76 and No. P-151.

The "Pittsburgh" angle sockets make it possible to rotate the reflectors on their axes after the installation is completed and burning, thus assuring best light distribution.

½-in. knock-out furnished at top or bottom as required.

Furnished with Pittsburgh Angle Receptacle and Form "S" or "L" (see Permaflector Page 20) as required.

Unless the small size of No. 2 conduit is a real advantage in any particular cove, it is preferable to use Conduit No. 2-A, described below.

Conduit No. 2A

Same as No. 2, excepting size is $1\frac{3}{8}$ in. high by $1\frac{1}{4}$ in. wide. Has the advantage of accommodating more wires and can be furnished with flexible joints.

OUTLET BOX ASSEMBLIES

Series B-1

For ordinary conduit wiring in coves, with such reflectors as Nos. 25, 26, 27, 28, 71, 75, 51, 52 and 100. Consists of a 3½ in. or 4 in. outlet box cover, equipped with special "Pittsburgh" Porcelain Socket No. 1 arranged to accommodate the "Pittsburgh" Adapters (see Permaflector Page 20).

OUTLET BOX ASSEMBLIES, SERIES B-1

Cat. No.	Consists of
B-1-3¼	Socket and 3¼ in. outlet box cover
B-1-3¼-S	As above, plus 2¼ in. "S" holder. (See Permaflector Page 20.)
B-1-3¼-L	As above, plus 2¼ in. "L" holder. (See Permaflector Page 20.)
B-1-¾-LC	As above, plus 2¼ in. "LC" holder. (See Permaflector Page 20.)
B-1-4	Socket and 4 in. outlet box cover
B-1-4-S	As above, plus 2¼ in. "S" holder. (See Permaflector Page 20.)
B-1-4-L	As above, plus 2¼ in. "L" holder. (See Permaflector Page 20.)
B-1-4-LC	As above, plus 2¼ in. "LC" holder. (See Permaflector Page 20.)

Note: Adapters Nos. 1234 and 1256 attach to B-1-3¼ or B-1-4.

Series B-2

For jobs where the cove is a circle or ellipse with short radius; in such coves it is not practicable to use "Pittsburgh" Conduit because of the curvature.

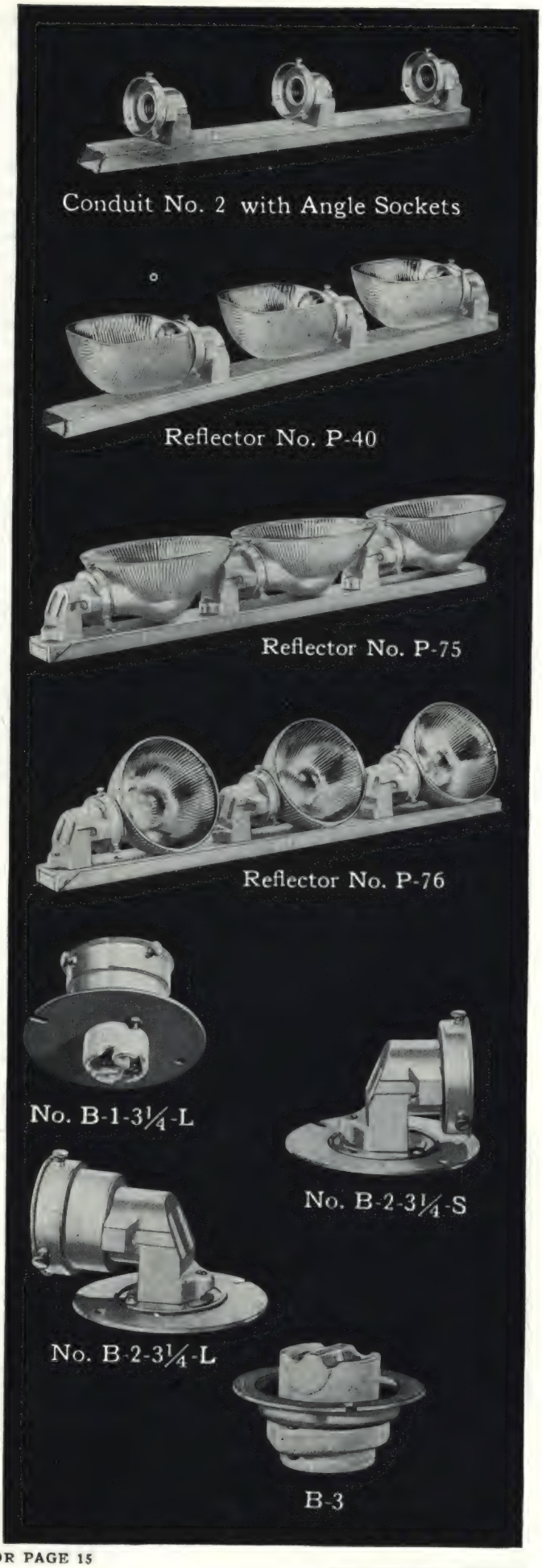
The assembly No. B-2-3¼-S and B-2-3¼-L of outlet box cover, angle socket and shade holder illustrated herewith makes it convenient to use the reflectors No. P-40, No. P-75, No. P-76, No. P-101, No. P-151 and No. P-200 in cove lighting work. It does not matter in what position the outlet box is installed, since by means of the slotted center piece the socket may be rotated into alignment with the cove.

OUTLET BOX ASSEMBLIES, SERIES B-2

Cat. No.	Consists of
B-2-3¼	Angle socket and 3¼ in. outlet box cover
B-2-3¼-S	As above, plus 2¼ in. "S" holder. (See Permaflector Page 20.)
B-2-3¼-L	As above, plus 2¼ in. "L" holder. (See Permaflector Page 20.)
B-2-3¼-LC	As above, plus 2¼ in. "LC" holder. (See Permaflector Page 20.)
B-2-4	Angle socket and 4 in. outlet box cover
B-2-4-S	As above, plus 2¼ in. "S" holder. (See Permaflector Page 20.)
B-2-4-L	As above, plus 2¼ in. "L" holder. (See Permaflector Page 20.)
B-2-4-LC	As above, plus 2¼ in. "LC" holder. (See Permaflector Page 20.)

Series B-3

No. B-3 consists of Pittsburgh Mogul Socket No. 4, with 4 in. outlet box cover, raised cover.



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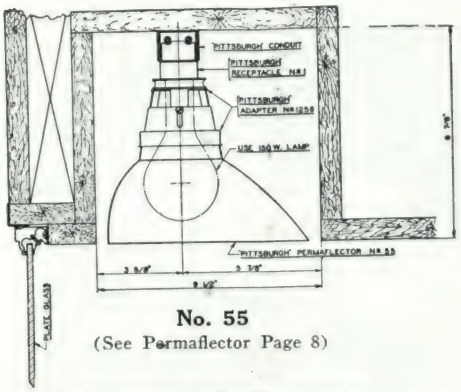
TYPICAL TROUGH AND FLUSH MOUNTING INSTALLATIONS

When designing the better class of show windows, architects more and more make special provision for the installation of the window lighting equipment. Two general forms are employed.

In the first, a properly dimensioned trough is set parallel with and above the plate glass; the other method provides for setting the reflectors flush in the ceiling of the show window.

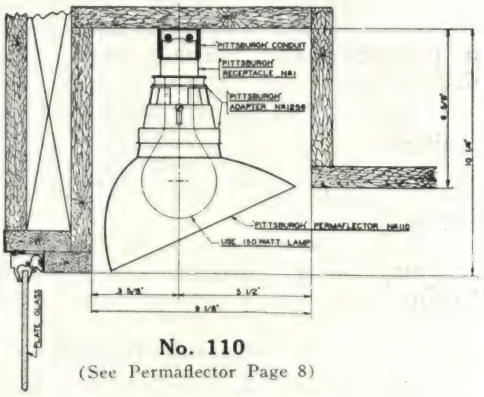


No. 55
(See Permaflector Page 8)

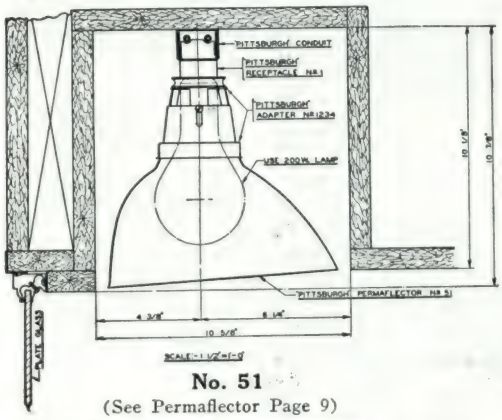
Trough Mounting

On this page are illustrated the cross sections of various troughs for accommodating the several different types of Permaflectors employed in show window lighting and as listed previously on Permaflector pages 16 to 19, inclusive. The usual method of installing reflectors suspended from the ceiling of the window, exposed, is shown on the same page with the illustration and lighting data pertaining to each reflector.

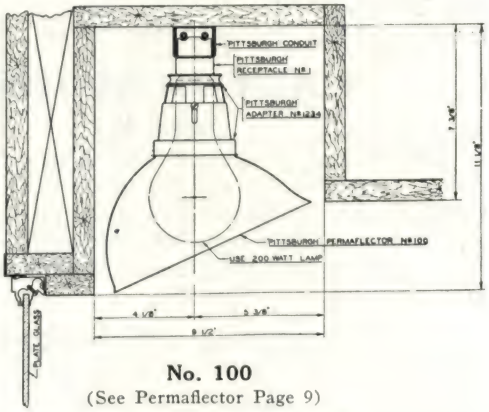
Local building codes may require troughs of this type to be lined with metal although ordinarily there is no real need for this precaution. Where unusually heavy wattage is required in a small confined space, to combat daylight reflections, it is advisable to line the trough and perhaps even ventilate same.



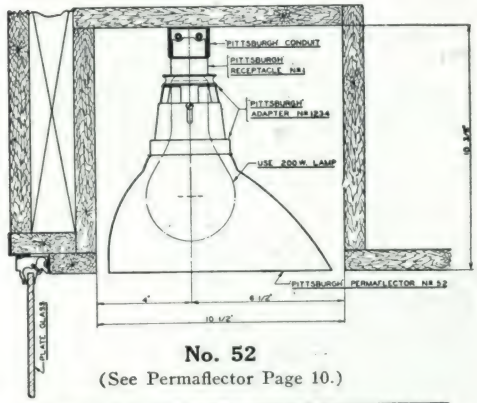
No. 110
(See Permaflector Page 8)



No. 51
(See Permaflector Page 9)



No. 100
(See Permaflector Page 9)

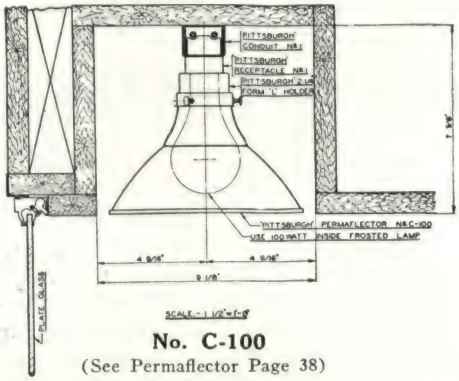


No. 52
(See Permaflector Page 10.)

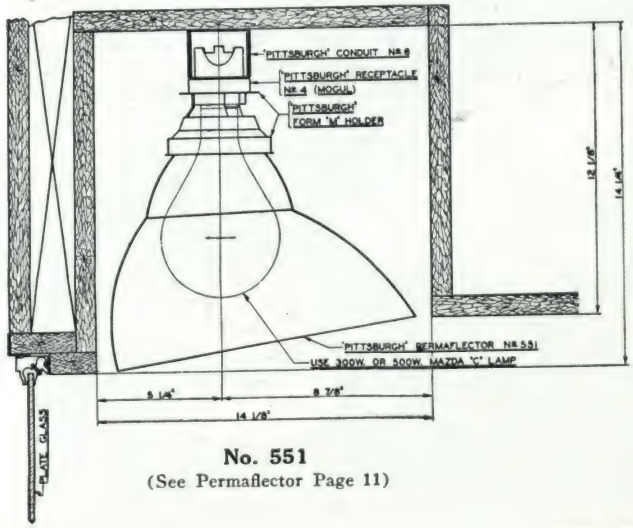
Scale: 1½″ = 12″

Note: Permaflectors C-100 and C-201 are used only in windows of extreme height, shallow depth and low trim. (See Permaflector Page 22.)

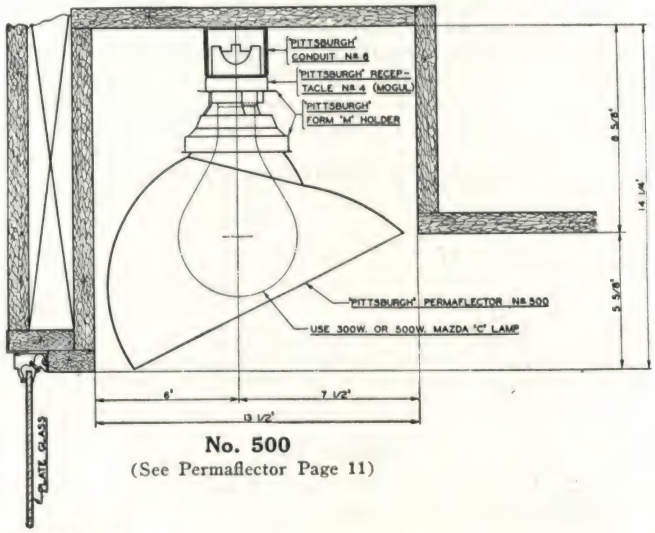
For trough mounting Permaflector C-201. (See Permaflector Page 22.)



No. C-100
(See Permaflector Page 38)



No. 551
(See Permaflector Page 11)



No. 500
(See Permaflector Page 11)

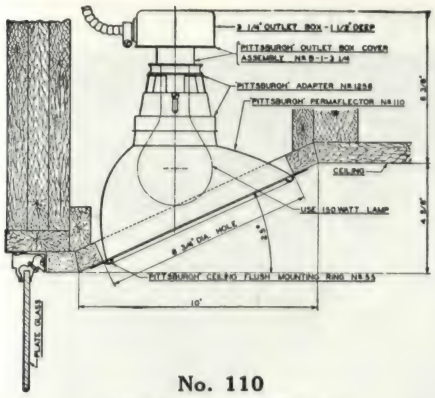
Continued on next page

Flush Mounting

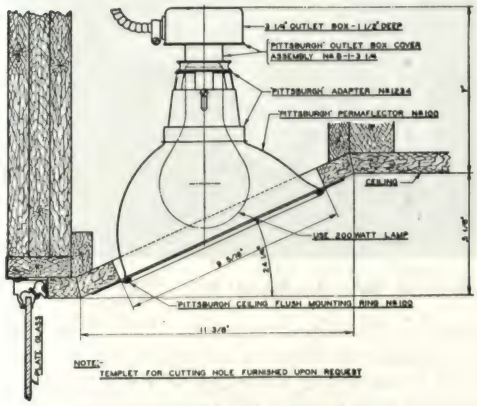
The illustrations on this page give design data for flush mounting the various show window lighting Permaflectors. For flush mounting service, "Easy-to-Install" Conduit does not provide as convenient a method of wiring as the use of ordinary wiring material. For convenience in making the installation, Pittsburgh Outlet Box Cover Assemblies to which the Adapters of the reflectors are directly attached, were brought out. It will be noted that Permaflectors No. 100, No. 110 and No. 500 are cut off at an oblique angle. To successfully set these Permaflectors flush, it is necessary to construct the ceiling with a dip towards the plate glass at the same angle. Illustrations on this page clearly indicate the method to be employed.

When flush mounting Permaflectors it is necessary that the opening in the ceiling be cut to the proper contour. Upon request a templet drawing for cutting the opening will be supplied.

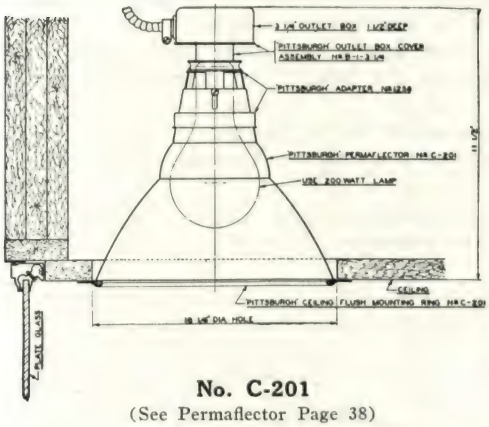
For high wattages in confined spaces it may be desirable to provide ventilation to prevent abnormal temperatures.



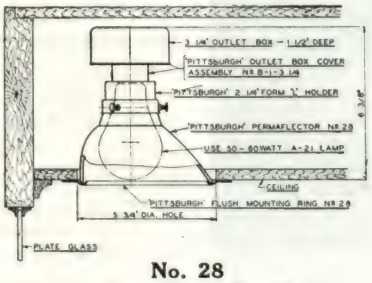
No. 110
(See Permaflector Page 8)



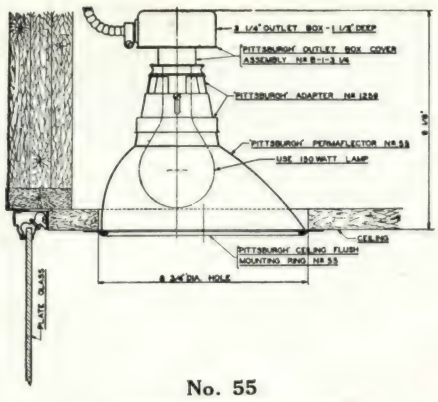
No. 100
(See Permaflector Page 9)



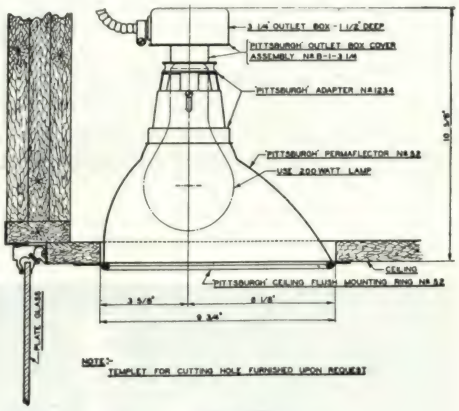
No. C-201
(See Permaflector Page 38)



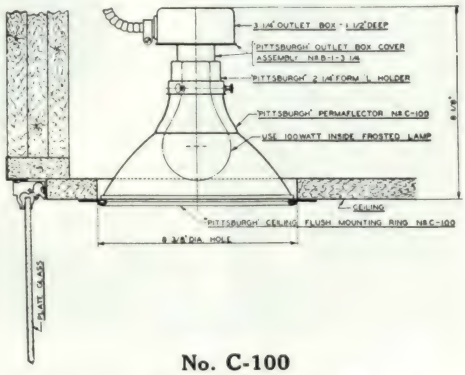
No. 28
(See Permaflector Page 25)



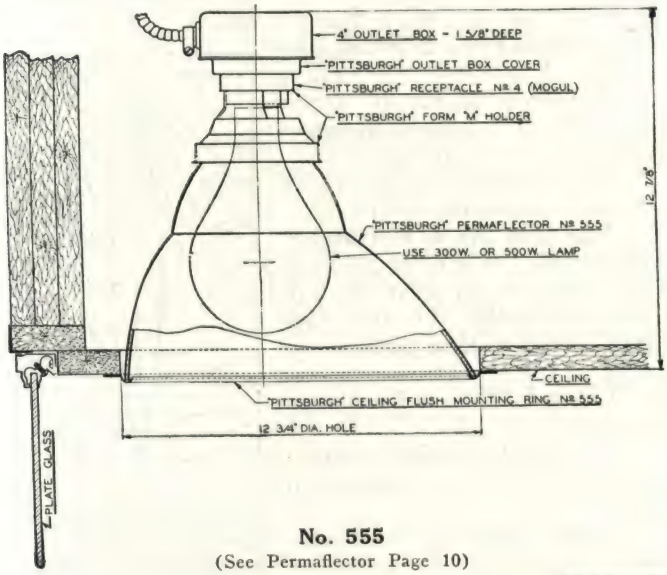
No. 55
(See Permaflector Page 8)



No. 52
(See Permaflector Page 10)

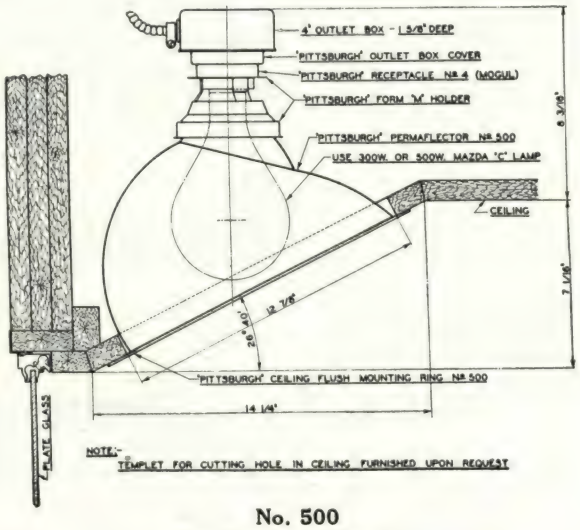


No. C-100
(See Permaflector Page 38)



No. 555
(See Permaflector Page 10)

Note: Permaflectors C-100 and C-201 are used only in windows of extreme height, shallow depth and low trim. (See Permaflector Page 38.)



No. 500
(See Permaflector Page 11)

Continued on next page

PERMAFLECTOR WINDO-SPOTS AND WINDO-FLOOD

These provide an effective method of high lighting with clear or colored light portions of the window display to which particular attention should be drawn.

The Windo-Spots and Windo-Flood are auxiliary equipment and are not intended as the sole sources of illumination in a show window. They perform a very definite and necessary service, however, where a very narrow beam of high apparent candlepower is required.

Other Uses—Useful for reducing daylight reflections and for special applications, such as theater stages, automobile show rooms where it is desired to silhouette a car against a light background, dance halls for so-called "moonlight" dances, for the lighting of walls of art galleries, skylights and any other purpose where intense illumination is desired over a limited area.

Spacing—The number installed in a show window depends largely upon the psychological effect at which the display man is aiming. In general, it is well to provide two in each show window as an auxiliary to the regular show window lighting. When wiring the window several conveniently placed extra receptacles should be provided in order to properly place these units.

Permaflector Windo-Spot No. 200

The "Pittsburgh" Windo-Spot No. 200 does not take the place of standard show window lighting but supplements it with a convenient means of high lighting those parts of displays which should be brought out most strongly.

Throws a flood of white light (or colored if Color-Lite is used) with a strong central spot.

The center beam has a maximum candle power of 18,000, as shown by the laboratory distribution curve herewith.

This is equivalent to 90 apparent candle power per watt, and is a very unusual achievement in reflector design.

Simple in construction, light weight and portable; easily attached and removed; handy to operate and low in price.

Can be attached by screws or bolts to ceiling, wall or floor or any horizontal or vertical surface.

By loosening large wing nut at the top, the supporting stem may be rotated; by loosening the smaller wing nut at the bracket joint, the reflector may be tilted.

This makes it possible to get any position necessary to direct the beam of light to any particular object in the window.

Reflector is 10 in. across opening; 12 in. from front of reflector to back of socket.

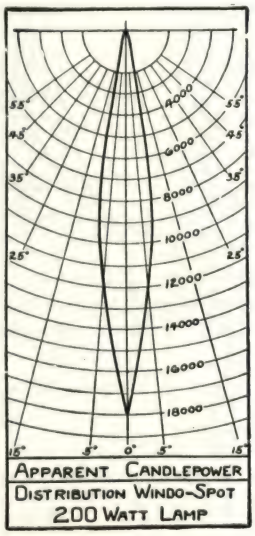
Either gelatin or glass Color-Lite may be used with it.

For Use As a Portable—Simply screw to a block of wood large enough so that it will not upset easily. Or use with metal portable base shown opposite.

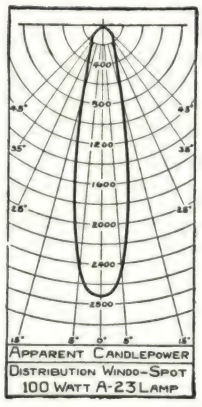
Lamp—200-watt lamp must be used.

Furnished complete, excepting lamp, with 3 ft. of cord with plug.

Color-Lites—(See Permaflector Page 21.)



Permaflector Windo-Spot No. 100



Similar in construction to Windo-Spot No. 200 excepting smaller and equipped with a different reflector.

Reflector is 8¼ in. in diameter.

Overall height, inclusive of socket and holder, 9 in.

Lamp—100-watt A-23 (inside frosted) must be used.

Furnished complete, excepting lamp, including three feet of cord and plug.

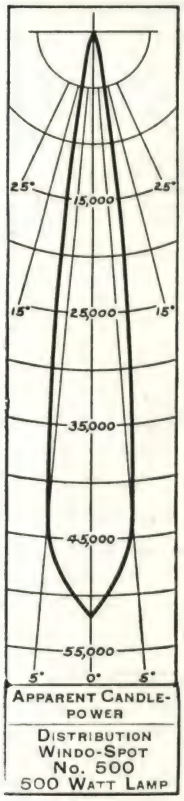
Color-Lites—(See Permaflector Page 21.)

Portable Base

For use with Windo-Spots No. 200 and No. 100 or Windo-Flood. Cast iron 8 in. in diameter.

Wall plate to be screwed to Portable Base.

Continued on next page



Windo-Spot No. 500

Principal Use—For those conditions in show window lighting and for other uses where a more intense beam is desired than is possible to secure with the Windo-Spot No. 200. Gives a very concentrating beam of light similar to Windo-Spot No. 200, but with a candlepower maximum of 52,000, more than 100 candlepower per watt.

The Windo-Spot No. 500 is equipped with an adjustable bracket for attaching to the ceiling of the show window or other supporting surface. Universal motion of the reflector may be secured by loosening the one large thumbscrew; reflector may then be tilted to any desired position and there fixed by tightening the thumbscrew. The bracket is exceptionally sturdy in construction and very easily manipulated.

Furnished complete as shown, with 3 ft. of armored cable and attachment plug.

Lamps—300-500-watt clear.

Dimensions—

Height overall, including bracket.18 in.
Diameter of reflector.....13½ in.

(Windo-Spot No. 500 becomes a Windo-Flood if frosted lamp is used.)

No. 500-551

No. 55

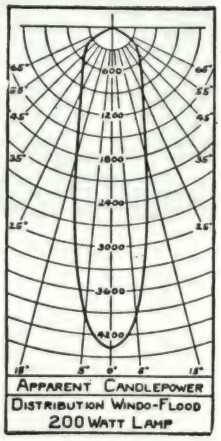
Windo-Flood

The Windo-Flood differs from the Windo-Spot only in design of the reflector, which throws a broader flood of light than the Windo-Spot, but with a central beam of less intensity.

Furnished complete excepting lamp, including 3-ft. cord with plug.

Lamp—200-watt only.

Color-Lites—(See Permaflector Page 21.)



FLUSH MOUNTING RINGS

(See also Permaflector Page 17)

For Permaflector No.	Flush Ring No.	Templet
100	100	Cardboard templet free on request
52	52	Cardboard templet free on request
551	551	Cardboard templet free on request
500	500	Blueprint free on request shows exact size to cut hole in ceiling
555	555	*Hole in ceiling to be circular, 12¾-in. diam.
28	28	*Hole in ceiling to be circular, 5¾-in. diam.
110, 55 E-100 I-75	55	*Hole in ceiling to be circular, 8¾-in. diam.
E-25	E-25	Hole in ceiling to be circular, 4⅜-in. diam.
I-60, E-75	I-60	Hole in ceiling to be circular, 7 -in. diam.
C-100	C-100	Hole in ceiling to be circular, 8⅝-in. diam.
I-100 C-201 I-201	C-201	Hole in ceiling to be circular, 10¼-in. diam.
E-200 E-225	E-200	Hole in ceiling to be circular, 10 -in. diam.

*Blueprint free on request, showing how to locate centers.

Permaflector Lighting Through Skylights

If interested ask for 8-page folder "Henry Art Gallery"

Continued on next page

ADAPTERS

The Permaflector Adapters (illustrated) are designed to be supported from 2¼-in. Form "O" Holders or attached to Permaflector "Easy-to-Install" Conduit No. 1.

(Screws for attaching adapters to conduit are furnished with the conduit.)

For 100-watt A-23 (Inside Frosted) Lamp—Permaflectors No. 55, No. 110, No. 102 and No. 112 will be furnished with Adapter No. 1256.

If Adapter No. 1234 is wanted with Permaflector No. 102, or No. 112 it must be specified.

For 150 to 200-watt No. PS-25 (Clear) Lamp—Permaflectors Nos. 100, 51 and 52 will be furnished with Adapter No. 1234.

If any of these reflectors are desired equipped with Adapter No. 1256, the order must so specify.

The use of the wrong adapter changes the position of the focal center of the lamp in its relation to the reflector, hence alters the distribution of the lighting and greatly lessens the lighting effectiveness.

HOLDERS

No. OB

No. OP

No. S

No. HB

No. HP

No. L

Form "O" and Form "H" Holders are common to the trade and may be had at any electrical store or jobber. Holders are not a part of the Pittsburgh line, but we supply them as a matter of accommodation.

For "O" (Low) Holders, 2¼ in.

The Uno Holder for brass shell, threaded sockets (No. OB).

Weatherproof, for porcelain sockets with holder grooves (No. OP).

For Sockets Nos. 1 or 3 or Assemblies Nos. B-1 or B-2 (No. S).

Form "O" (Low) Holder, 3¼ in.

Form S-3¼. Similar to Form S.

Form "H" (High) Holders, 2¼ in.

The Uno Holder, for brass shell, threaded sockets (No. HB).

Weatherproof, for porcelain sockets with holder grooves (No. HP).

No. 10

For Socket Nos. 1 or 3, Assemblies Nos. B-1 or B-2 (No. L); (or No. "LC") which is the same as (No. "L"), excepting it is longer.

Special Holder No. 10

For use with No. I-502 and B-3 Assembly or No. 6 Conduit.

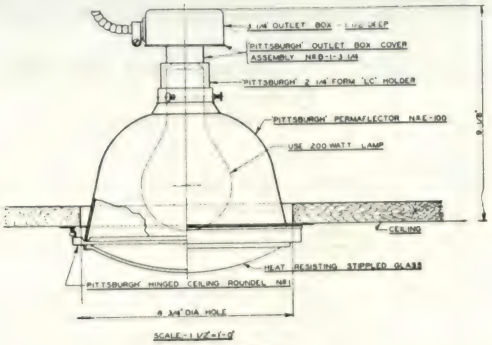
HINGED CEILING ROUNDELS

Number 1—Diameter 10 in. Includes stippled glass roundel. For use with Permaflectors Nos. 55, 110, E-100 and I-75.

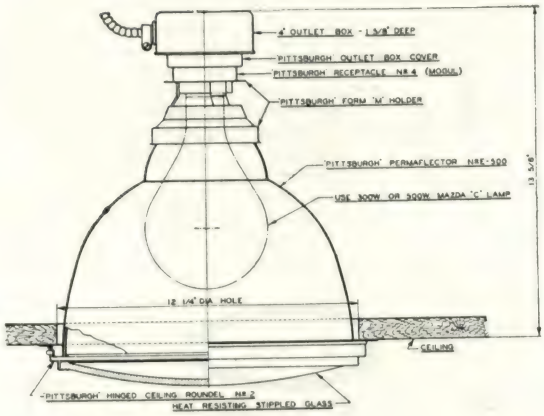
The E-100, when used with Ceiling Roundel No. 1 may be used with 200-watt lamp if attached to LC holder. (LC Holder is similar to Holder L, but slightly higher.)

Hinged Ceiling Roundel

Number 2—Diameter 15 in. Includes stippled glass roundel. For use with Permaflectors Nos. E-500, 551 and 500.



No. E-100



No. E-500

No. E-100 and No. 1 Ceiling Roundels
Under and above balcony

Continued on next page

PERMAFLECTOR COLOR-LITES

Color-Lite No. 1 (Gelatin)

Consists of retainer frame with spiral springs, inner retainer and four gelatin sheets, one each of red, blue, green and amber. The gelatin is held in place between the two steel rings, each of which have retainer wires stretched across the opening.

For Permaflectors No. 51, No. 52, No. 100, Windo-Spot No. 200 and Windo-Flood. To attach merely hook the springs in holes of the adapter; to remove, unhook. Neither lamp nor reflector need be removed.

Color-Lite No. 5 (Gelatin)

For Permaflectors Nos. 110 and 55, E-100, I-75 and Windo-Spot No. 100, similar to Color-Lite No. 1.

Color-Lite No. 2 (Glass)

Similar to No. 1

Consists of retainer frame with coiled springs, inner retainer and color glass. The color will not fade, glass is heat-resisting and will not break due to heat of lamp; does not shrink or wrinkle; not affected by moisture. Colors: Red, blue, green, amber. Specify color desired when ordering. For use with Permaflectors Nos. 51, 52, 100, Windo-Spot No. 200 and Windo-Flood.

Color-Lite No. 4 (Glass)

For use with "Pittsburgh" Reflectors Nos. P-75, P-151, P-101, E-75 and I-60. Consists of retainer frame with one color glass. Frame fits on over bead on edge of reflector. Glass rounded and its frame hinged for ready access to lamp. Colors are red, blue, green and amber. Specify color desired when ordering.

Note: When Color-Lites are wanted for use with flush-mounting rings (Permaflector Page 19) order must so state.

Color-Lite No. 6

This is a glass Color-Lite for Permaflectors Nos. 110, 55, E-100, I-75, C-100, Windo-Spot No. 100, similar to Color-Lite No. 2 but of smaller diameter.

Color-Lite No. 7

This is a gelatine Color-Lite for Permaflectors Nos. 500, 551, 555, C-500, and Windo-Spot No. 500, similar to Color-Lite No. 1 but of larger diameter.

Color-Lite No. 8

This is a glass Color-Lite for Permaflectors Nos. 500, 551, 555, C-500 and Windo-Spot No. 500, similar to Color-Lite No. 2 but of larger diameter.

Color-Lite F-1

For use with Floodlight FLC-250. Consists of pressed glass Roundel, 10⅜ in. in diameter. Snaps over mouth of Permaflector, being held in place by three spring clips. Installed inside of unit under protection of heat-resisting glass cover. Available in red, amber, green, blue.

Color-Lite F-2

8-in. pressed glass roundel, for use with Floodlight No. FLC-100. Colors: Red, amber, green, blue.

Color-Lite F-3

Consists of blown glass cap, 7⅞ in. in diameter, ventilated metal cap at top and clamping spring steel strap. Available in four colors, red, amber, green, blue.

Cap rests on offset in reflector contour as shown below. Color-Lite is clamped in place by spring steel strap, provided with notches at end which clamp under knurled head screws and with hole in center for centering over fillister head screw, binding the ventilated cap to the color cap.

The ventilated metal cap is in two parts, clamped into opening at top of glass cap. Cooling air circulates past lamp bulb and through ventilated metal cap so arranged as to permit the air to pass but allows no escape of white light.

Color-Lite F-3 places no pressure on lamp bulb, being supported entirely independent of lamp. In combination with the Permaflectors used in Floodlights FLC-501 and FLC-1001, it provides a ventilated lamp chamber and means of producing colored floodlighting heretofore not available.

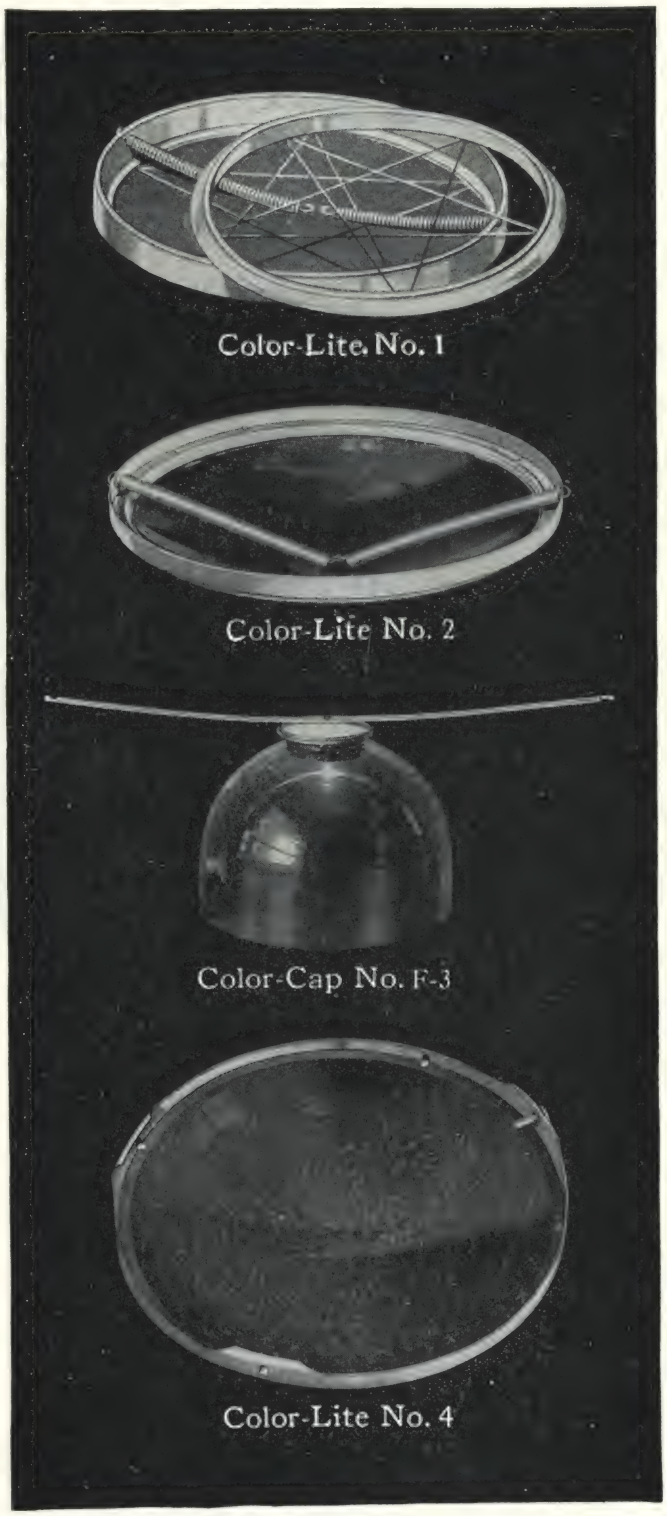
Can be used only with Nos. FLC-501 and FLC-1001.

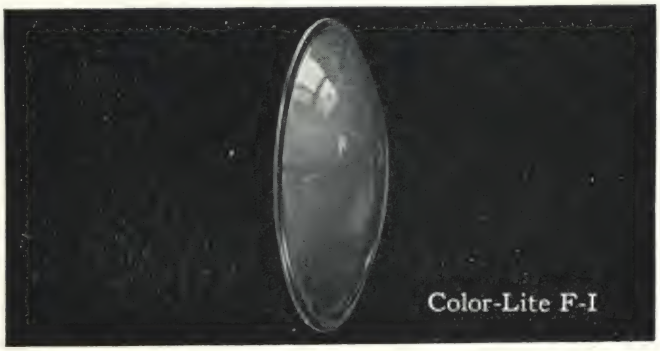
Color-Lite F-4

A 9½-in. pressed glass roundel, for use with Floodlight FLC-104. Colors: Red, amber, green, blue.

Color-Lite F-5

A 12-in. pressed glass roundel, for use with Floodlights FLC-300 and FL-301. Colors: Red, amber, green, blue.





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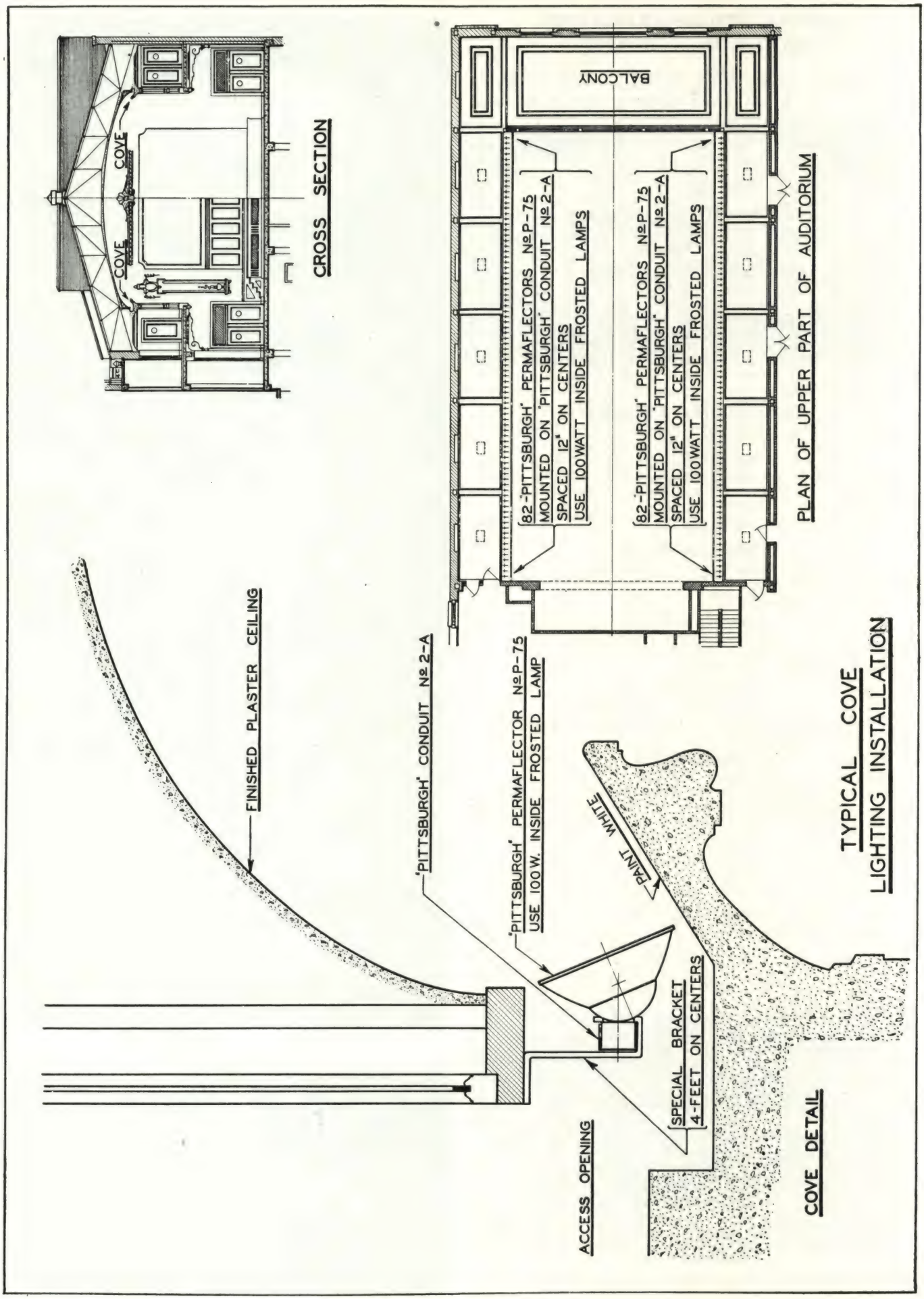

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INDIRECT LIGHTING

Indirect Lighting

That special adaptation of indirect lighting, commonly known as cove lighting, not only has all the advantages of other forms of indirect lighting but has the additional advantage of entirely concealing all lighting fixtures as well as the light sources.

Lighting problems have two aspects, the utilitarian and the aesthetic.

Industrial lighting is primarily for utilitarian purposes, with the possible exception of the higher class general and private offices; whereas window lighting, which is utilitarian in its important aspect, seeks pleasing aesthetic effects.

In this case the aesthetic contributes almost wholly to the utilitarian—the sales power of the show window. Therein window lighting differs from other forms of lighting.

Usually the aesthetic is something apart and different from the utilitarian, and in many instances the strictly aesthetic is not utilitarian at all.

The controversy that has been going on for years between the architect and the interior decorator on the one hand, and the illuminating engineer on the other, results from the efforts on the part of the former to make the aesthetic the predominant feature of the lighting, whereas the engineer is often guilty of an almost brutal disregard for the aesthetic side in his search for highest utilitarian quality.

Obviously the best solution of any lighting problem, where both these aspects must be given due consideration, is the solution which provides effective illumination while at the same time conforming to aesthetic requirements. In arriving at this goal there must be some disposition to compromise on the part of the architect or interior decorator and the engineer.

Indirect lighting from cornices and coves offers an excellent solution, from this standpoint, of good lighting for many interiors such as church and theater auditoriums, ball rooms, lodge rooms, hotel and club dining rooms, library reading rooms, court rooms, fine store interiors and other similar interiors.

Many large interiors would be ruined architecturally by the installation of the host of lighting fixtures of the ordinary type that would be required for their proper illumination. With cove lighting it is possible to eliminate visible fixtures. The lighting units may be cleverly concealed within cornices and coves of the architectural design, wall and floor urns, and in other ways.

Planning the Lighting System

In designing a beautiful architectural work, the architect visualizes and keeps in his mind's eye the aesthetic effects he is striving to realize. While the lighting is only one factor in attaining this object, it nevertheless is a most important factor. Therefore, a good general idea of the type of lighting to be used should be determined upon early in the drawing of the plans.

Too frequently the important decisions concerning the lighting are not made until the building is too far advanced to permit of the best results. Obstacles which could have been avoided, had it been known what character of lighting would be used, may prevent the consummation of the desired happy combination of maximum lighting utility with beautiful aesthetic effects.

Moreover, if consideration of the lighting is postponed too long, it may be found that the electric wiring has not been properly placed and that it is insufficient in carrying capacity for the lighting requirements of the building.

Examples of Cove Lighting

Herein are shown photographs of a few of the manifold applications of cove lighting.

It will be noted that almost without exception the lighting is the making of the interior, in that it reveals the architectural details in a superb manner without fastening attention upon itself, as would be the case with lighting fixtures.

Moreover this form of illumination leaves little to be desired from the standpoint of the utilitarian inasmuch as it has long been recognized as the nearest approach to daylight in its beneficial effects upon the eye. Glare is very nearly, if not entirely, absent due to the low brightness of the source of light, which in effect is the ceiling and walls because the primary source, the lamp and auxiliary reflecting equipment, is concealed. Shadows are greatly softened because of the diffuse character of the illumination and hence annoyance and eye fatigue are reduced to a minimum.

"Pittsburgh" Cove Lighting System

Recognizing the important aesthetic and utilitarian service to be rendered to humanity by the development of this form of lighting the PITTSBURGH REFLECTOR COMPANY has for years been perfecting a line of reflectors and wiring devices to aid the architect in securing the very best cove lighting installation.

Flexibility and ready adjustability have been given especial consideration.

The various reflectors illustrated on Permaflector Pages 25 to 27 in this catalogue have been designed particularly for this important type of service, and to facilitate wiring "Pittsburgh" "Easy-to-Install" Conduit has been devised. (See Permaflector Pages 14 and 15.)

It is believed that the present line of cove lighting reflectors is reasonably complete and that cove lighting problems can be satisfactorily handled by the selection of the proper reflector from this group. When occasion may arise making necessary a new design of reflector, having new characteristic distribution, the architect may depend upon it that the PITTSBURGH REFLECTOR COMPANY will proceed with its development and manufacture without delay.

Engineered Cove Lighting

For the reasons already mentioned architects are urgently requested to permit our Engineering Department to co-operate with them as the design of the building proceeds, because through such co-operation they will be assured of superior results. First sketches submitted to us will give us sufficient information upon which to base a lighting recommendation.

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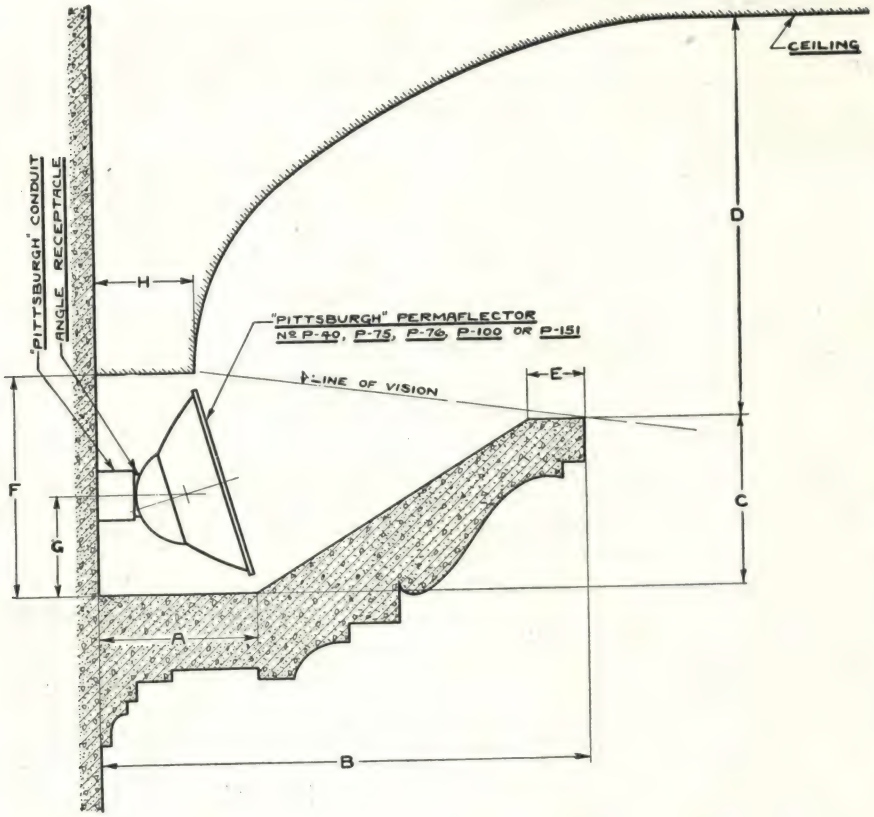
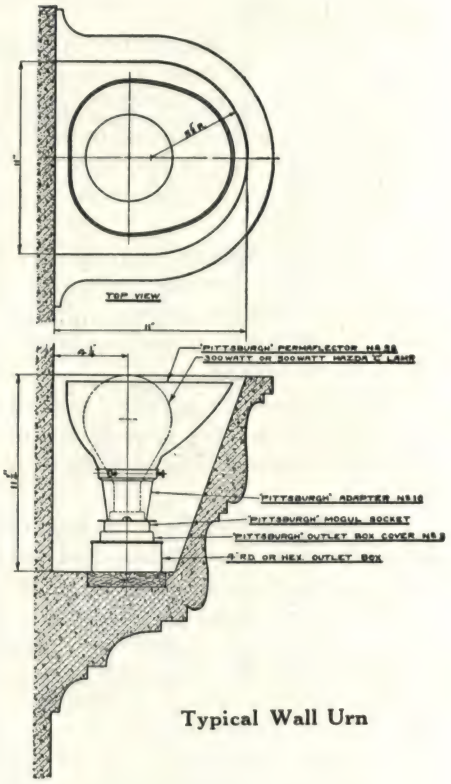


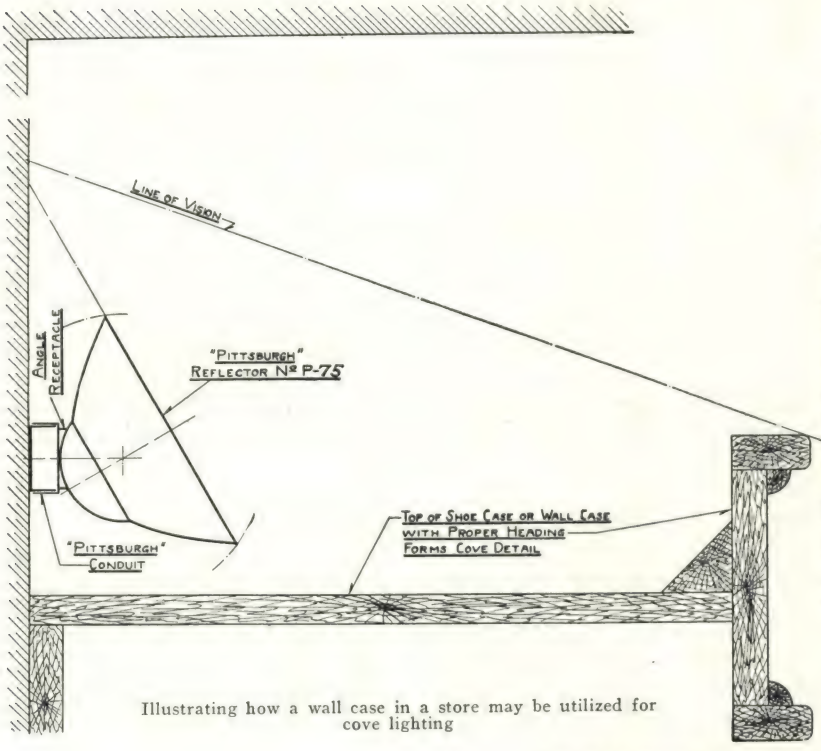


Typical Wall Urn

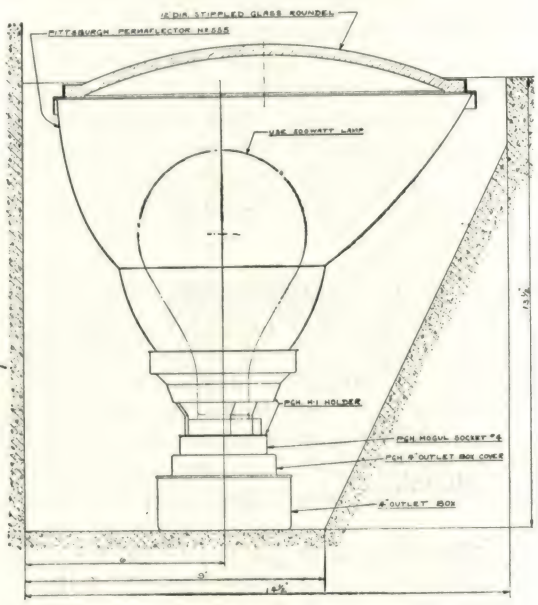
Information Required for Cove Lighting Recommendations

If our recommendations are desired, it is necessary for us to know the following dimensions:

Floor to ceiling.
Length of room.
Width of room.
Dimensions A, B, C, D, E, F, G and H.
Plan of cove, if not rectangular or circular.



Illustrating how a wall case in a store may be utilized for cove lighting



Typical Cove

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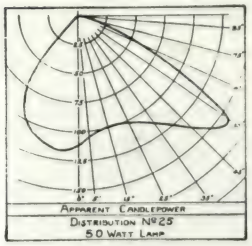
Permaflector No. 25

A very useful cove lighting reflector; lighting distribution throws out a maximum at 55° below the zenith, which permits placing cove close to ceiling.

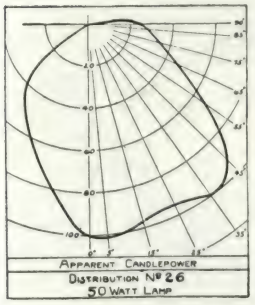


Lamp—25-watt A-19 or 50-watt mill type used with 2¼ in. Form "O" Holders. 50-watt A-21 used with 2¼ in. Form "H" Holder.

Dimensions—
Height ..... 4¼ in.
Width ..... 4¼ in.
Front to back of opening .....5 in.
Minimum spacing 4½ in. o. c.

May be used with Conduit No. 1 or Assemblies, Series B-1.

Permaflector No. 26



A show case reflector. Also for use in small coves, as in residences.

Lamp—25-watt A-19 (inside frosted) or 50-watt mill type.

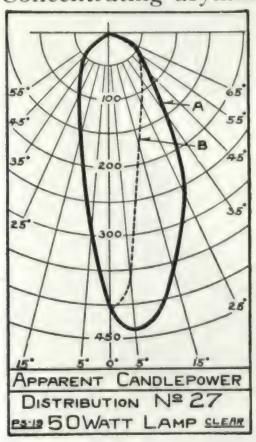
Holder—2¼ in. Form "O."

Dimensions—
Height ..... 3½ in.
Front to back..... 4⅛ in.
Width ..... 4⅛ in.
Minimum spacing 4½ in. o. c.

May be used with Conduit No. 1 or Assemblies, Series B-1.

Permaflector No. 27

Primarily for tall and shallow wall display cases. Concentrating asymmetric distribution; with maximum candle power at 15°. Spacing should be 12 to 15 in. on center. Minimum 6½ in. on center.



Also useful for lighting small show windows, bank cages, bookcases, stock shelves, for cove lighting, etc.

Lamp—25-watt A-19, 50-watt A-19 or 50-watt mill type.

Holder—2¼ in. Form "O."

Dimensions—
Height ..... 3⅞ in.
Width ..... 6 in.
Front to back..... 6⅜ in.

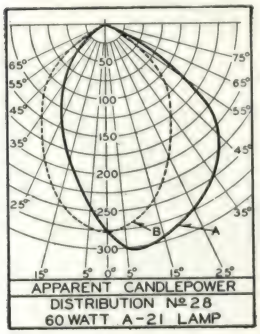
May be used with Conduit No. 1 or Assemblies, Series B-1.

Permaflector No. 28

Similarly to No. 27, Permaflector No. 28 is designed for tall and shallow wall display cases. It is concentrating, asymmetric in distribution, and maximum candlepower occurs at 10°.

Also useful for lighting small show windows, bank cages, book cases, stock shelves, side walls of gasoline service stations.

It differs from No. 27 primarily in that it is horizontal across the bottom opening, for flush mounting service. It has circular bottom opening, 5½ in. in diameter.



Lamp—25-watt inside frosted, or 50-watt mill type, use form "S" holder; 50-60-watt inside frosted lamp, use form "L" holder.

Dimensions—
Height ..... 3⅞ in.
Diameter ..... 5½ in.

Minimum spacing 6 in. on centers; ordinary spacing from 9 to 15 in. on centers.

May be used with Conduit No. 1 or Assemblies, Series B-1.

Continued on next page

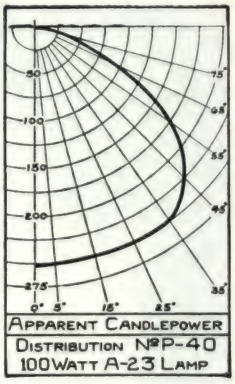
Permaflector No. P-40

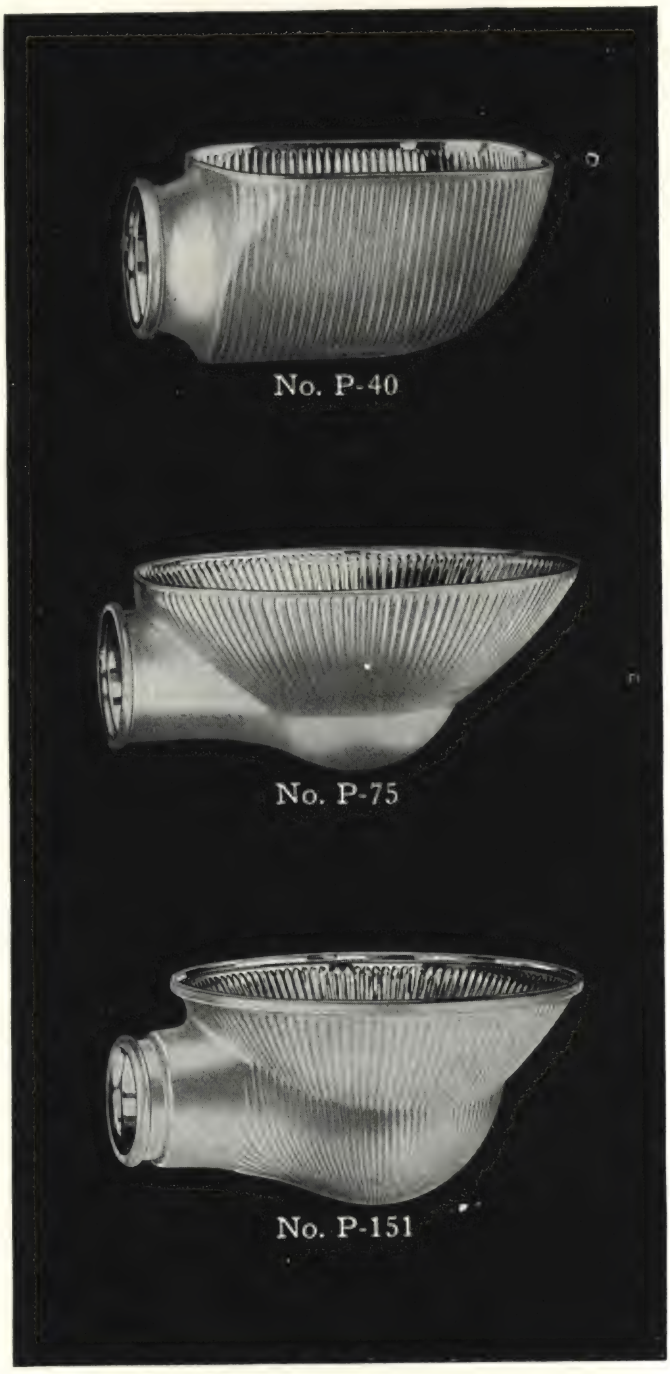
For indirect lighting from coves. Broad distribution. Minimum spacing, 8 in. on center. Also for lighting wall cases, bank cages, indirect lighting fixtures, art gallery lighting, etc.

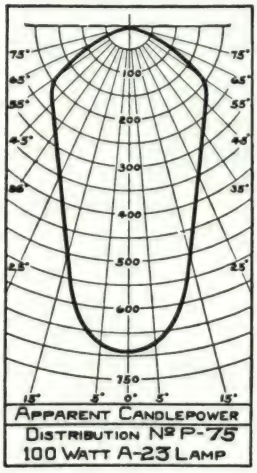
Lamp—50-watt and 60-watt A-21 (inside frosted) with 2¼-in. holder Form "O"; 100-watt A-23 (inside frosted) or 75-watt clear, with 2¼-in. Holder Form "H."

Dimensions—
Height ..... 2¾ in.
Width ..... 4¼ in.
Length ..... 5½ in.

May be used with No. 2 or No. 2-A Conduit or Outlet Box Assemblies, Series No. B-2.







Permaflector No. P-75

Designed primarily for indirect lighting from coves, where light must be thrown some distance and therefore a concentrated beam of light is desired. Also for indirect lighting fixtures, stock quotation boards, art galleries and also for small shallow windows where overhead room is limited and high intensity is desired. Minimum spacing 7¾ in. on centers.

Color-Lighting—(See Permaflector Page 21.) Color-Lite No. 4.

Lamp—100-watt A-23 (inside frosted) or 75-watt clear, 2¼-in. Holder Form "O."

Dimensions—
Height ..... 3 in.
Diameter ..... 6¾ in.

May be used with No. 2 or No. 2-A Conduit or Outlet Box Assemblies, Series No. B-2.

Permaflector No. P-151

Designed primarily for indirect lighting from coves, where light must be thrown some distance, and, therefore, a concentrated beam of light is desired.

Also for indirect lighting fixtures, rug racks, wall paper racks, wall cases, stock quotation boards, art galleries, and for small shallow show windows, where overhead room is limited and high intensity is desired. Minimum spacing 8¼ in. on centers.

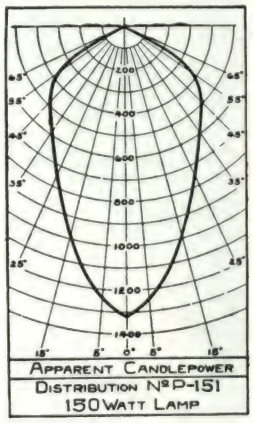
Color-Lighting—(See Permaflector Page 21.) Color-Lite No. 4.

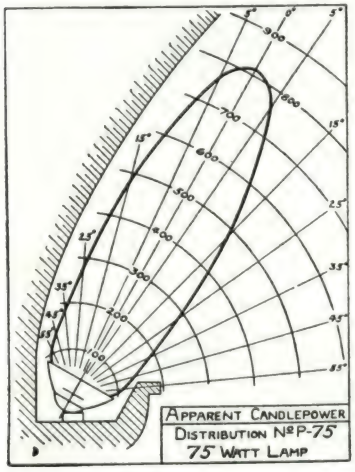
Lamp—150-watt clear.

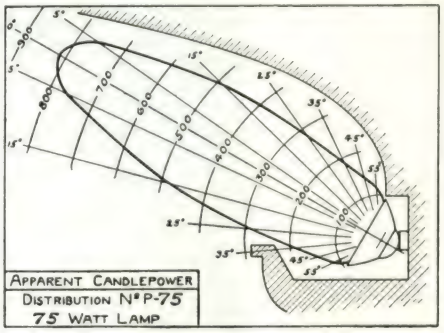
Holder—2¼ in. Form "O."

Dimensions—
Height ..... 3⅞ in.
Diameter ..... 6¾ in.

May be used with No. 2 or No. 2-A Conduit or Outlet Box Assemblies, Series No. B-2.

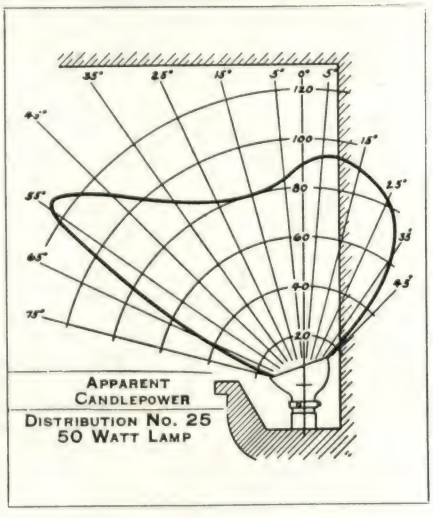






Typical Examples

Other typical examples of application of Permaflectors to cove lighting appear on Permaflector Pages 22 and 24. If our recommendations are desired, please give information as to dimensions (see Permaflector Page 24).



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Permaflector No. P-101

Same class of cove lighting as No. P-40 and No. P-76, particularly where large areas are to be lighted or greater absorption of light by surfaces of lower reflection factor must be counteracted by additional wattage. Also for indirect lighting fixtures and for special applications requiring high wattages within limited space. Minimum spacing, 9 in. Usual spacing, 12 in. o.c.

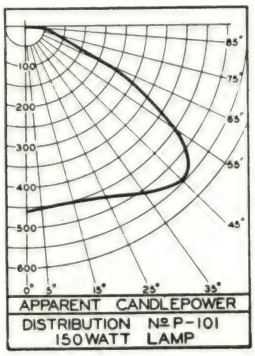
Color-Lighting—(See Permaflector Page 21.) Color-Lite No. 4.

Lamp—100-150-watt clear.

Holder—2¼ in. Form "O." (Or with 200-watt and 2¼-in. Form "H" holder.)

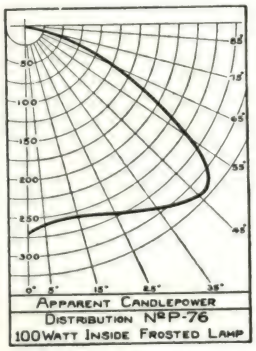
Dimensions—
Height .....3⅞ in.
Diameter .....6¾ in.
Length .....7¾ in.

May be used with No. 2 or No. 2-A Conduit or Assemblies, Series No. B-2.



Permaflector No. P-76

For indirect lighting from coves; distribution broader than No. P-40. Minimum spacing 7½ in. o.c. Also for indirect lighting fixtures and special applications where spacing is limited.



Lamp—50-watt A-21 (inside frosted) with holder 2¼ in. Form "O"; 100-watt A-23 (inside frosted) or 75-watt clear with holder 2¼ in. Form "H."

Dimensions—
Height .....3 in.
Diameter .....4¾ in.

May be used with No. 2 or No. 2-A Conduit or Assemblies, Series No. B-2.

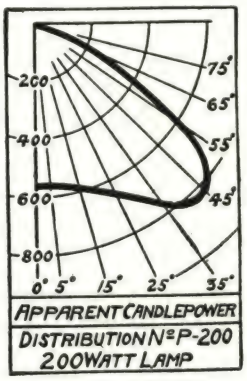
Permaflector No. P-200

Primarily for cove lighting; broad distribution. Similar to No. P-101. Minimum spacing 10 in. o.c. Also for indirect fixtures, etc.

Lamp—100-150-watt clear with 2¼ in. Form "O"; 200-watt with 2¼ in. Form "H" holder.

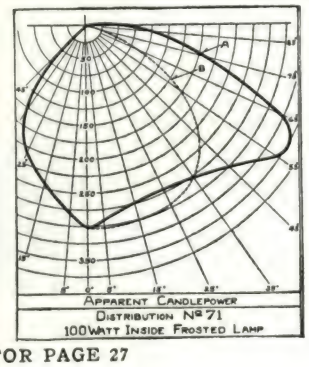
Dimensions—
Height .....4¼ in.
Diameter .....7¼ in.
Length .....8 in.

Cannot be used with Conduit No. 2 or No. 2-A. May be used with Outlet Box Assemblies, Series No. B-2.



Permaflector No. 71

For wall cases, interior bulletin boards, paintings, cove lighting, stage footlights. Spacing recommended, 12 in. on center. May be placed as closely as 8 in.



Lamp—100-watt A-23 (inside frosted) and 75-watt clear.

Holder—2¼ in. Form "H."

Dimensions—
Height .....5½ in.
Width .....5½ in.
Front to back.....6¼ in.
Center to back.....2¾ in.

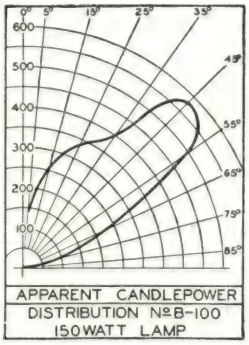
Receptacles must be not less than 3 in. from glass.

May be used with Conduit No. 1 or Assemblies, Series No. B-1.

Continued on next page

FOR INDIRECT FIXTURES

(Lamps Burning Base Up)



No. B-100

Lamps — 100-150-200-watt clear.

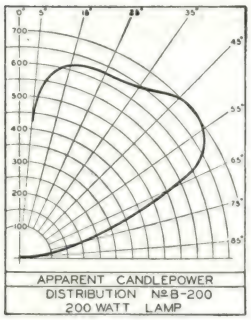
Dimensions—

Height ..... 5 in.
Diameter ..... 9 in.

Permaflectors B-200, B-501, B-1000 and B-1001

These have an exterior silvered surface which is deeply cross-fluted, in order to provide a smooth distribution of light over the ceiling. The interior of the glass, however, is smooth and, therefore, easy to clean and to keep clean; there are no deep wrinkles in which dust and dirt may lodge.

The distribution of light over the ceiling is extremely broad, the ceiling effect is beautifully smooth, uniformly graded, no sharp cutoff to the field of light, but a gradual fading away.

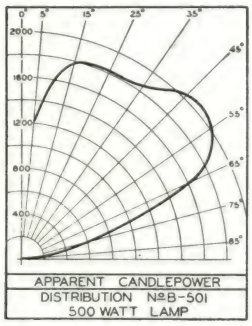


No. B-200

Dimensions—

Diameter ..... 9½ in.
Depth ..... 4¾ in.

To produce the light distribution indicated on the curve, center contact of base of 200-watt lamp must be 4⅞ in. above top rim of Permaflector.

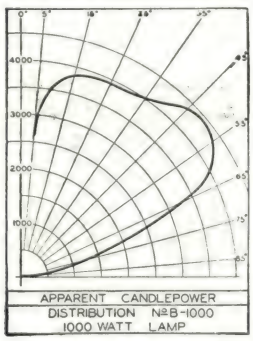


No. B-501

Dimensions—

Diameter ..... 12 in.
Depth ..... 6 in.

To secure the light distribution indicated on accompanying curve, center contact of base of 300 or 500-watt lamp must be 5⅜ in. above top rim of Permaflector.



No. B-1000

Dimensions—

Diameter ..... 16 in.
Depth ..... 8 in.

To secure the light distribution indicated on accompanying curve, center contact of 750-1000-watt lamp base must be 7¼ in. above top rim of Permaflector.

FOR URNS

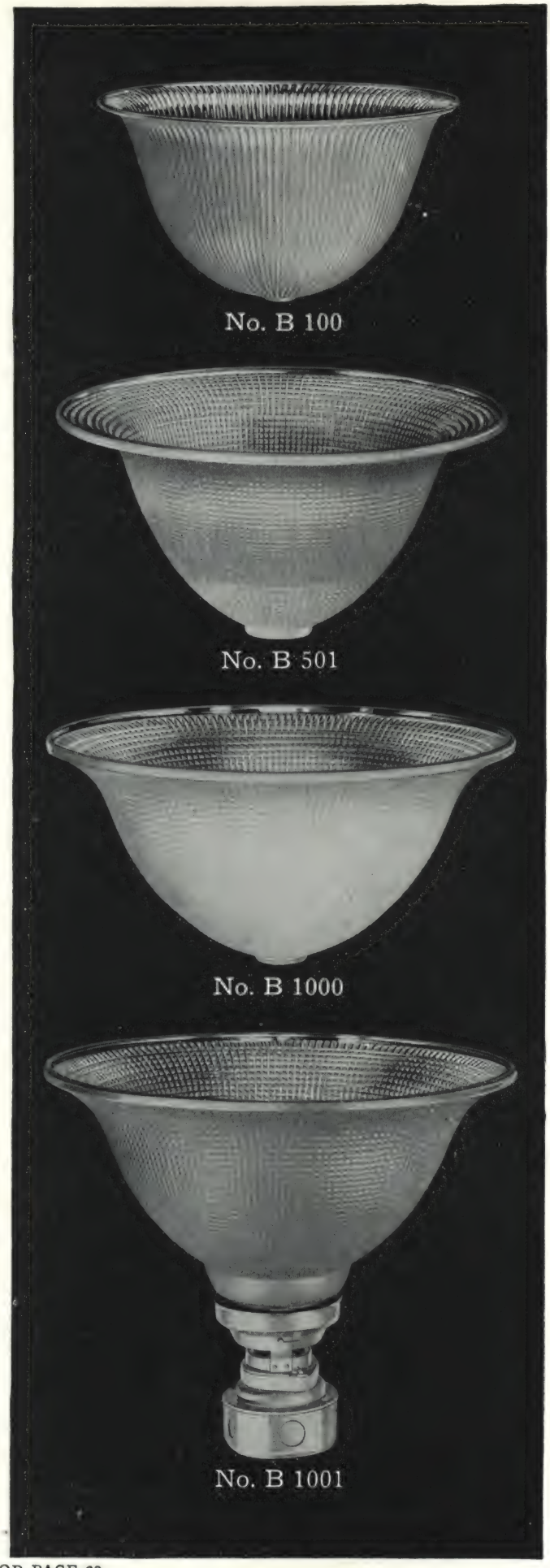
(Lamp Installed Base Down)

No. B-1001

For use in indirect urn-type Luminaires. Lighting distribution the same as B-1000.

Dimensions—

Diameter ..... 16 in.
Depth of reflector only ..... 8⅛ in.
Depth, complete with holder and 4-in. outlet box, as shown ..... 13⅝ in.



PERMAFLECTOR PAGE 28

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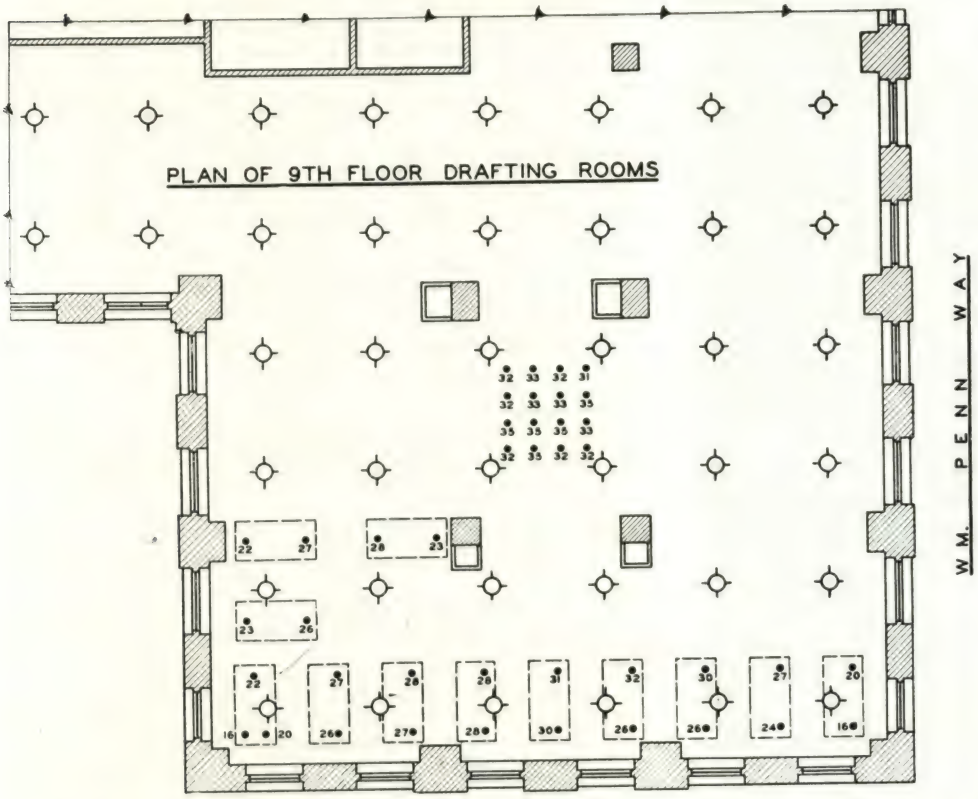
ILLUMINATION TESTS OF LUMINAIRE A-5 IN THE DRAFTING ROOMS, KOPPERS COMPANY, KOPPERS BLDG., PITTSBURGH, PA.



Average approximately 25-ft. candles—30-35-ft. candles in central bays—minimum 16-ft. candles in corners.

Description of Installation

Indirect Luminaire A-5—300-watt Mazda "C" lamp.

Suspension — Top of bowl to ceiling 30 in.

Spacing—8 to 9 ft. on centers.

Ceiling—11 ft. high, finished eggshell white.

Installation—New and clean.

Illumination Tests

Date—April 11, 1929—7:30 p. m.

Conducted By — John A. Hoeveler, E.E.

Test Condition — No natural light in room at time of test.

Instrument — Macbeth Illuminometer No. 63577.

Test Results—Illumination in foot-candles on horizontal plane 34 in. above floor at stations indicated.

One Section of a Drafting Room of Koppers Company, Pittsburgh, Pa.

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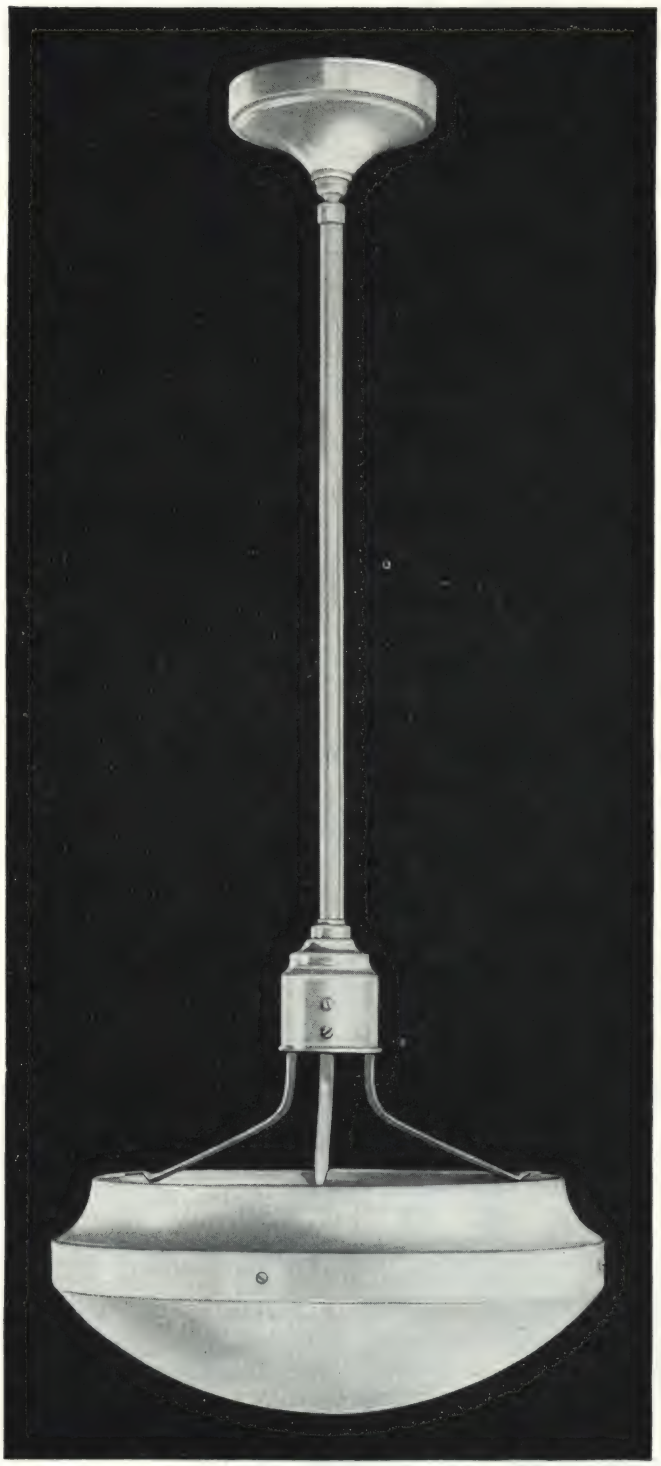


Indirect Luminaire A-5

(Patent Applied For)

Indirect Luminaire No. A-5 is designed primarily for commercial service, such as lighting of stores and offices.

The distribution of light over the ceiling is extremely broad, adequately covering a 20-ft. bay from a single central unit, with 30-in. suspension. The field of light is beautifully uniform; shadows from supporting arms are absent; and there is no sharp cutoff to the field of light, but a gradual fading away.

These unusual results are achieved by means of Permaflector No. B-501, designed for this purpose; at the same time, the design is such as to permit the lamp to be installed low in the reflector, thus reducing the exposure of the neck of the lamp.

Black supporting arms, black porcelain receptacle, and black finish inside of the socket husk, together with this low position of the lamp in the reflector, eliminate objectionable brightness of these elements and of the lamp neck.

The interior of the reflector is smooth and consequently it is easy to clean and to keep clean, which is a most important feature.

The sheet steel bowl is made of two pieces, telescoping one inside the other and held together by screws. This method of enclosing and fastening the reflector provides a very neat appearing fixture, one that looks just as good from above as from below.

Any one of the supporting arms may be disconnected and the bowl allowed to hang from the other two arms, for easy cleaning of the reflector (which is fastened in place and cannot drop out).

The Mogul Socket is enclosed in a sheet steel husk, which also serves as the means of supporting the bowl from the cold-rolled steel arms.

The husk is porcelain enameled, in order to make certain of a lasting finish on the husk, which becomes very hot in service; the porcelain enameling matches the ivory Duco finish of the fixture, both as to color and lack of glaze.

A stem support with swivel joint at canopy is used, thus doing away with the chain and at the same time insuring that the fixture will hang pendant.

The swivel stem support is considerably better looking than chain, and can more readily be kept free from dirt accumulation.

The sheet steel canopy is harmonious in design with the bowl and is arranged for supporting from fixture stud in outlet box.

The finish is a rich ivory, which will harmonize well with most any store or office interior.

The distinct points of advantage of Luminaire A-5 are:

(1) Easy assembly and wiring and installation.

(2) Very much improved light distribution.

(3) Elimination of support shadows.

(4) Elimination of sharp cutoff of field of light.

(5) Elimination of peeling of finish on husk.

(6) A much better design, and consequently very much improved appearance.

(7) Easy maintenance of reflector.

(8) Swivel joint at canopy—luminaire hangs pendant.

(9) A Luminaire equipped with a Permaflector unconditionally guaranteed for 10 years.

The fixture is designed for use with 300 and 500-watt general service, incandescent lamps.

Dimensions—

Diameter of bowl	16 in.
Depth of bowl	6½ in.
Diameter of canopy	6 in.
Suspension, top of bowl to ceiling	30 in.

Reflector is Permaflector No. B-501, which is 12 in. in diameter and 6 in. deep. (See illustration at right; also Permaflector Page 28.)

Illumination Design Data

Spacing between units should not exceed ceiling height for ceilings 12 ft. or less. For higher ceilings, spacing may exceed ceiling height, but not by more than 25 per cent.

For good office lighting, approximately 10 foot-candles, use 300-watt lamps up to 12-ft. spacings.

For greater spacings, or where higher illumination is desired, use 500-watt lamps.

Continued on next page

Indirect Luminaires No. B-2 and B-5 (Patent Applied For)

Pittsburgh Indirect Luminaire A-5 was brought out more than a year ago to satisfy an insistent demand for a better indirect fixture for commercial and office lighting. As a part of this unit, we developed the new Permaflector B-501, with its broad, smooth, efficient distribution of light over the ceiling. Permaflector No. B-200 for the 200-watt lamp and Permaflector B-1000 for the 750 or 1000-watt lamp followed.

Indirect Luminaire A-5 incorporates unusually fine design features and naturally it commands a price commensurate with its quality.

There is, however, a considerable market for a lower priced line of indirect luminaires. Pittsburgh Indirect Luminaires B-2 and B-5 are offered for this field. The lowering of the cost of production has been accomplished entirely in the fixture. The same Permaflectors, B-200 and B-501, respectively, are employed as in the DeLuxe Type A Luminaire. In other words, customers who want efficient, properly distributed indirect illumination may now have it at very low cost for fixtures.

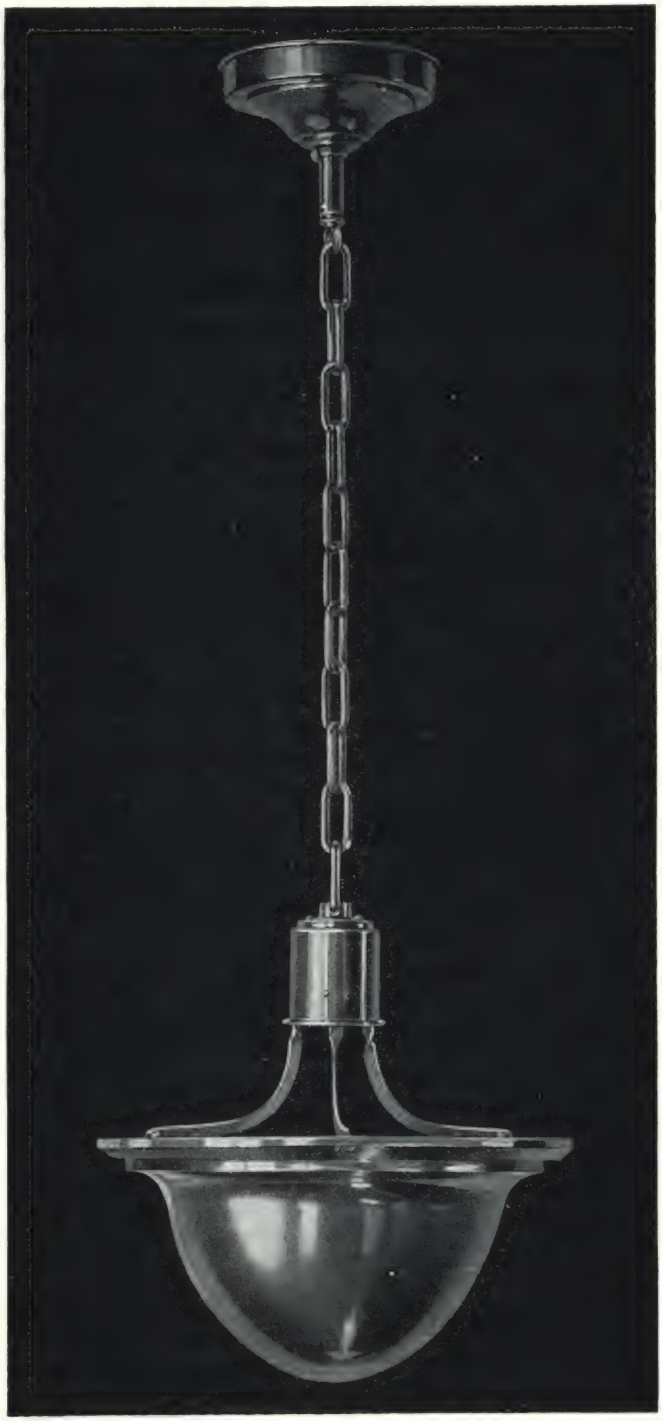
Indirect Luminaires B-2 and B-5 consist of spun copper bowls, of the design indicated, suspended from the spun copper husk enclosing the socket, by means of detachable steel arms. Canopy is of spun copper; stem of brass tubing; chain of steel. All external parts of fixture are finished in dark monumental bronze.

Sufficient chain is provided to make possible a length of suspension from top of bowl to ceiling of 36 in. This will usually be more than desired. Consequently, chain may be shortened to secure the desired length of suspension by removing as many links as may be necessary for a particular job.

Indirect Luminaires B-2 and B-5 can be maintained just as conveniently as Indirect Luminaire A-5. Any one of the three supporting arms may be detached and the bowl swung free of the lamp on the two remaining arms. This permits easy cleaning of the smooth interior surface of Permaflectors B-200 or B-501.

Bowl Size	*Diameter*	*Depth*
No. B-2	11⅛ in.	5⅞ in.
No. B-5	13¾ in.	7 in.

Note: These are standardized units available only as described above. They can be furnished in other finishes only on special order in those cases where large quantities are involved.



Permaflector Luminaires No. A-5 or No. B-5 Are Ideal for Office Lighting

Permaflector Luminaires No. A-5 or No. B-5 Provide Even, Shadowless Light for Drafting Rooms

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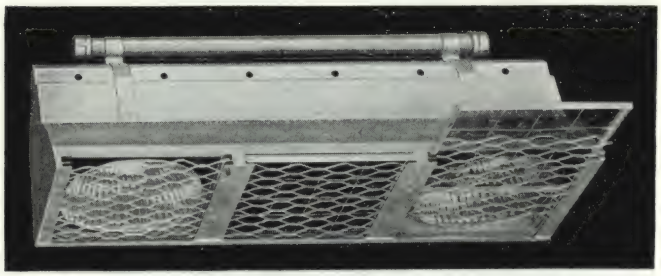
FOR THE STAGE

"Pittsburgh" Theater Border Light

Consists of heavy gauge sheet metal housing, pipe hanger extending full length of each unit, slide for guard of expanded metal and slide for Color-Lite frame containing gelatin. Glass Color-Lites also available.



Pittsburgh Theater Border Light 3 Ft. Long

Provides fine light control and efficiency, at no increase in operation cost over ordinary border lights of low efficiency.

"Pittsburgh" Theater Border Light completely protects the silvered glass reflectors with the heavy gauge metal housing and expanded metal guard beneath.

Built in any length; in sections, when more than 25 ft. long. Specifications for 300 to 500-watt border lights for very large theaters available on request.

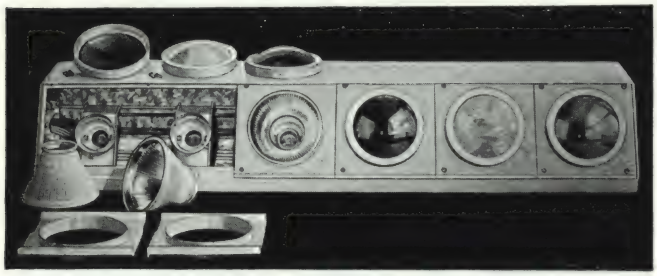
Border Light No. 1—For use with either 100 or 150-watt lamps, spaced 12 in. on centers. Over-all height, 14½ in., width 10½ in.

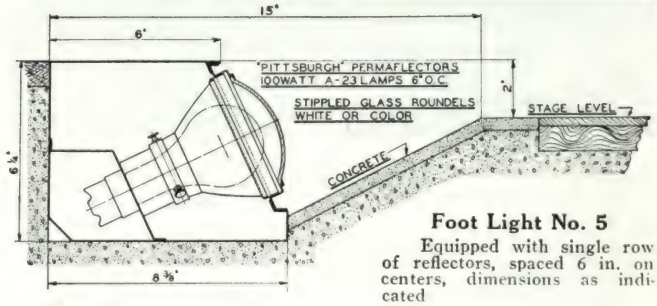
Border Light No. 2—For use with 200-watt lamps, spaced 12 in. on centers. Over-all height, 16 in., over-all width, 11½ in.

Border Light No. 3—For 300-500-watt lamps, 12 in. on centers. Over-all height, 17 in.; width, 11½ in.

"Pittsburgh" Theater Foot Lights

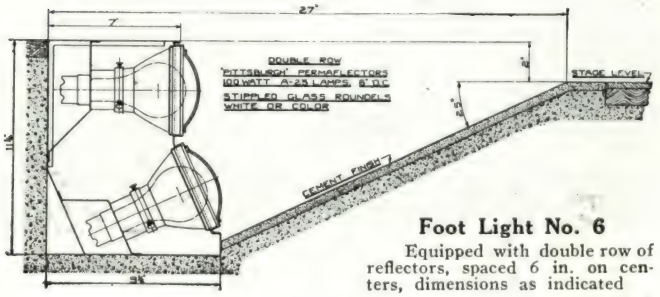
Equipped with highly efficient Permaflectors, set inside a heavy gauge continuous metal housing strong enough to support the weight of an actor.





Foot Light No. 5

Equipped with single row of reflectors, spaced 6 in. on centers, dimensions as indicated



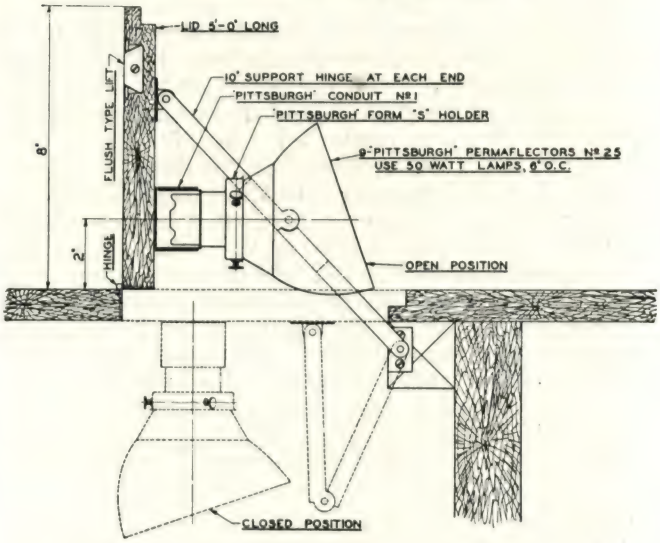
Foot Light No. 6

Equipped with double row of reflectors, spaced 6 in. on centers, dimensions as indicated

Pittsburgh Foot Light is completely enclosed, self-contained, dusttight. The convex glass roundels are easily removed to renew lamps. Front plate containing roundels may be removed in sections to get at the wiring. With this enclosed, dusttight foot light, the lamps and reflectors are always protected against the accumulation of dust and dirt.

When specifying either No. 5 or No. 6 Pittsburgh Foot Light, architects should detail them as indicated below, thus requiring the general contractor to build the stage so that the Pittsburgh Foot Light will accurately fit into place.

Disappearing Foot Light No. 8

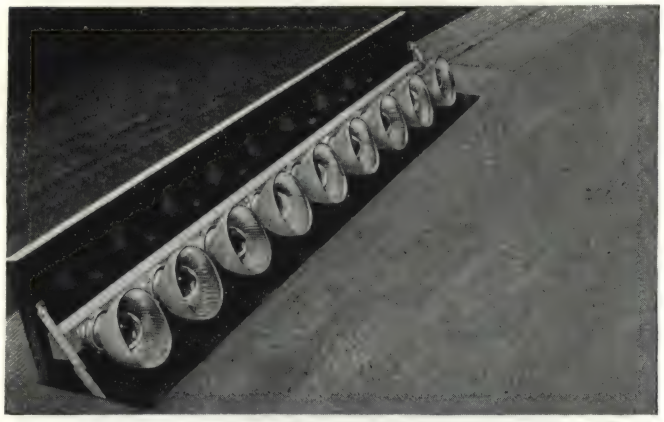


For those schools having stage in the auditorium for which a disappearing foot light is desired, but who can not afford Disappearing Foot Light No. 7, we recommend Disappearing Foot Light No. 8. It consists of 5 ft. by 8-in. hinged sections in the floor, constructed as shown. These should be equipped with 10-in. support hinges at each end and a flush type of lift.

Attached to the bottom of the hinged lid, at the location shown, is a 5-ft. length of Pittsburgh "Easy-to-Install" Conduit No. 1, equipped with 9 receptacles, spaced 6 in. on centers as shown, 2¼-in. Form "S" shade holders, and 9 Pittsburgh Permaflectors No. 25, equipped with 50-watt lamps.

The school authorities to arrange with the carpenter contractor for construction of these hinged sections in accordance with the detail here shown.

Electrical contractor may furnish and install the "Easy-to-Install" Conduit and Permaflectors.



This foot light was first worked out for St. Augustine's Academy, Cleveland, Ohio. It is very successful as a lighting unit, but of course does not possess the ruggedness and practical features of Foot Light No. 7.

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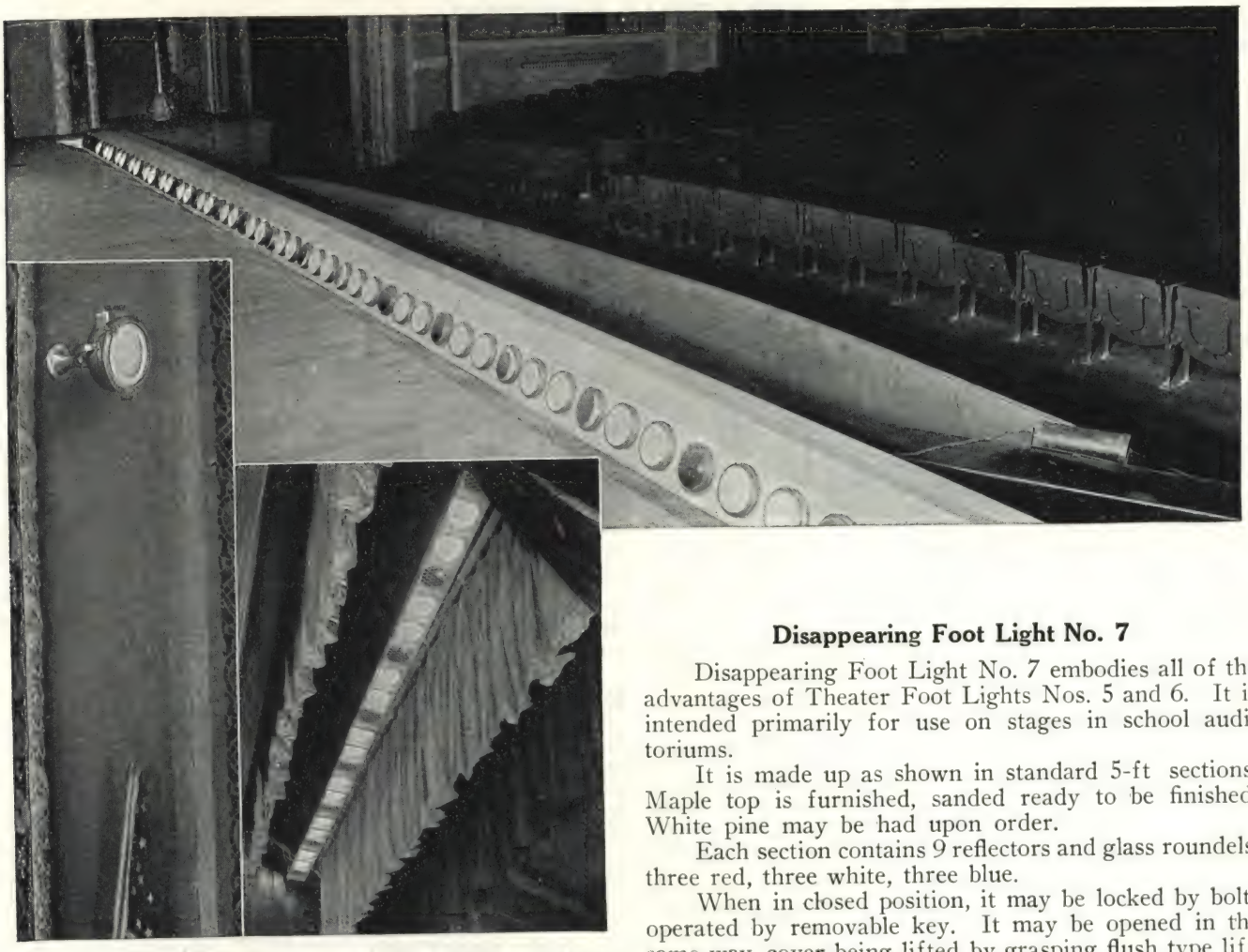


Above Illustrates Border Light No. 1; No. FLC-250 Used as an Emergency Light; and Foot Light No. 5

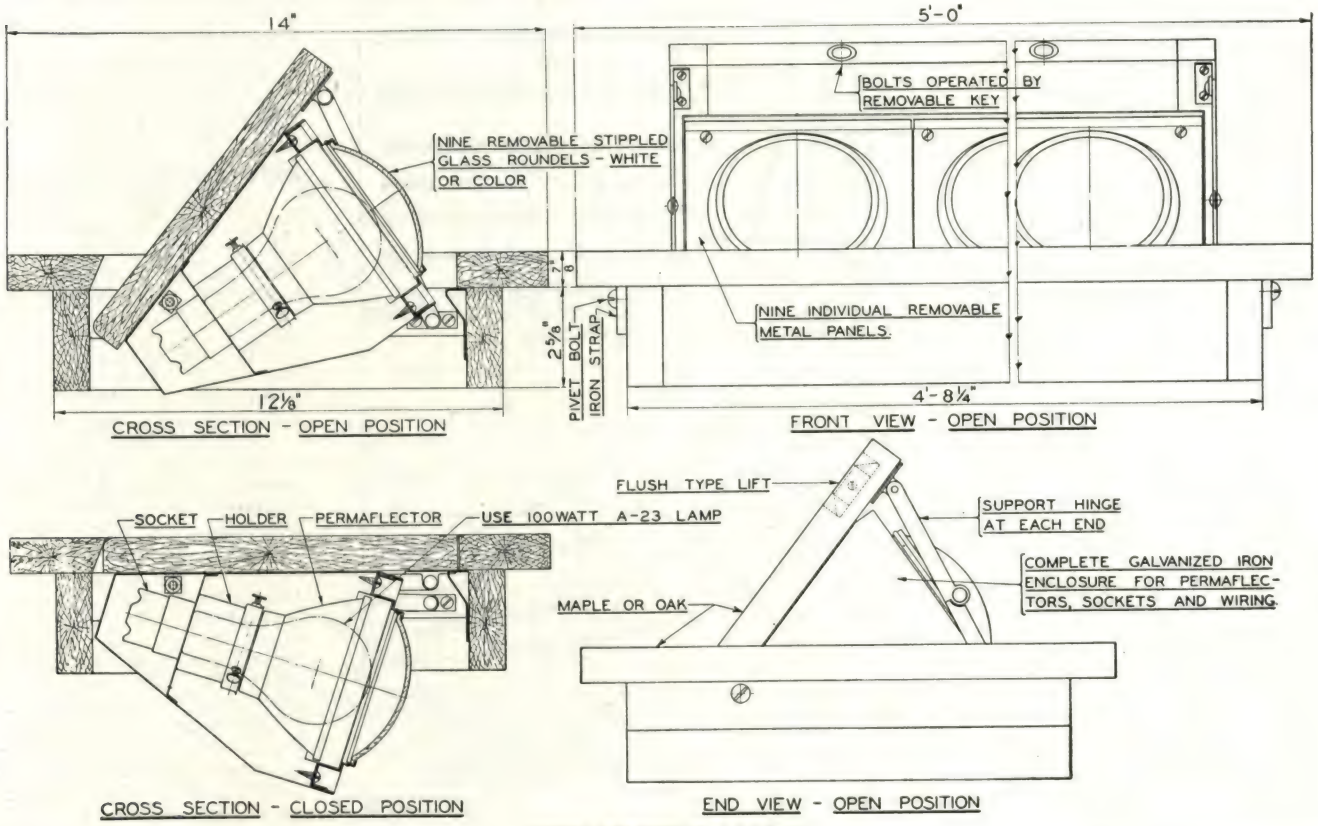
Disappearing Foot Light No. 7

Disappearing Foot Light No. 7 embodies all of the advantages of Theater Foot Lights Nos. 5 and 6. It is intended primarily for use on stages in school auditoriums.

It is made up as shown in standard 5-ft sections. Maple top is furnished, sanded ready to be finished. White pine may be had upon order.

Each section contains 9 reflectors and glass roundels, three red, three white, three blue.

When in closed position, it may be locked by bolts operated by removable key. It may be opened in the same way, cover being lifted by grasping flush type lift. Cover is held open by support hinge at each end.



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INDUSTRIAL LIGHTING

Importance of Good Factory Lighting

It has been said that the use people make of illumination is a measure of their progress. For thousands of years the human race struggled along with artificial sources of light of puny lightgiving ability, with the result that no work requiring close vision could be done except during the hours of daylight. During this time mechanical invention and science lagged.

In the past half century, however, there has been more development in lighting than in all the ages before, since man first used a brand from the fire to light his way at night. Significantly, this rapid advance in artificial lighting methods was accompanied by the most astounding material development of the world.

Conservation of Eyesight

Lengthening the hours during which close work can be done has brought with it some disadvantages, however; (1) unusual and unnatural demands have been placed upon the eye; (2) the eye has not always been able to adjust itself to these increased demands of close vision, because artificial illumination has not always been intelligently adapted to assist the eye in carrying its added burden. Thus it is evident that the lighting problem is one of greatest importance from the standpoint of conservation of vision.

Because diminution of eyesight due to working with insufficient and improperly applied illumination takes place gradually, it may take a person years to become aware of it, which makes it important to guard against the insidious effects of dim illumination, of glaring light sources shining in the eyes, of flickering lights, of sharp shadows and of glare reflected from polished parts of the work.

Accident Prevention

Experience has also demonstrated that insufficiently and improperly applied illumination is a prolific cause of industrial accidents. In the past few years numerous investigators studying the cause of accidents have found that the accident rates in plants with poor lighting is higher than similar plants which are well illuminated. Moreover, factories which have installed improved lighting have experienced reductions in their accidents which have proved very gratifying.

In any compilation on accident statistics, every known cause may be given except faulty lighting, either as a direct or indirect cause. Yet it must be perfectly evident that inadequate illumination increases the possibility of accidents.

Attention was first directed to this when it was discovered that the number of fatal accidents in December and January, months of fewer daylight hours, was materially higher than during the summer months.

State Lighting Codes

As a matter of fact, the number of industrial accidents which were traceable to poor illumination reached such a figure some years ago that a number of states adopted industrial lighting codes which specifically set forth the minimum lighting requirements permissible for the various manufacturing processes.

Increased Production

It is also a demonstrable fact that poor lighting reduces the output of a factory. Without illumination the most skilled mechanic operating the most efficient machine can turn out no work at all. With a little illumination some work, frequently of inferior quality, will be produced at great hazard to both man and machine; but with adequate illumination the maximum work will be produced with less spoilage and less chance of accidents.

About the most inconsistent thing the plant manager can do is to equip his shops with expensive machinery, employ expert mechanics and then fail to supply adequate illumination, the most essential factor in securing high man-efficiency.

That improved illumination actually has a marked effect in increasing production has been ascertained by numerous carefully conducted tests during the last ten years. Such tests were made in a variety of industries, including the coarse industrial processes requiring no close vision, as well as fine processes requiring the closest of vision. In every instance considerably more production resulted from the better illumination and spoilage was decreased.

Evidently illumination is a most important instrument of production.

Other Desirable Attributes of Good Lighting

In addition to making for lesser eyestrain, reduction of accidents, increased production and less spoilage, better lighting also makes for greater accuracy in workmanship, promotes better working and living conditions thereby making workmen more contented, better order and neatness in the plant, easier supervision of employees and most important of all, reduces labor turnover.

While at one time employers gave but slight consideration to a continual changing of employees, today it is recognized that excessive labor turnover disrupts an industrial organization and lowers its efficiency.

Design of "Pittsburgh" Industrial Lighting Reflectors

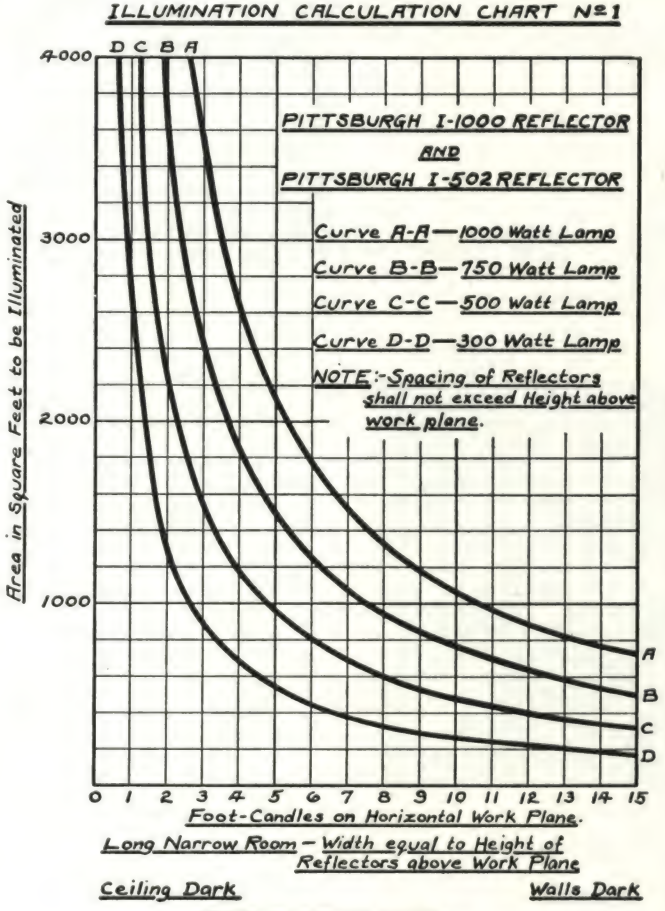
Factory lighting, in order to accomplish the foregoing beneficial results, must conform to a number of fundamentals as follows: (1) adequate intensity of illumination at the work; (2) proper shading of lamps to minimize glare; (3) reasonably uniform distribution of light on the work; (4) absence of excessive brightness contrast within the field of view.

(1) Adequate intensity is a matter of selecting the proper size and spacing of lighting units, having due regard for their efficiency.

(2) "Pittsburgh" reflectors are designed on the principle of concealing the electric lamp so as to provide the requisite degree of shading.

(3) Uniformity will be obtained through proper mounting and spacing of lighting units.

(4) Excessive contrasts are avoided through the use of light-colored ceilings and medium-colored walls.



PERMAFLECTOR PAGE 34

Industrial Lighting Calculations

In order to assist users of "Pittsburgh" Industrial Lighting Reflectors to choose the proper size of lamp and reflector, mounting height and spacing between reflectors, for the various conditions of industrial lighting service, illumination calculation charts have been prepared.

The first step in planning the lighting for any industrial interior is to determine what intensity of illumination is necessary. In states where Industrial Lighting Codes are in effect, the minimum permissible intensities are specified in such Codes. Practically all of these Codes are based upon the code of lighting for factories, mills and other work places, prepared by the Illuminating Engineering Society. Rule I of this Code requires the illumination maintained to be not less than tha given in the following:

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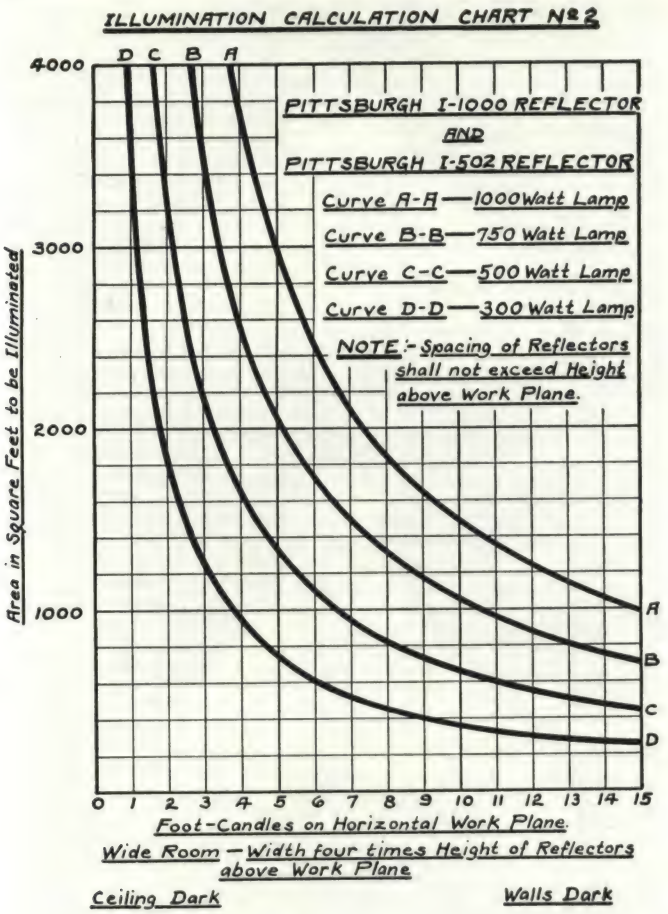


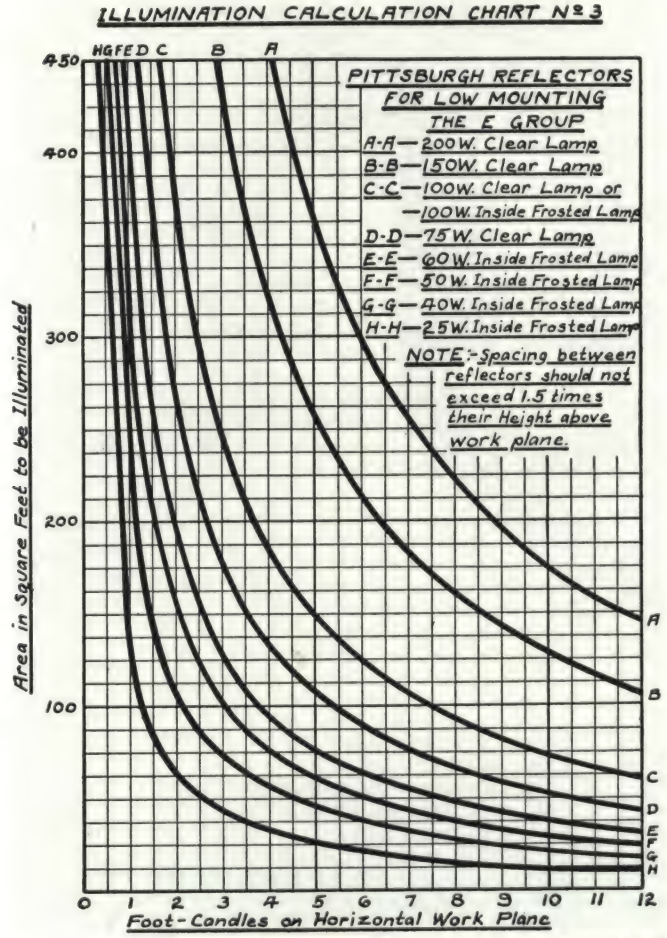


TABLE II

(a) Roadways; yard thoroughfares	0.02
(b) Storage spaces; aisles and passageways in workrooms excepting exits and passages leading thereto	0.25
(c) Where discrimination of detail is not essential. Spaces, such as: hallways, stairways, exits and passages leading thereto; toilet rooms; elevator cars and landings. Work, such as: handling material of a coarse nature; grinding clay products; rough sorting; coal and ash handling; foundry charging.	0.5
(d) Where slight discrimination of detail is essential. Spaces, such as: stairways, passageways, and other locations where there are exposed moving machines, hot pipes or live electrical parts. Work such as rough machining, rough assembling; rough bench work; rough forging; grain milling.	1.
(e) Where moderate discrimination of detail is essential. Work, such as: machining; assembly work; bench work; fine coremaking in foundries, cigarette rolling.	2.
(f) Where close discrimination of detail is essential. Work, such as: fine lathe work; pattern making; tool making; weaving light-colored silk or woolen textiles; office work; accounting; typewriting.	3.
(g) Where discrimination of minute detail is essential. Work, such as: watchmaking; engraving; drafting; sewing dark colored material.	5.

It should be noted that the foot-candle values of Table II are minimum legal requirements. They represent only a sufficient intensity of illumination to prevent accidents and undue eyestrain. In order to gain the other advantages of better lighting, most important of which is increased production, intensities equal to two or three times the minimum values will be found necessary.

In general, industrial interiors may be divided into two classes, i. e. (1) high interiors (ceilings 15 ft. or more); (2) low interiors (ceiling less than 15 ft.). For high interiors "Pittsburgh" concentrating reflectors No. I-500 and No. I-1000 provide efficient lighting because of their ability to concentrate light on the work plane from high elevations.

For low mounting purposes, "Pittsburgh" distributing reflectors designated by the letter "E" should be used.

After determining the desirable intensity of illumination to be supplied to the work, the next step is to determine proper spacing between reflectors, which is dependent upon the mounting.

In general it is desirable to mount reflectors as high as practicable, care being exercised not to install them above beams and belting, shafting, etc.

In the case of high mounting reflectors No. I-500 and No. I-1000, the maximum spacing between reflectors should not exceed their height above the work plane; whereas the distributing reflectors, designated by the letter "E" may be spaced somewhat further apart, but in no case should the spacing exceed 1.5 times the height of the reflectors above the work plane.

Charts 1 and 2 apply to reflectors for high mounting. In the case of long narrow rooms, where the width of the room is about equal to height of reflector above work plane, Chart No. 1 should be used, whereas for wide rooms where the width of the rooms is three to four times the height of the reflectors above the work plane, Chart 2 should be used. The purpose of these charts is to enable users of "Pittsburgh" Reflectors No. I-1000 and No. I-500 to select the proper size of lamp to give a predetermined illumination on the horizontal work plane in a given area. Curves AA refer to the 1000-watt lamp; curves BB, to the 750-watt lamp; curves CC, to the 500-watt lamp; curves DD, to the 300-watt lamp. It is assumed that the space between reflectors will not exceed their height above the work plane. The horizontal scale gives the foot-candles illumination on the horizontal work plane, whereas the vertical scale to the left, gives the area in square feet to be illuminated.

Example: Assume an industrial interior 400 ft. in length by 100 ft. in width, with reflectors mounted 25 ft. above the work plane. Under this condition the maximum spacing between reflectors would be 25 ft. and each of the required 64 units would illuminate an area 25x25 or 625 sq. ft. If 10 foot-candles are desired on the horizontal work plane, locate the intersection of the 10 foot-candle line of Chart 2 with the 625 sq. ft. area line. It will be noted that this point is close to the CC curve, which means that 500-watt lamps, equipped with No. I-500 Reflectors spaced 25 ft. apart, at an elevation of 25 ft. above the work plane will result in slightly more than the desired illumination of 10 foot-candles.

Chart No. 3 gives similar curves for "Pittsburgh" reflectors intended for low mounting service. Assume an industrial interior 100 ft. long by 60 ft. wide locating reflectors approximately 10 ft. from the floor. Usually the work plane of an industrial plant is about 36 in. from the floor. Consequently reflector height above the work plane would be 7 ft. and the maximum permissible spacing between units would be 1.5 times 7, or 10.5 ft. Taking an even 10 ft. spacing between units in both directions makes a symmetrical arrangement. Under these conditions each lamp and reflector will illuminate 100 sq. ft., requiring sixty units.

Continued on next page

Assume further that the operation is one where moderate discrimination of detail is essential, and that 7 to 8 foot-candles will be desirable. Referring to Chart 3 it is noted that the intersection of the 8 foot-candle line with the 100 sq. ft. area line occurs very close to curve CC. This means that the 100-watt inside frosted or clear lamp, equipped with the proper reflector will give from 7 to 8 foot-candles on the horizontal work plane. If the 100-watt inside frosted lamp is used, Reflector No. E-75 should be used, whereas if the 100-watt clear lamp is used, Reflector No. E-100 is recommended.

Permaflector No. I-75

An intensive type for low mounting localized industrial lighting (5—12 ft. above work plane). Also for ornamental direct lighting fixtures such as Gothic lanterns for churches; for flush mountings in low ceilings; also certain shallow show windows.

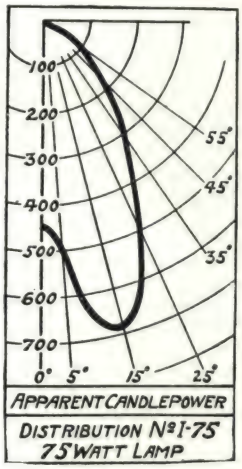
Flush Mounting Ring No. 55—(See Permaflector Page 19.)

Lamp—100-watt A-23 (inside frosted) or 75-watt clear.

Holder—2¼ in. Form "H."

Dimensions—

Height .....4¾ in.
Diameter .....8⅜ in.



Permaflector No. I-505

Designed for high bay industrial lighting where the lighting equipment is located 25 feet or more above the floor. Also for lighting through skylights as in art galleries, bank lobbies and similar applications.

For industrial lighting the spacing between Permaflectors should not exceed their height above the work plane.

Lamps—300-500-watt.

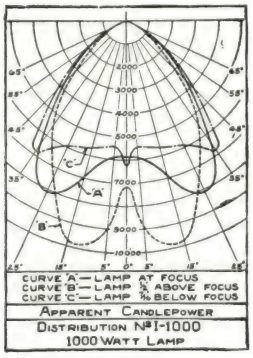
Holder—Furnished with 4-inch round box cover, Mogul Socket and special holder, as illustrated, for installation with 4-inch round or octagon outlet box.

Dimensions—

Height of Permaflector—9¾ in.
Diameter of Permaflector—16 in.

Permaflector No. I-1000

Designed particularly for industrial lighting where the lighting unit must be from 25 to 50 ft. or more above the floor, usually above the crane as well. Also for lighting through skylights. Very concentrating, most of the reflected light being confined to the zone 0° to 40°, with a cut-off at approximately 60°.



Spacing between reflectors should not exceed their height above the work plane.

Lamps—300-500-750-1000-watt.

As illustrated, for 750 and 1000-watt lamps. For 300-500-watt lamps, lower the receptacle so that upper screw is located at lower arrow.

Holder — Mogul Socket and special holder furnished, tapped for ½-in. conduit.

Guard—Wire basket guard available, with bottom hinged for relamping.

Dimensions—

Height overall .....16¾ in.
Height of reflector..... 8 5/16 in.
Diameter .....16 in.

Continued on next page

Permaflector No. I-25

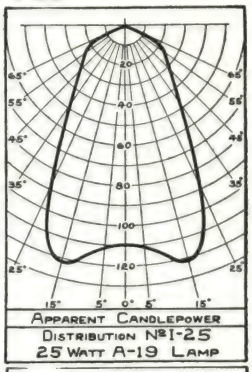
This reflector is of the focusing type, of service whenever highly concentrated beam over a limited area is desired. Particularly designed for the lighting of the exterior of filling stations, with reflectors set at 45° angle under the eaves of the building. Also useful for theater service, indirect cove lighting and special applications where space is limited.

Lamps—15-watt A-19 or 25-watt A-19 (inside frosted).

Holder—2¼ in. Form "O."

Dimensions—

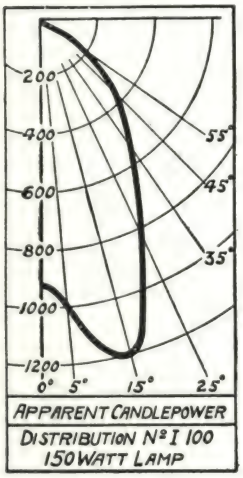
Height ..... 3 in.
Diameter ..... 4½ in.



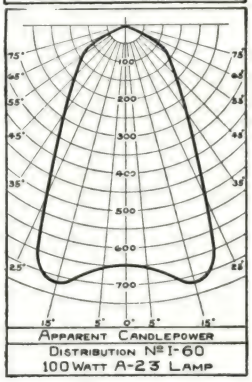
Permaflector No. I-60

Also a focusing type of reflector, designed for the same uses as No. I-25. Also of service for low mounting industrial use, where a localized overhead system is desired, as over benches, inspection tables, stock shelves, etc.

Lamps—60-watt A-21 or 100-watt A-23 (inside frosted).



Holder—2¼ in. Form "O" for 60-watt. 2¼ in. Form "H" for 100-watt.



Color-Lite — Special Color-Lite available.

Dimensions—

Height ..... 4 7/16 in.
Diameter ..... 6¾ in.

Flush Mounting Ring No. I-60 —(See Permaflector Page 19.)

Permaflector No. I-100

Same as No. I-75, excepting it is for 100-watt A-23 and 100-150-watt clear lamps.

Lamp—100-150-watt clear with 2¼ in. Form "H" holder; 100-watt A-23 with 2¼ in. Form "O" Holder.

Dimensions—

Height ..... 5⅞ in.
Diameter ..... 9¾ in.

Flush Mounting Ring No. C-201—(See Permaflector Page 19.)

Permaflector No. I-200

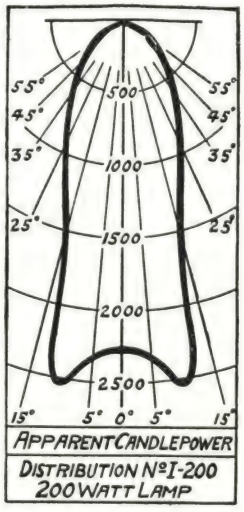
A focusing type of reflector for use whenever a highly concentrated beam over a limited area is desired. Primarily a local lighting unit for intensifying the illumination of particular areas.

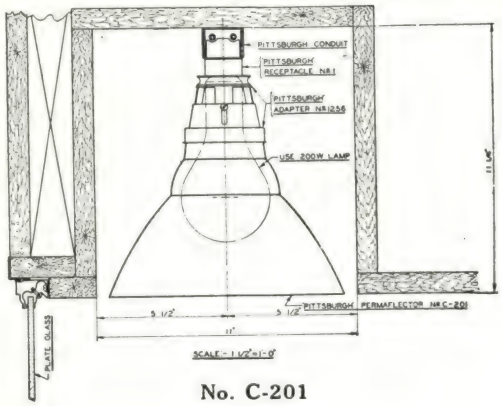
Lamp—200-watt.

Holder—2¼ in. Form "O."

Dimensions—

Height ..... 7⅜ in.
Diameter ..... 11 in.





No. C-201

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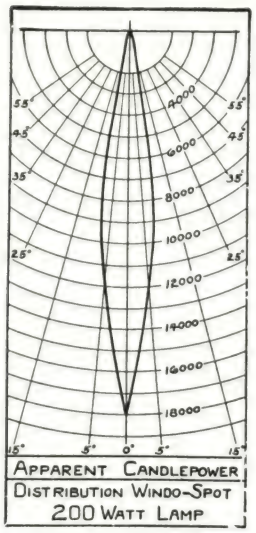
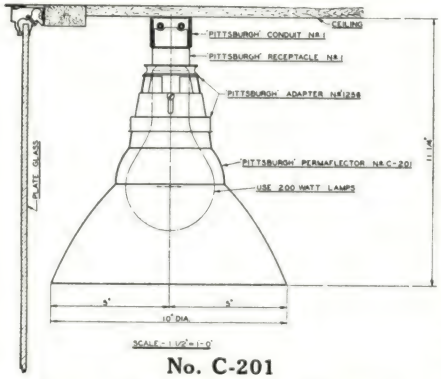


Permaflector No. T-1

For use with traffic lamps.
Lamp—60-watt special traffic.
Holder—2¼ in. Form "O."
Dimensions—
Height .....4 in.
Diameter .....8 3/16 in.

Permaflector No. C-201

Also a spot type of reflector useful in high and extremely shallow windows—see chart for selecting proper Permaflector for windows (See Permaflector Page 7.) (This reflector is used in Windo-Spot No. 200.)
Lamp—200-watt.
Holder—2¼ in. Form "O."
Color-Lite—Special Color-Lite available.
Dimensions—Height (including No. 1 Adapter) 9⅜ in.
Diameter .....10 in.

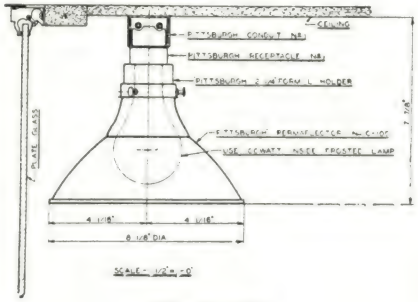


No. C-201

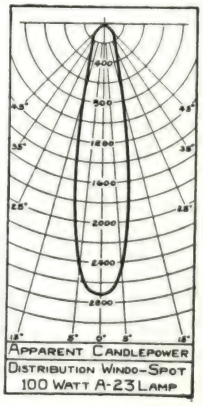
Permaflector No. C-100

A spot type of reflector useful in very shallow windows. See chart for selecting proper Permaflector for windows. (See Permaflector Page 7.) Also a local lighting unit for intensifying the illumination of particular areas. (This reflector is used in Windo-Spot No. 100.)

Lamp—100-watt A-23 or 150-watt clear.
Holder—2¼ in. Form "H" or our 2¼ in. Form "L" on Conduit No. 1, for A-23, 100-watt; form "LC" for 150-watt.
Color-Lite—Special Color-Lite available.
Dimensions—Height .....5 in.
Diameter .....8⅛ in.
Flush Mounting Ring No. C-201—(See Permaflector Page 19.) For trough mounting (see Permaflector Page 43); for flush mounting (see Permaflector Page 17).



No. C-100



Flush Mounting Ring No. C-100—(See Permaflector Page 19.) For trough mounting or flush mounting (see Permaflector Pages 16 and 17).

Permaflector No. E-500

Distributing type intended for intermediate mounting high intensity industrial service, mounting 12 to 25 ft. above the work plane; for the lighting of gymnasiums; and for flush mounting in ceiling in combination with Hinged Ceiling Roundel No. 2. (See Permaflector Page 20.)

Also useful for installation in Gothic and other designs of lanterns, in churches and public buildings.

Lamp—300-500-watt, clear or bowl frosted.
Holder—Form "M," with Mogul Socket and 4 in. round outlet box cover.
Ceiling Roundel—See page 20.
Dimensions—Glass, height ..... 9⅛ in.
Glass diameter .....11⅞ in.
Overall, height, including 4 in. outlet box.....14 in.

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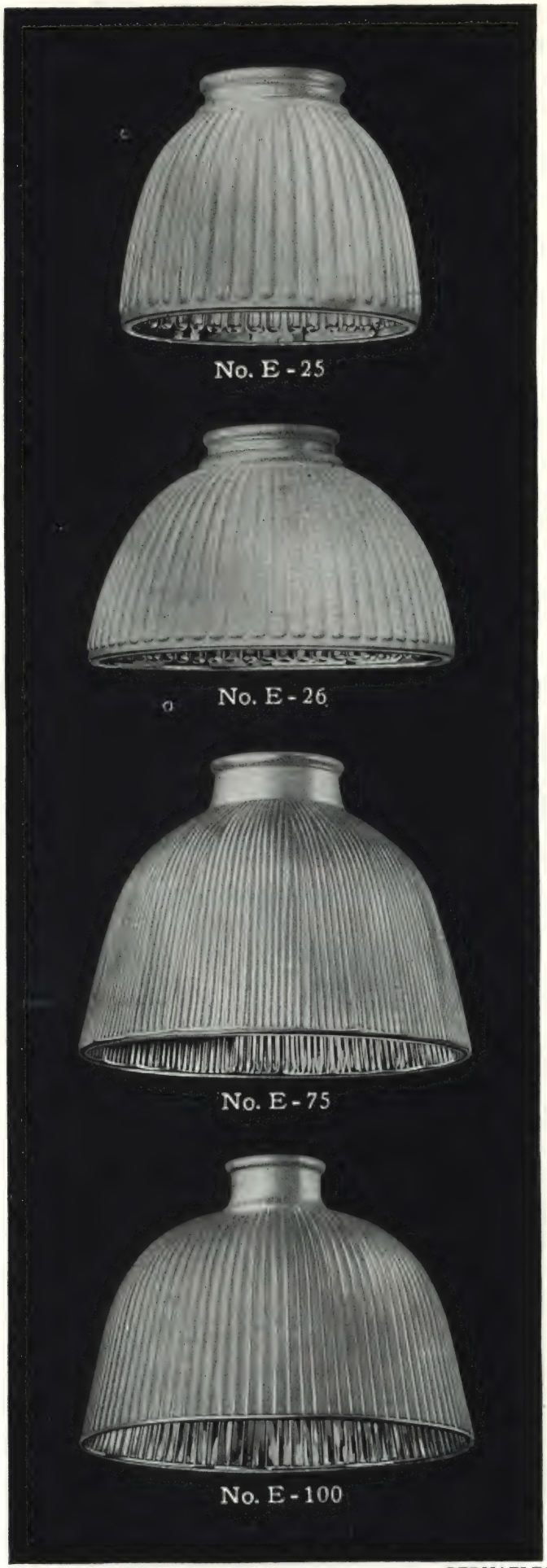


Permaflector No. E-25

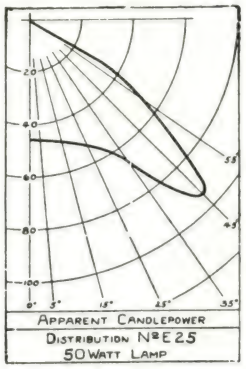
Distributing type for local lighting purposes.

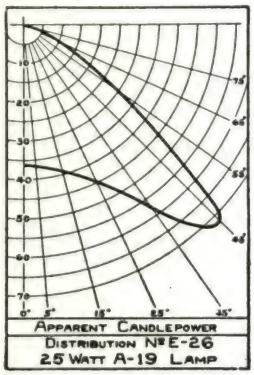
Flush Mounting Ring No. E-25—(See Permaflector Page 19.)

Lamp—25-watt A-19 and 50-watt A-21 (inside frosted).

Holder—2¼ in. Form "O" with 25-watt; Form "H" with 50-watt.

Dimensions—
Height .....3½ in.
Diameter .....4¼ in.





Permaflector No. E-26

A semi-distributing type for local lighting purposes.

Flush Mounting Ring No. 28—(See Permaflector Page 19.)

Lamp—25-watt A-19 (inside frosted) with holder 2¼ in. Form "O"; 50-watt A-21 (inside frosted) with holder 2¼ in. Form "H."

Dimensions—
Height .....3 7/16 in.
Diameter .....5⅝ in.

Permaflector No. E-75

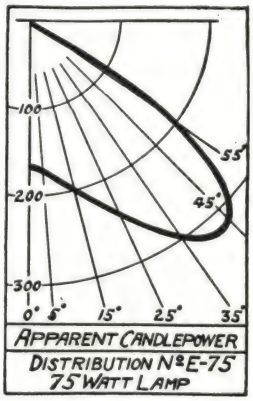
Distributing type for low mounting (5—12 feet above work plane), industrial general lighting service, for use in ornamental direct lighting fixtures such as Gothic lanterns in churches, and for use in flush mounting in low ceilings.

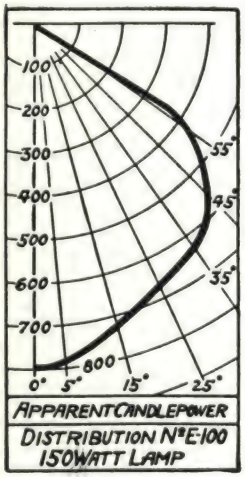
Flush Mounting Ring No. I-60—(See Permaflector Page 19.)

Lamp—100-watt A-23 (inside frosted) or 75-watt clear.

Holder—2¼ in. Form "H."

Dimensions—
Height .....4¾ in.
Diameter .....6½ in.





Permaflector No. E-100

Same as No. E-75, excepting for use with 100-watt A-23 and 100-150-watt clear lamps.

Flush Mounting Ring No. 55—(See Permaflector Page 19.)

Ceiling Roundel—(See Permaflector Page 20.)

Lamp—100-150-watt, clear with 2¼ in. Form "H" holder; 100-watt A-23 with 2¼ in. Form "O" holder. When equipped with "LC" holder, No. E-100 in combination with Hinged Ceiling Roundel No. 1 takes the 200-watt lamp.

Dimensions—
Height .....6⅛ in.
Diameter .....8½ in.

Continued on next page

Permaflector No. E-200

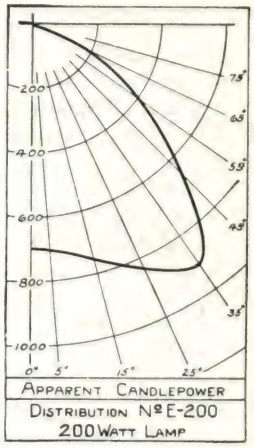
Same as No. E-75, excepting for use with 200-watt lamps.

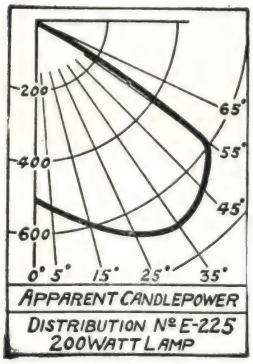
Lamp—200-watt.

Holder—2¼ in. Form "O."

Dimensions—
Height .....9 in.
Diameter .....9½ in.

Flush Mounting Ring No. E-200—(See Permaflector Page 19.)





Permaflector No. E-225

Semi-distributing, otherwise same as the No. E-200.

Lamp—200-watt.

Dimensions—
Height .....7¾ in.
Diameter .....9½ in.

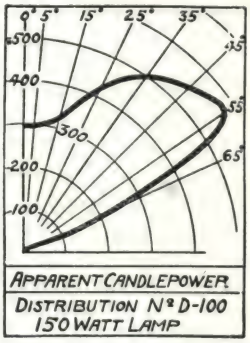
Flush Mounting Ring No. E-200—(See Permaflector Page 19.)

Permaflector No. D-100

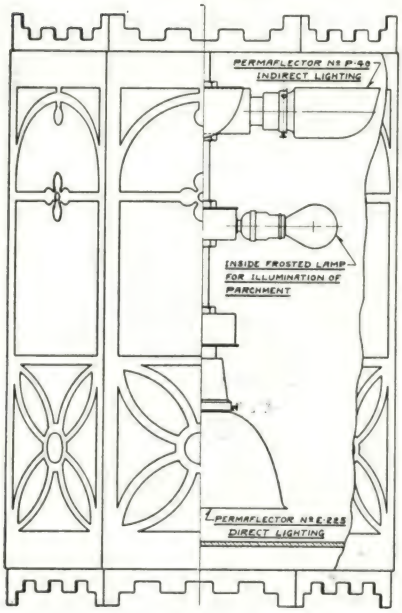
For use in indirect lighting fixtures with the lamp burning tip up.

Lamp—100-150-watt clear with 2¼ in. Form "H" holder; 100-watt A-23 with 2¼ in. Form "O" holder.

Dimensions—
Height .....4½ in.
Diameter .....7 in.



Permaflector No. D-200



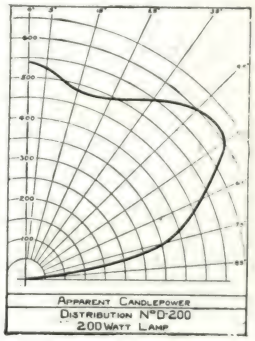
Typical Cross Section of Lantern Showing Application of Permaflectors

For use in indirect lighting fixtures, lamp burning tip up. The distribution of light is wider than that of No. D-100.

Lamp—200-watt.

Holder—3¼ in. Form "O."

Dimensions—
Height .....5¾ in.
Diameter ...9½ in.



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FLOODLIGHTING

Nearly two decades ago, a new form of display lighting was made possible through the development of floodlighting equipment employing incandescent lamps with a concentrated light source. The previously employed form of display lighting, small electric lamps outlining buildings or monuments, contributed but little to bringing out the form, contour, and architectural beauty of the building.

With the advent of floodlighting, it became possible to bathe an entire structure with light from distant points, thus simulating daylight and in many instances developing more interesting light and shade effects than with daylight.

Consequently, imposing structures such as large office buildings, banks, theaters, capitols and other public buildings were illuminated at night in this manner. At first white light alone was employed and many pleasing effects realized. Buildings so illuminated enjoyed unusual publicity and because of the publicity value, growth in the use of floodlighting was rapid and steady. While white floodlighting of a building exterior is a pleasing accomplishment, to "paint the exterior surface of a building with ever changing, blended hues of colored light, scintillating against the black dome of the night sky" is an achievement of the highest order in the night illumination of the exterior of buildings and monuments. In this development, the PITTSBURGH REFLECTOR COMPANY has been in the van of the march of progress. The first large skyscraper to be illuminated with Mobile Color was the Edison Building of the Philadelphia Electric Company, illustrated elsewhere herein.

This mammoth installation, employing over 500 Pittsburgh Floodlights, was turned on January 1st, 1928. It has been in constant operation since that time.

The two outstanding features of the installation are: (1) constantly changing color effects, according to a predetermined cycle, which repeats itself throughout the evening; (2) flexible floodlighting equipment which makes possible complete rearrangement of the color effects and change in the sequence of the color cycle.

With the Mobile Color lighting of the Edison Building, there came into use a new method of securing changing color effects. The Edison Building has two complete floodlighting installations: (1) a white floodlighting installation controlled by a cycle dimmer; (2) a second floodlighting system to provide the colored illumination.

The colored lighting remains on steadily while the floodlighting is in operation. The white lighting is controlled by a cycle dimmer which gradually brings the illumination from "black out" to full brightness and vice-versa, according to a prearranged cycle of operation. When the white lighting is extinguished, on a particular portion of the building, that portion of the building appears luminous in the color or combination of colors employed. As the white lighting gradually increases in intensity, it progressively dilutes the colored lighting, thus presenting to the eye lighter and lighter tints of the color or combination of colors employed. When the white lighting is on full brightness, it completely overcomes the colored lighting and the building appears in white. As the white lighting begins to subside in intensity, the building again comes up in color, beginning with the very lightest tints which gradually deepen to the full depth of the color as the white lighting is completely "dimmed-out."

This "wash" method of providing Mobile Color has the distinct advantage of employing to the full the advertising value of changing colors in combination with the advertising value of high intensity white illumination at intervals. A far greater variety of effects is obtainable than by the method where colored lighting only is employed, each color being controlled by a cycle dimmer. Not only is the building brought up periodically in white lighting and in deep rich hues of colored lighting, but also in the innumerable intermediate tints.

Another very attractive installation of Mobile Color lighting followed the installation of the Edison Building by about six months. It is the John H. McClatchey Building, 69th Street and West Chester Pike, Philadelphia, Pennsylvania. The design of the building is modernistic. The exterior surface of the building is beautifully colored semi-glazed terra-cotta. A set-back occurs at the third floor level and this immediately suggested the application of Mobile Color floodlighting to the upper part of the building, but since this is only 12 ft. in height and consists of a single surface, something different and more elaborate had to be employed than in the case of the Edison Building with its three distinct set-back surfaces. In the case of the Edison Building variety is obtained by the simultaneous use of three or more colors on the various surfaces of the building. In the case of the McClatchey Building it was obvious that variety would have to be secured by the use of a number of different colors and color combinations in sequence on the single surface to be floodlighted.

It was also decided that a horizontal band of Mobile Color across the top of the building, standing by itself, would not be a good effect from the advertising standpoint nor from the aesthetic. Therefore, two-story art glass pilasters are incorporated in the design. At 1-ft. intervals two Pittsburgh Permaflectors No. P-76, attached to Pittsburgh Conduit No. 2-A running the full length of each pilaster and equipped with 60-watt lamps, reflect their light to a white plaster surface and the reflection from the white plaster surface makes the art glass pilasters uniformly luminous throughout their length.

To complete the illusion of support from the ground up, for the third floor Mobile Color illuminated section, a projector in the top of each art glass pilaster directs a finger of light upwards to the golden eagle at the third floor level.

Continued on next page

FLOODLIGHTING (Continued)

The Mobile Color installation consists of six complete floodlighting systems: (1) red, (2) amber, (3) green, (4) moonlight blue, (5) royal blue, (6) uncolored or white. The white lighting is connected in circuit with a cycle dimmer of the resistance type. The five colored light circuits are controlled by means of remote control magnetic switches, the operations of which are properly synchronized with the operation of the cycle dimmer. This control apparatus, known as "Mobilite," is a new development of our organization and available only for Permaflector installations.

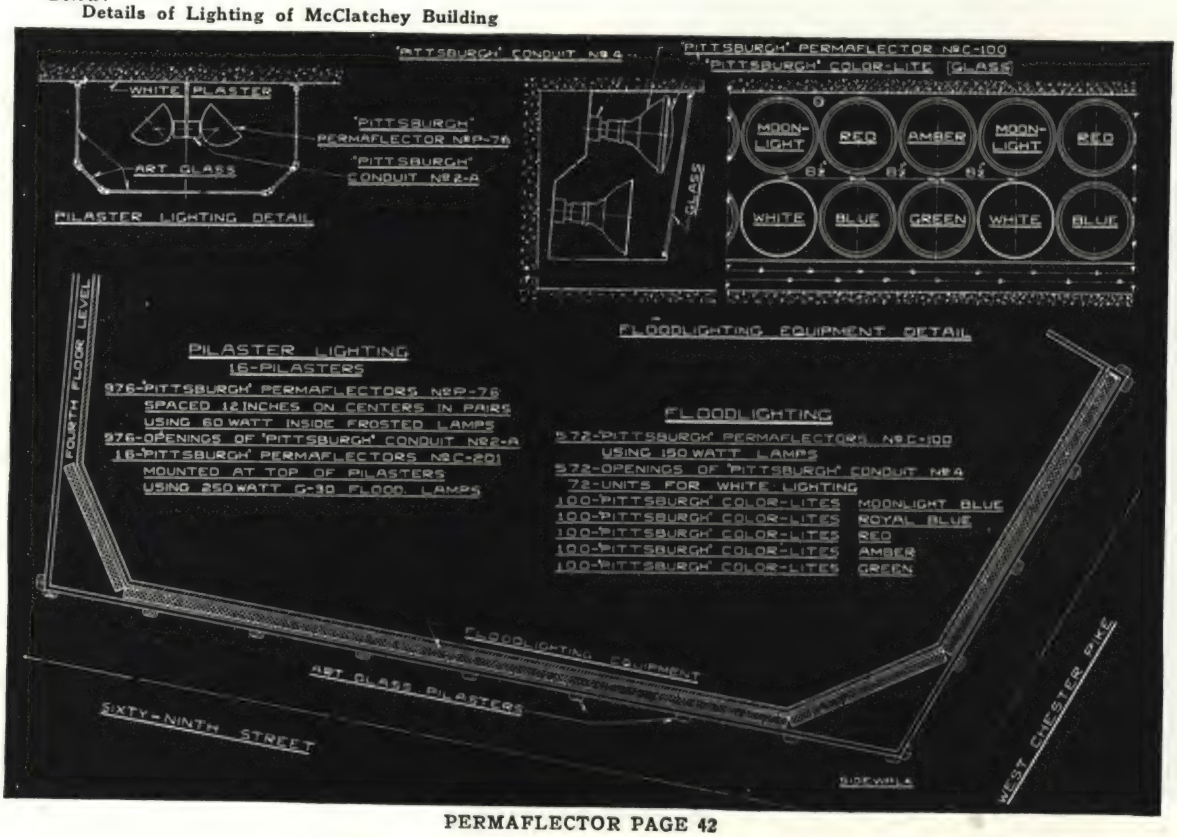
Another very interesting installation is the Berks County Trust Company, Reading, Pa., illustrated herewith. It is a somewhat simpler installation than the McClatchey Building and hence will serve better to illustrate the manner in which "Mobilite" provides a sequence of changing color and occasional white lighting according to a predetermined cycle.

The installation of Mobile Color floodlighting on the Berks County Trust Company consists of three complete floodlighting systems: (1) red, (2) blue, (3) white, or uncolored. The floodlighting equipment for illuminating the front elevation is concealed in the balconies of the second floor level where the Permaflector equipment is installed in a metallic housing constructed of sheet copper, equipped with plate glass weatherproof cover and ventilated. The side elevation of the building, for a distance of 50 ft. from the front, is illuminated by means of Permaflector equipment installed in a sheet metal extension of the cornice at the second floor level. Since only the first 50 ft. of the building can be seen from the street, it was not deemed advisable to illuminate back any further than that amount.

McClatchey Building in Daytime

At Left:
Permaflectors Back of the Colored Glass in Pilasters
At Right:
Permaflectors for the Flood Lighting

Below:
Details of Lighting of McClatchey Building



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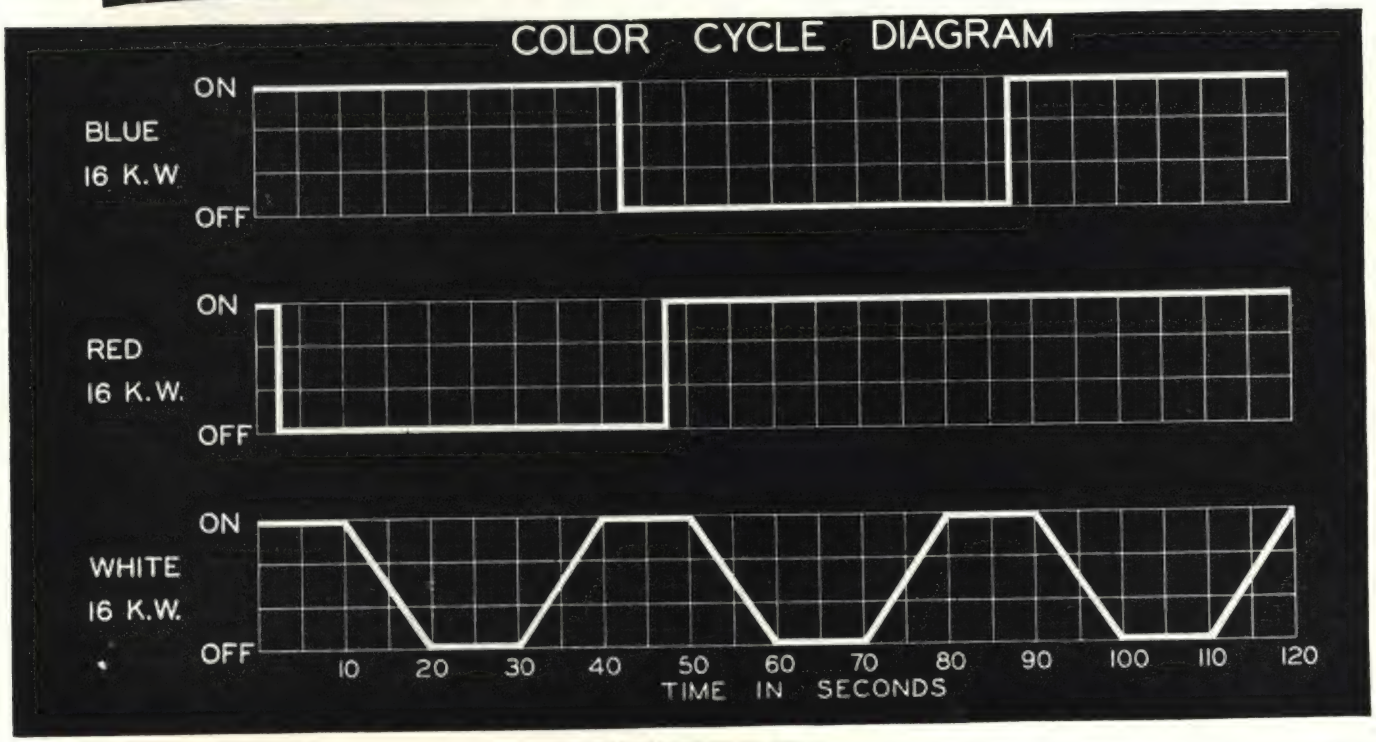
FLOODLIGHTING (Continued)

In the basement of the bank building is installed "Mobilite" (see Permaflector Page 47), the electrical distribution and control apparatus. This is an all-electrical controller consisting of cycle dimmers for the control of the white floodlighting system, and magnetic contact switches properly synchronized with the operation of the cycle dimmers for controlling the colored lighting. Twelve changes take place in each two-minute interval and this operation is continuous while the floodlighting is turned on.

Examination of the color cycle diagram illustrated herewith will indicate that the building comes up in white, periodically in full depth of red, full depth of blue, full depth of red and blue combined, making purple, and while the white lighting is either increasing or decreasing in intensity, the various tints of these colors are produced. Whenever the white lighting is on full intensity, the color is "washed out" and changes are made, the predominance of the white lighting masking these changes. A complete cycle of operations requires two minutes and in these two minutes the building appears in white for three intervals of ten seconds, in color for three intervals of ten seconds, and in changing color for six intervals of ten seconds each.

"Mobilite" is the only all-electrical control apparatus available for providing Mobile Color lighting by the "wash" method, that is to say, by the method of changing colors by controlling the white lighting with cycle dimmers and the colored lighting by magnetic remote control switches operated by contactors synchronized properly with the operation of the cycle dimmers. This "Mobilite" controls lighting in changing colors, presents the maximum in variety. Not only are the buildings illuminated with this system brought out in full deep colors, periodically in white, but in addition, almost an infinite number of tints, from full deep colors to complete "wash-out," are presented to the astonished and admiring gaze of the public.



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FLOODLIGHTING (Continued)

Two Units FLC-100

Permaflector Floodlight FLC-100

Designed for lighting vertical surfaces of the height of 12 ft. or less, from equipment close to base of such vertical surfaces. Designed for use with 100-watt A-23 inside frosted lamp. Four standard colors: red, amber, green, blue are available.

Consists of galvanized iron channel, to which are attached individual conical spun copper drums, containing Pittsburgh Receptacle No. 1, Permaflector I-60, 8-in. color glass roundel (Color-Lite F-2) and 8-in. clear heat-resisting cover glass as shown above.

Channel must be supported by means of special strap iron brackets.

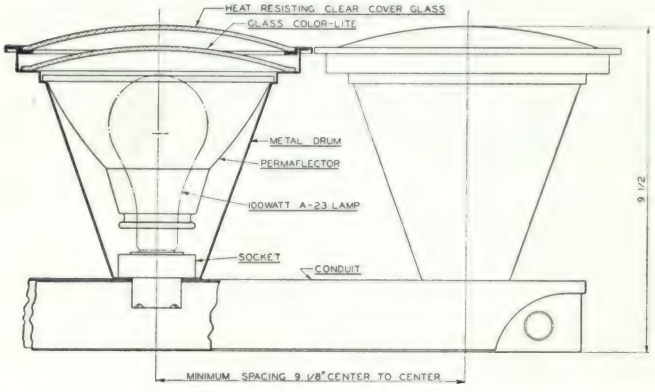
Furnished in units as shown. Units may be ordered on any desired spacing: minimum 9⅛ in. on centers.

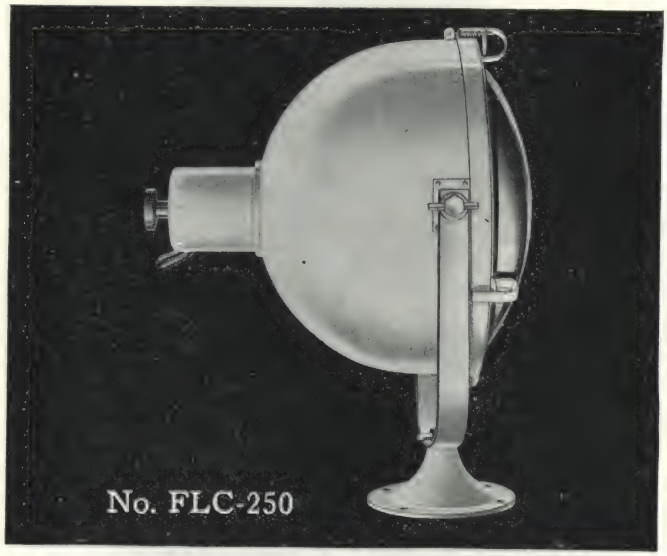
Permaflector Floodlight No. FLC-104

Same as No. FLC-100, excepting that it is larger to accommodate 200-watt lamp. Minimum spacing 11 in. on centers. Height over all, 12¾ in. Employs a new Permaflector (No. C-101), a 9½-in. colored glass roundel (Color-Lite F-4) and 9½-in. heat-resisting cover glass.

Floodlight FLC-104, because of its higher wattage capacity, may be employed for illuminating vertical surfaces of a height of 20 feet from a location close to the base of such surfaces.

Neither FLC-100 or FLC-104 may be employed for other than upward lighting of vertical surfaces.





Permaflector Floodlight No. FLC-250

A very concentrating floodlight, designed for use with the 250-watt G-30 floodlighting lamp. Particularly useful for floodlighting buildings from locations on the building itself, such as cornices, setbacks, etc., where space is limited and for intermediate throws. Serves essentially the same purpose as FLC-501 but for shorter distances and smaller areas.

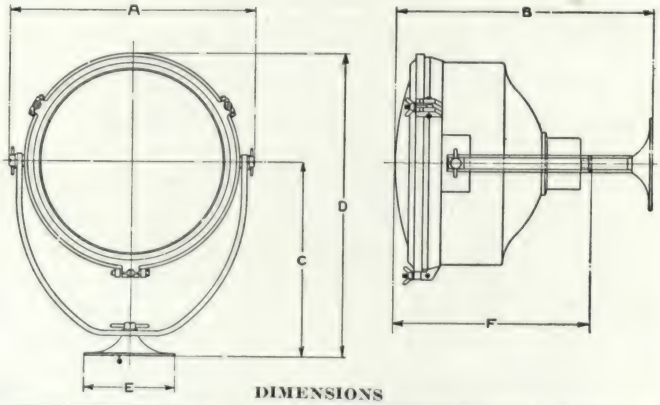
Similar to No. FLC-501, in construction and materials, excepting case is entirely of Armco sheet metal, galvanized.

Cover with heat-resisting glass is hinged, held under pressure against asbestos gasket by three spring clip fasteners.

Beam spread, 16 degrees; lamp, 250 watts G-30; beam lumens, 1374; candle-power maximum at center of beam, 70,750.

Glass Color-Lite No. F-1 in four colors, red, blue, green and amber, available. These Color-Lites are installed inside of heat-resisting cover glass.

Lamp—250-watt G-30 floodlighting. (Base down only.)



DIMENSIONS

No.	A	B	C	D	E	F
FLC-501	21″	25″	16″	25½″	8″	19″
FLC-1001	21″	27″	17″	27″	8″	23″
FLC-250	15″	17″	13¾″	20″	6″	14″

All floodlights, except FL-750, furnished with clear cover glass unless otherwise specified. If stippled or spread lens is desired, order must so state. Floodlight FL-750 furnished only with stippled cover glass.

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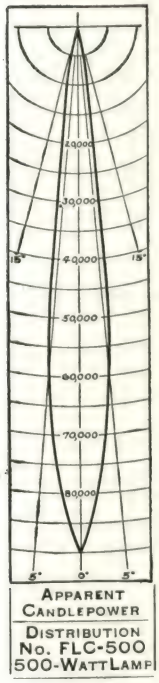

Permaflector Floodlight No. FLC-501 —"The Tower Lighting Unit"

Consists of a cast-iron base, Armco sheet metal housing for lamp and reflector galvanized inside and outside and painted aluminum color, cast-iron cowl containing focusing-mechanism, heat-resisting glass cover cemented in hinged cast-iron door, and silver-plated glass Permaflector No. F-1001.

The excessive heat developed by the 500-watt lamp makes colored glass covers impracticable. Moreover, when changes in color of light are desired, considerable difficulty is experienced in changing the colored glass covers, which must be water tight.

No. FLC-501 is designed especially to accommodate the color caps (No. F-3, Permaflector Page 21) which are readily slipped over the lamp bulb. This eliminates the question of breakage of the color medium since the color caps are thoroughly protected from the weather by the outside clear heat-resisting glass cover.

This floodlight therefore provides a most practical means of securing color effects in floodlighting of buildings, monuments, etc.

Lamps—Floodlight No. FLC-501 is designed for use with the 300 or 500-watt standard Mazda C Lamp.

"Permaflector" Floodlight No. FLC-1001

Same as No. FLC-501, excepting different reflector and longer cowl. For 750-1000-watt lamp. Takes Color Cap (No. F-3, Permaflector Page 21).

"Permaflector" Floodlight No. FLC-300

This new floodlight meets the demand for a concentrating unit for use with the 300-watt general service incandescent lamp. Light distribution is similar to that of floodlight No. FLC-250, No. FLC-501, and No. FLC-1001.

It is intended primarily for the same class of service as the above mentioned floodlights, namely, the illumination of buildings from locations on the buildings themselves such as cornices, set-backs, etc.

No. FLC-300 is designed to accommodate Color-Lite No. F-5 which is a pressed Roundel 12 in. in diameter. It snaps into three clips over the top of the Permaflector, under the protection of the heat-resisting glass cover. Color-Lite No. F-5 is available in red, amber, green, and blue.

Floodlight No. FLC-300 is constructed entirely of Armco sheet steel metal, Parkerized. Base is of cast iron and bow of steel.

All moving parts, adjustments, screws, etc., are of brass as proof against erosion and freezing.

"Permaflector" Floodlight No. FLC-1002

This is a new floodlight especially designed for use with the 1000-watt G-40, 115-volt, clear bulb, floodlight lamp. The use of this lamp in a floodlight makes possible greater concentration of light than can be secured with the 1000-watt general service PS-52 lamp. Hence, Floodlight FLC-1002 serves the purpose of exceptional long range service.

Floodlight FLC-1002 is practically identical with FLC-501. The only difference is in the focusing mechanism which is adjusted so as to permit the use of this spherical bulb lamp having a short light center.

This floodlight is especially serviceable for illuminating the long distance shots of golf driving ranges.

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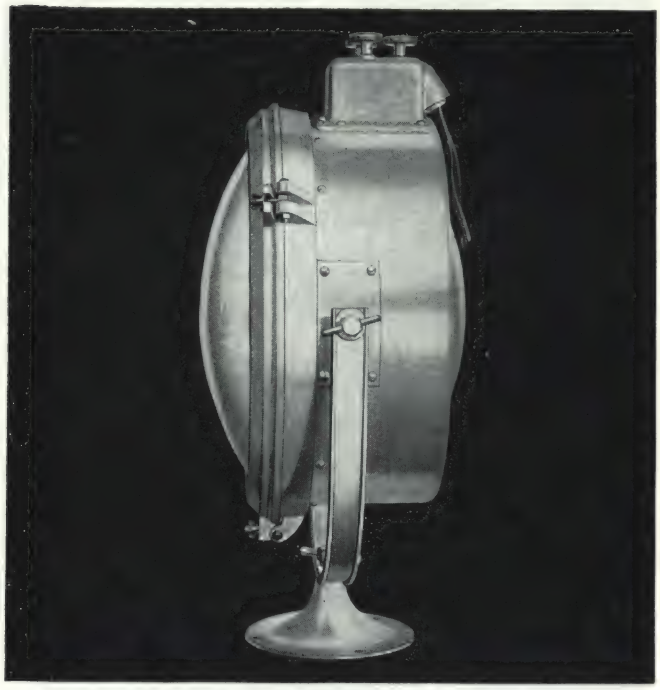
FLOODLIGHTING (Continued)



"Pittsburgh" Floodlight No. FL-500

Focusing—Three adjusting screws allow the lamp to be raised or lowered, moved from side to side, from front to back or back to front providing for perfect control of lamp in either plane. Permits rapid change of beam spread from 7½° to 30°. All moving parts, adjustments, screws, etc., are of brass and proof against corrosion and freezing.

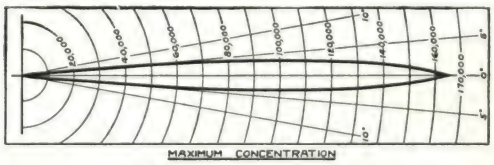
Housing—Cast iron base, door, door frame and cowl with drum of heavy Armco iron, galvanized. Door equipped with heat-resisting clear glass, cemented in, waterproof.

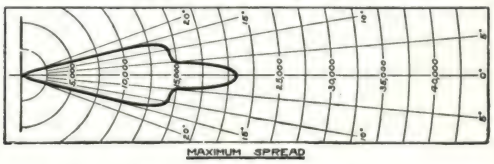
Cowl—Carries socket and adjusting mechanism.

Finish—Exterior of floodlight finished in satin silver color.

Reflector—Especially designed Permaflector 16 in. in diameter. Finished in satin silver color.

Lamp Size—300-500-watt.

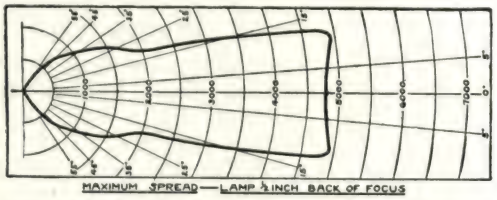


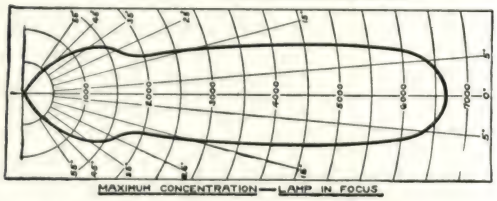


Apparent Candlepower—Distribution No. FL-500 500-Watt Lamp

"Pittsburgh" Airport Field Flood

The No. FL-1500 equipped with dioptric lens





Apparent Candlepower—Distribution No. FL-300 300-Watt Lamp

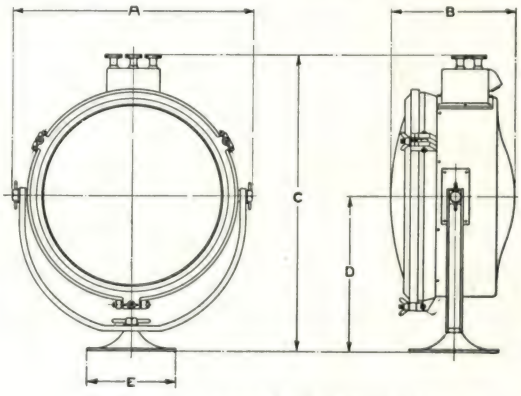
Floodlight No. FL-1500

Same as No. FL-500, excepting it is larger and contains a different reflector with more concentrating distribution, and for larger lamps.

Lamp Size — 750-1000-watt.

Floodlight No. FL-750

Same casing as used with FL-500 but contains broad beam reflector in which 750-1000-watt lamps may be used. Distribution midway between FL-300 and FL-500. Furnished with stippled glass cover only.



"Pittsburgh" Floodlight No. FL-300

Comparatively broad light distribution for short distance floodlighting. Reflector fluted to smooth out the field of light. Designed particularly for mounting relatively close to the surface to be illuminated—approximately 10 to 20 feet therefrom, such as upon lighting standards at the curb. It may be feasible to locate at greater distance than indicated above. Whenever possible, floodlighting problems should be referred to "Pittsburgh" Engineering Department for recommendations.

When lamp is at focal center, maximum concentration is secured, the width of the important part of the beam being 30°. With the lamp ½ in. back of focal center, maximum spread is secured, width of beam being approximately 50°.

Description of housing, cowl, finish and reflector same as for No. FL-500.

Lamp—300-watt Type "C." 200-watt may be used with proper socket reducer.

Concentrating Reflector

FL-300 may now be had equipped with unfluted Permaflector for applications where more concentration is desired. No color-lite available for use with this Floodlight.

DIMENSIONS

No.	A	B	C	D	E
FL- 300	15¾″	10½″	22¼″	12″	6″
FL- 500—FL-750	21″	12″	28¼″	16″	8″
FL-1500	24½″	12½″	30″	17″	10″

PERMAFLECTOR PAGE 46

Continued on next page

Floodlight FL-301

Floodlight FL-301, similarly to FL-300, has comparatively broad light distribution for short distance floodlighting. Reflector is fluted to smooth out the field of light. It is designed particularly for mounting relatively close to the surface to be illuminated, approximately 10 to 20 ft. therefrom, such as upon lighting standards on the curb. It may be feasible to locate at a greater distance than indicated above. One popular application is in the floodlighting of gasoline filling stations.

This is a companion floodlight to FLC-300. Similarly, it is constructed of Armco sheet metal, parkerized. Base is of cast iron and bow of steel. All moving parts, adjustments, screws, etc., are of brass and proof against erosion and freezing.

Similarly to FLC-301, it may be fitted with Color-Lite F-5 under the protection of the heat-resisting cover glass. Color-Lite F-5 is available in red, amber, green, and blue.

Floodlight FL-301 now may be obtained equipped with an unfluted Permaflector, providing more concentrated illumination where same is desired.

Heat-Resisting Cover Glass

Consists of special heat-resisting, clear convex glass, well annealed so that breakage caused by rain, sleet or snow is practically eliminated. Furnished as standard equipment with all Permaflector Floodlights, except FL-750 which is furnished only with stippled cover glass.

Cover Glass No. 1 for Floodlights Nos. FL-500, FL-750, FLC-501, FLC-1001 and FLC-1002 (16¾ in. diameter).

Cover Glass No. 3 for Floodlight No. FL-1500 (18¾ in. diameter).

Cover Glass No. 2 for Floodlight No. FL-300 (12 in. diameter).

Cover Glass No. 4 for Floodlight No. FLC-250 (11¼ in. diameter).

Cover Glass No. 5 for Floodlights FL-301 and FLC-300 (13¾ in. diameter).

Stippled Cover Glass—For Floodlights Nos. FLC-250, FL-500, FL-750, FL-1500, FL-300, FLC-501, FLC-1001 and FLC-1002. Useful for smoothing out the field of light for short throws. Furnished with Permaflector Floodlights only when order so specifies.

Spread Lens

For Floodlights Nos. FL-300, FL-500, FL-1500, FLC-250, FLC-501 and FLC-1001.

The "Pittsburgh" Spread Lens flattens the beam of light from the floodlight into a rectangular band of 60° width similar in action to the automobile headlight lens. Particularly useful for lighting rectangular signs from rather close locations.

When ordering specify if beam is to be spread horizontally or vertically.

Furnished with Permaflector Floodlights only when order so specifies.

Floodlight Reflectors

For FL-500. Diameter 16 in.
For FL-750. Diameter 16 in.
For FL-1500. Diameter 18 in.
For FLC-250. Diameter 10 in.
For FL-300. Diameter 12 in.
For FLC-501. Diameter 16 in.
For FLC-1001. Diameter 16 in.
Reflector is C-201, Permaflector Page 38.

Unless otherwise specified when ordering, all floodlights will be furnished with clear cover glass.

Bases

Low base for Nos. FL-500, FL-750, FL-1500, FLC-1001 and FLC-501. Weight 4 lb.

Round base for No. FL-300, illustrated on page 46.

Bracket base for Nos. FL-500, FL-750, FL-1500, FLC-1001 and FLC-501 (used either upright or horizontal).

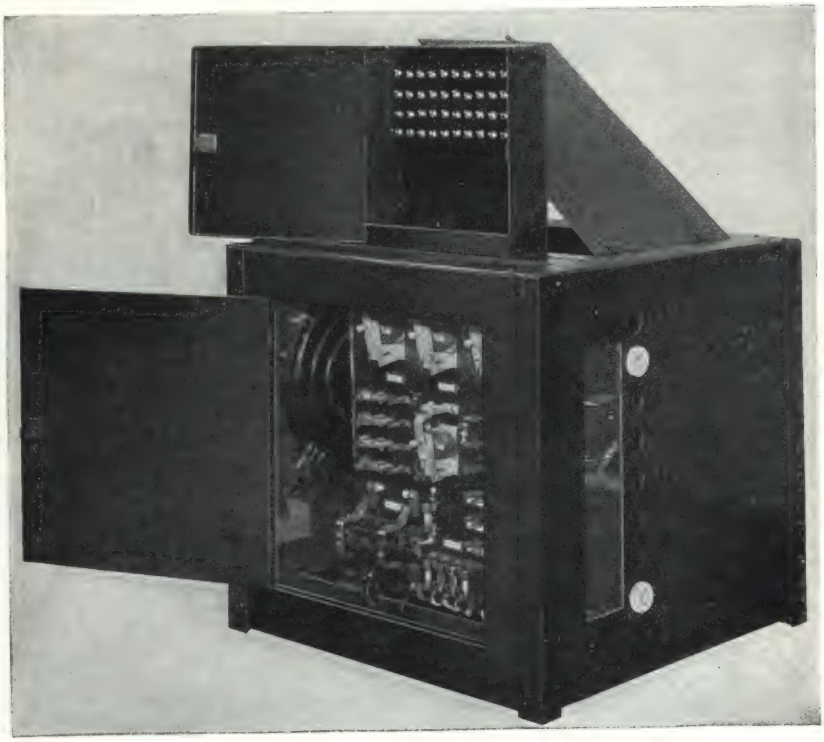
High (portable) base for Nos. FL-500, FL-750, FL-1500, FLC-1001 and FLC-501 36 in. high. Weight 15 lb.

"Mobilite"
(Patented)

"Mobilite" is the only all-electrical control apparatus for providing Mobile Color lighting of buildings or show windows by the wash method.

The distinctive feature of this machine is the manner in which the operation of cycle dimmers are synchronized with the operation of magnetic remote control switches.

This machine makes possible the washing out of colors by gradually bringing up the white lighting from "black out" to full brilliancy and switching from one color to another under the mask of the white lighting, as more fully described on page 43.



"Mobilite" for Mobile Color Floodlighting

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TAKE ADVANTAGE OF OUR COMPLETE LIGHTING SERVICE

For more than twenty years we have specialized in all forms of lighting for which the silver-plated glass reflector is particularly suited. We have accumulated a fund of information that is valuable to architects, engineers, and others having problems of this nature who have not had this varied experience. This information is at your service, without obligation, on all problems relating to the lighting of show windows, color lighting, spot lighting, cove lighting, as well as direct and indirect lighting, outdoor floodlighting, etc. The catalogue and booklets listed below will be found very interesting as well as useful in connection with their particular subjects. Copies will be sent free on request. Check the subjects in which you are interested:

Book on Floodlighting

The Permaflector Engineering Department has prepared a 64-page book discussing in detail various phases of floodlighting, including floodlighting in colors and in changing colors. The book is profusely illustrated, showing a wide variety of typical floodlighting installations—specific information on calculating floodlighting installations—how to decide the intensity of illumination required; how to select the floodlight locations; how to select the most suitable type of floodlights; how to decide the beam spread required; how to select the type and size of lamp; and how to determine the number of floodlights required.

Permaflector Catalog No. 33

Issued in June, 1930. This catalogue is practically a reprint of the pages here in SWEET'S ARCHITECTURAL CATALOGUES—a very complete book on illumination problems, illustrating and describing the complete Permaflector line. In bound form; size, 8½x11 in.—suitable for your files.

Permaflector Lighting Magazine

This 28-page magazine (8½x11 in.) is published eight or ten times a year, each issue being devoted to one subject. All architects who receive SWEET'S ARCHITECTURAL CATALOGUES are on the mailing list to receive this magazine as published. If you do not receive it, or wish additional copies, please write. Back issues available are as follows:

Church Lighting
Automotive Lighting
Bank Lighting
School and College Lighting
Floodlighting
Theater Lighting
Retail Store Lighting (other than show windows)

Other Permaflector Publications Available

Lighting Through Skylights—Henry Art Gallery, Seattle, Wash.
What Engineers Found Out About Show Windows
Play Football at Night

PITTSBURGH REFLECTOR COMPANY

304 Ross St., Pittsburgh, Pa.

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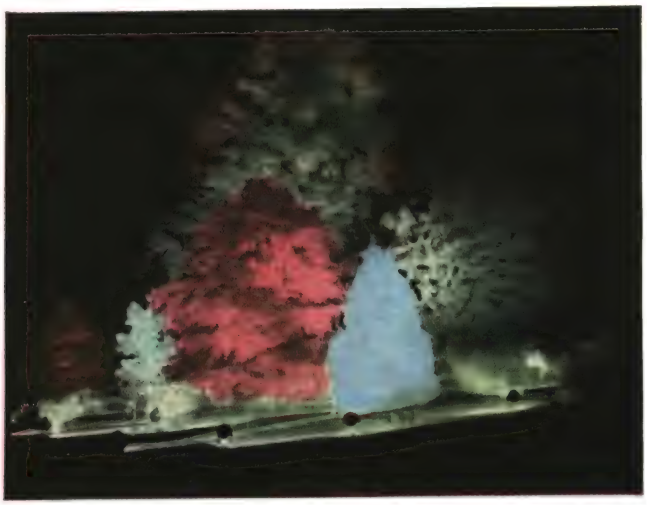


Spectacular Color Lighting

The wide variety of applications of Permaflector Floodlights is well described and illustrated in the Floodlighting issue of the Permaflector Lighting Magazine; one application in which architects are at times particularly interested is the color lighting of scenic features.

The colored pictures on this page give only a faint idea of the beautiful effects that may be secured through the use of Permaflector Floodlights and Color-Lights.

This particular installation was made for the recent Garden Club festival at Seattle, a section approximately 1000 feet by 600 feet of Volunteer Park being turned into a gigantic garden at night through the use of Permaflector Floodlights and Permaflector Color Lights.

The Copper Birch Group, shown above, "keys" the entire lighted section. The Golden Cedar under the color lighting looks like a Heliotrope in full blossom; the Copper Birch in back of it, like a huge red Salvia; and the towering Poplar resembles a bouquet of dark red Wallflowers with green foliage.

The Golden Cedar is painted in blue light through the use of four Permaflector Floodlights FLC-250. The Copper Birch, having a red tinge on the top of its leaves and green on the back, turns a vivid red under the three Permaflector FLC-1001 units with red color cap. The Poplar tree, sixty feet high, is painted in green with just a fringe of red at the top. A few Spruces are painted with blue light, Cedars of various kinds in red, and here and there a combination of red and green on a group of trees shows red with yellow highlights.

So attractive is this gigantic garden that as many as five thousand people are visiting the park each night to view the display.

This idea of transforming private grounds and public parks into gigantic gardens at night, blazing with light and color, is one that will appeal to many.

Another application of the same idea is at Ladder Creek, at the Skagit Power Development of the Lighting Department, City of Seattle.

Dropping off the mountain is a series of falls in a primeval forest setting. Huge trees line the banks; and granite boulders here and there break the rushing waters into foam.

The huge rocks stand out in the darkness revealed by the white floodlighting; here the falling water is of rainbow hues — and there, liquid fire dashing down into bowls of gold. Back in the glens, mysterious spots of color — blue lights playing on jutting rocks, spruces given added charm by blue light, red cedars in red light, and here and there a combination of colors painting groups of trees red and yellow.

Permaflector engineers will be very glad to discuss this form of scenic lighting with anyone who may be interested.

PERMAFLECTOR LIGHTING

WHEELER REFLECTOR COMPANY

275 Congress Street, BOSTON, MASS.

NEW YORK, N. Y., 68 Thomas Street ATLANTA, GA., Red Rock Building CLEVELAND, OHIO, 616 St. Clair Avenue, N. E.

Sales Offices also at St. Louis, Indianapolis, San Francisco, Los Angeles, and Seattle

WORKS AT BURRAGE, MASS.

Products

PORCELAIN ENAMELED STEEL REFLECTORS for industrial lighting; STREET FIXTURES; SIGN REFLECTORS; EXIT SIGNS; and REFLECTORS for bank, theater, window and other special lighting.

Also Metal Shades and Lamp Guards.

Wheeler

Wheeler Industrial Reflectors

Wheeler Reflectors are made of Armco Ingot Iron, finished with Wheeler porcelain enamel. The industrial reflectors are green outside and white inside unless otherwise stated. Wheeler Reflectors are designed to meet particular lighting requirements and to give correct light distribution. They are available in a wide variety of types, shapes, and sizes. Several popular Wheeler Reflectors are shown.

R.L.M.—"H" Group

Shallow Dome

Standard Angle

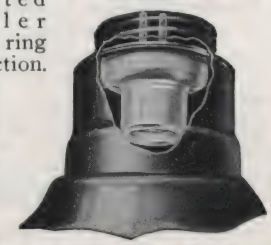
Standard Bowl

Standard Reflector Shapes

Duratach Fixtures

Duratach construction (patent applied for) allows lamp and reflector to be attached to or removed from canopy as one unit—eliminates handling of hot lamps and allows extreme convenience in installation and maintenance. Duratach embodies the patented Wheeler screw ring construction.

Duratach Fixture R.L.M.



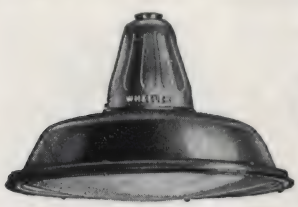
Duratach Construction

Reflectors may be changed without disturbing the wiring of the original installation. It is not necessary to break the circuit when relamping, either medium or mogul base, as circuit is broken in socket when reflector is detached from canopy.

Duratach Fixtures are available with four types of reflector—R.L.M. Standard Dome, Shallow Dome, Standard Bowl, and Standard Angle. There are five types of canopy, meeting every installation need. All Duratach Reflectors, either medium or mogul base, are interchangeable in all Duratach canopies. Sizes for 25 to 1000-watt lamps.

Vapolux Fixtures

Vapolux Fixtures are vaporproof, smokeproof and dustproof—thoroughly protecting the bulb, socket, and reflecting surfaces from vapor, smoke and dust. A special convex glass disc is tightly and permanently sealed into the mouth of the reflector by asbestos gaskets and an aluminum pressure ring. Vapolux canopies are made of cast aluminum, assuring light weight, and embody the Wheeler patented screw ring construction. The diameter of the reflector neck is sufficient to allow the reflector to be removed over the lamp without disturbing the glass disc. All metal parts are aluminum and monel metal and withstand smoke, acid, and sulphurous fumes.

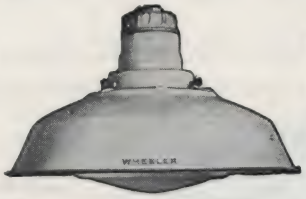


Vapolux Fixture "H" Group

There are three types of Vapolux Fixtures—"H" Group, Standard Angle, and Standard Bowl. Sizes for 50 to 500-watt lamps.

Glassteel Diffusers

For lighting of offices and factory workrooms where fine operations require minimized shadows. White inside and outside. Furnished complete, ready for wiring. White diffusing globe is supported in neck of reflector by setscrews which bear against a copper overcollar.



Duratach Glassteel Diffuser

Glassteel Diffusers are available with Duratach construction, which allows reflector, globe and lamp to be removed from canopy as one unit. Duratach Glassteel Diffusers are available to fit ½-in. pipe and 4-in. outlet boxes. Glassteel Diffusers also supplied with Wheeler canopies "R" and "F."

Isolux Reflectors

For lighting signboards and other vertical surfaces. Wide, rectangular light outlet and flat reflecting planes assure even distribution of light with no high lights or shadows. Body drawn in one piece, canopy tapped for ½-in. pipe. Two-piece construction for sign lighting provides easy installation and wiring—no elbows are required. Reflectors are easily removed from canopy for cleaning.

One-piece Isolux construction is recommended for lighting of yards, platforms, bowling alleys and for side lighting in factories.

Two-piece construction available for 100, 150, 200, and 500-watt lamps.

One-piece construction available for 100 to 1000-watt lamps.

Two-piece Isolux Reflector

Wheeler Exit Signs

The attractive appearance of Wheeler Exit Signs meets the requirements of the finest theater, auditorium or public building.

Surface Type Exit Sign

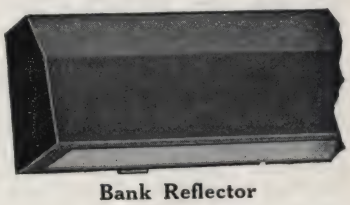
There are three types—Stenciled Exit Signs, Etched Glass Exit Signs and Painted Glass Exit Signs. Made of heavy galvanized iron, finished dark bronze outside and aluminum bronze inside, unless otherwise ordered. Available in surface and flush types, with 5, 6, and 8-in. letters.

Special Lighting Equipment

For theater lighting, there is a complete line of Wheeler footlights, borderlights, and proscenium reflectors.

For bank lighting there are several designs for counter screen, bank table and customers' desk reflectors.

Also reflectors for cove, showcase, window, picture and art gallery lighting.



Bank Reflector

Wheeler Service

Specific data and plans for your needs will be drawn up by our Engineering Department, if desired.

We shall be glad to submit recommendations and layouts, without obligation.

Catalogues showing the complete Wheeler Lines of Industrial, Street, and Special Lighting Equipment are available on request.

ESTABLISHED 1912

REFLECTOR & ILLUMINATING CO.

Manufacturers and Engineers; Makers of Sterling Reflectors and Other Scientifically Designed Lighting Products

1401-1417 West Jackson Boulevard, CHICAGO, ILL., U. S. A.

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NEW YORK, N. Y., Thomas J. Crofton & Co., 109 Lafayette Street
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GREENVILLE, S. C., J. W. Vaughan, Jr., 408 Masonic Temple
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DETROIT, MICH., Electrical Specialties Co., 433 E. Larned Street
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Products

Reflectors for Show Window, Show Case and Wall Case Lighting, and Floodlights for Show Window and all forms of Display Lighting; Show Window Footlights; Color Attachments for Show Window and other forms of Display Lighting; Reflectors for Indirect Lighting, such as Cove Lighting in theatres, lodge halls, banks, churches, etc.; Reflectors for Industrial Lighting such as in factories, warehouses, shops, garages, gymnasiums, etc.

Floodlights for Floodlighting Building Exteriors, Monuments, Signs, Storage Spaces and for Night Construction Work and Protection Lighting.

Wiring Channel for attractive Show Window Reflector installations and all kinds of Outline and Border Lighting.

Special Reflectors for all purposes.

TRADE-MARK

Engineering Service

Very often certain lighting problems confront the architect, the solutions of which are found only in the special applications of the various standard reflectors. Through long experience in the field of illumination, our engineers are familiar with these numerous special applications and are able to recommend at once the best installation for the job in question. We cordially invite architects to avail themselves of this wide experience in the handling of special lighting problems by consulting our engineers. Address your inquiries to the Engineering Department, Reflector & Illuminating Co., 1401-1417 West Jackson Boulevard, Chicago, and they will receive immediate attention.

Catalogue and special bulletins gladly furnished on request.

Indirect Lighting

Cove lighting and all forms of indirect illumination invariably entail problems peculiar to standard reflectors. Each cove lighting installation presents an individual problem different from any other and must be executed as such; either the physical dimensions of the rooms vary, ceilings may be flat, arched or vaulted, colors of the ceilings and walls are different, and many other factors enter into the design of a cove lighting installation to necessitate special consideration. Accordingly, we suggest that you consult our Engineering Department concerning your indirect lighting plans.

Special Reflectors

Besides our standard line of reflectors, we are constantly engaged in the manufacture of special reflectors for signals, motion picture projectors, floodlights, searchlights, headlights and other similar equipment. We invite your inquiries on special reflectors for any purpose.

Show Window Lighting

Show window lighting is recognized as one of the most important and necessary elements in successful merchandising. Properly illuminated show windows, and display cases can rightly be termed powerful magnets that attract the public, sell merchandise and create profits year after year. For this purpose Sterling Reflectors offer great possibilities of service and satisfaction.

STERLING STIPPLE REFLECTORS

Scientific Research

Sterling Reflectors are the result of years of scientific research, careful study and engineering skill to produce an improved type of reflector that would provide increased efficiency in the distribution of light, promote greater economy and render more satisfactory results in the illumination of show windows, display cases, interiors, exteriors, and all forms of display lighting.

Superior Features of Sterling Reflectors

(1) Old systems of fluting and corrugation are replaced with our modern, exclusive process, the Sterling Stipple, which eliminates striations and circular ghosts commonly known as shadows.

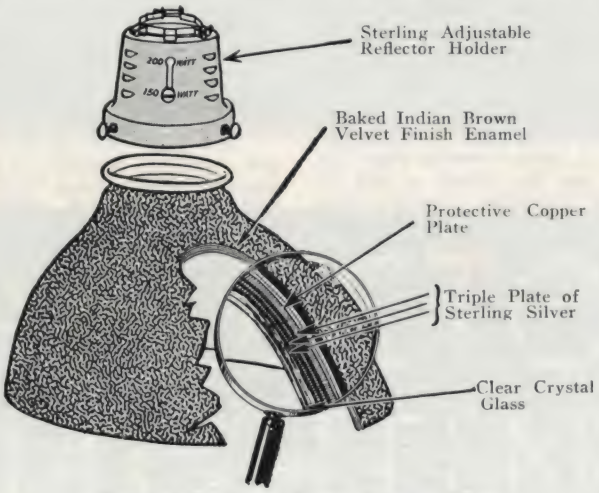
(2) Reflectors are designed and moulded in order that the raw light of the incandescent lamp might be redirected to the most useful zones without submitting to the laws of excessive absorption.

(3) A special and exclusive process of our own origin used in applying three applications of pure grain silver and reinforcing its delicate body with a coat of pure copper.

(4) Baked Indian Brown Velvet Finish in complete harmony with all colors and finishes of window trimming, instead of the traditional green and aluminum which frequently clash with the wood and cloth trimmings.

(5) Adjustable reflector holders are an exclusive Sterling patented feature.

(6) Each reflector individually packed in improved convenient containers which facilitate handling and lessen breakage.



Sterling Reflector Cross Section View

Guarantee

Sterling Reflectors are sold under a bona fide guarantee, that they will give lasting service and absolute satisfaction. If for any reason the finish of any Sterling Reflector should check, peel, tarnish or discolor, or otherwise prove unsatisfactory through any fault that may be attributed to the materials or workmanship, it will be replaced without charge.

Continued on next page

SHOW WINDOW LIGHTING

Selecting the Proper Reflector

Illuminating Intensities

Correct illumination intensity, to be used in various classes of window displays, is of a certain standard and is substantially adopted as good practice in organizations engaged in the sale of lighting equipment, rendering engineering advice to those who are not so well acquainted with what may be considered *correct illumination.* Therefore, we submit herewith, two different ways in which illumination may be calculated.

First Method: Watts per square foot of floor area for various intensities in ordinary windows where the depth is one-half to two-thirds the height.

Second Method: Foot candle intensity of various values.

Formula: FC × L × (H + D) divided by U = watts.

Foot candles (FC) multiplied by the length (L) of the window, times the height plus the depth (H + D) divided by U (utilization constant) will equal the watts required.

The following table gives the Utilization Constants corresponding to the wattage of lamp used:

For 75-watt lamp U = 6
For 100-watt lamp U = 7
For 150-watt lamp U = 8
For 200-watt lamp U = 8
For 300-watt lamp U = 9
For 500-watt lamp U = 10

	First method	Second method
Minimum illumination	12 watts	25 foot candles
Fair illumination	17 watts	40 foot candles
Average illumination	22 watts	60 foot candles
Good illumination	37 watts	100 foot candles
Excellent illumination	50 watts	150 foot candles
Brilliant illumination	75 watts	250 foot candles

Example: A window, length 10 ft., height 10 ft., depth 5 ft., requiring 60 foot candles (see above paragraph for intensity) is to be illuminated by 150-watt lamps in reflectors. How many lamps and reflectors will be needed?

Solution: (1) By referring to the above table of Utilization Constants, 8 is given as the constant U corresponding to the 150-watt lamp.

(2) Apply the formulae $\frac{FC \times L \times (H + D)}{U} = \text{watts}$

Here FC = 60, L = 10, H + D = 15, U = 8

Therefore: $\frac{60 \times 10 \times 15}{8} = 1125$ watts

(3) Since 1125 watts are required, divide this number by 150 (the wattage of the lamps to be used): $\frac{1125}{150} = 7.5$

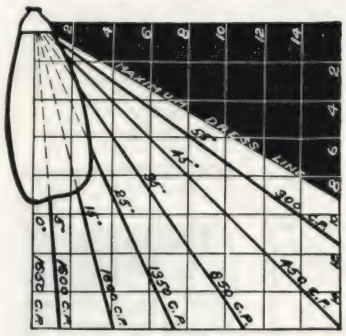
(4) When the result of step (3) is other than a whole number, use the next greater whole number. Therefore since the result of step (3) is 7.5, the working figure will be taken as 8.

(5) There will be 8 150-watt lamps in reflectors required to illuminate this window to an intensity of 60 foot candles. The reflectors will be spaced 15 in. on center.

If dark and light goods are to be displayed at different times in a window and it is impractical to provide two or more intensities of illumination to meet such conditions, adequate illumination should be provided for the darkly dressed window. Very satisfactory results may be obtained in the ordinary window by an allowance of from 5 to 44 watts per sq. ft. of floor area, using a large number of small units rather than a small number of large units, in order that the illumination may be as even as possible.

How to Read Curve Values

Photometric Curve—



Apparent Candlepower Distribution No. 251 150-watt Lamp

The number of photometric curves appearing in this catalogue will illustrate how the Sterling Reflector utilizes and confines the light of the bare lamp to the display in a uniform manner, allowing very little, if any, light to escape to what may be considered useless working zones.

Photometric curves of any combination, made under proper conditions, tell very clearly the character of the distribution of a lighting unit and the flux value (candle power) contained within any angle and should be carefully analyzed before decisions are made so that the results obtained will be satisfactory.

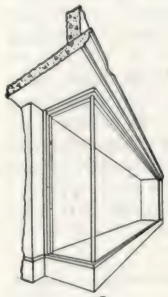
When referring to the distribution curves appearing on the following pages, to determine what position the maximum dress line strikes the back wall or the display, read to the right for depth of window and downward for the height. Vertical lines also indicate back wall or height of display.

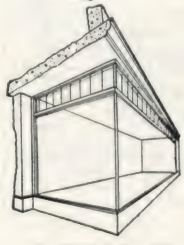
Lamp Position—

Lamp position is measured from the point of the lamp contact to the reflector holder screws.

In most instances where two reflectors are recommended, it will be noticed that they are of the same style and have the same characteristic light distribution but are made to serve different sized lamps and should be selected to agree with the adjacent conditions of the show window and the amount of illumination desired.

SELECTING STERLING TYPES





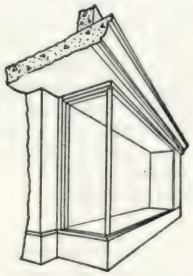
High Shallow Window—Sterling Nos. 251 or 401 should be selected to serve a window of this character. They produce an even, concentrated beam of light and are supplied with Sterling Adjustable Reflector Holders, which accommodate 150, 200, 300 or 500-watt lamps.

High Deep Window—Sterling Nos. 251 and 253 or Nos. 401 and 403 should be used in combination. One unit illuminating the front section of the display while the other harmoniously illuminates the rear portion. 150, 200, 300 or 500-watt lamps can be used in these reflectors. Adjustable shade holder is supplied.

For Island Windows—Sterling Nos. 231, 251 or 401 are constructed so that the major portion of the light is directed on the merchandise and not in the eyes of the prospective purchaser, and are specially recommended for island windows.

Low Shallow Window—Sterling Nos. 231 or 251 are especially fitted for this style of window. 75, 100, 150 or 200-watt lamps may be correctly used. Sterling Reflector Holders are supplied with these units.

Low Deep Window—The general specifications for this window are similar to the high deep window mentioned at left, with the exception of Sterling Nos. 231 and 233 or Nos. 251 and 253 with 75, 100, 150 or 200-watt lamps recommended.



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SHOW WINDOW LIGHTING

Reflector No. 251

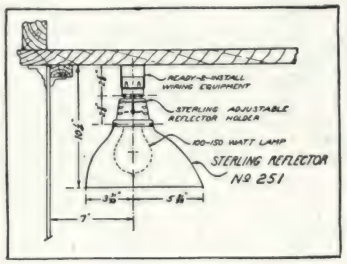
For 150, 200-watt Mazda "C" Lamps—The Sterling No. 251 reflector produces a concentrated projection of light and is constructed for the purpose of serving medium, high or low shallow windows. This reflector also is recommended for island windows, as it has a deep bowl and will conceal the filament of the lamp from the eyes of the prospective purchaser.

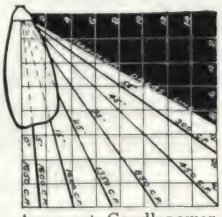
Lamp position is measured from the point of the lamp contact to the reflector holder screws.

Use No. 125 Color-Lite and No. 1025 flush mounting ring with this reflector.

No. 251

DIMENSIONS
Height, 5⅝ in. (14.3 cm.).
Width, 9½ in. (24.1 cm.).
Depth, 9 1/16 in. (25.2 cm.).
Back to front.
Holder, Sterling adjustable.
Lamp position, 3 in. (7.62 c.m.).





Apparent Candlepower Distribution No. 251, 150-watt Lamp

Reflector No. 253

No. 253

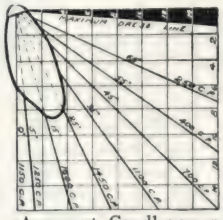
DIMENSIONS
Height, 6 1/16 in (15.4 cm.).
Width, 9½ in. (24.1 cm.).
Depth, 9 7/16 in. (23.9 cm.).
Back to front.
Holder, Sterling adjustable.
Lamp position, 3 in. (7.62 c.m.).

For 150, 200-watt Mazda "C" Lamps—Sterling Reflector No. 253 is designed to give uniform illumination over a wide area. It is especially intended for show windows where the merchandise on display is trimmed quite high.

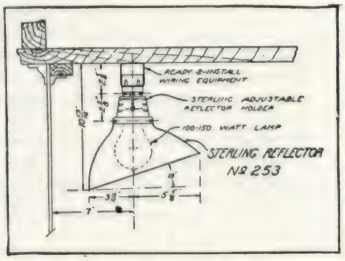
Lamp position is measured from the point of the lamp contact to the reflector holder screws.

Use No. 125 Color-Lite and No. 1025 flush mounting ring with this reflector.

No. 253 is one of the most popular Show Window Reflectors in the Sterling line and is recommended for unusual efficiency and satisfactory results.



Apparent Candlepower Distribution No. 253, 150-watt Lamp



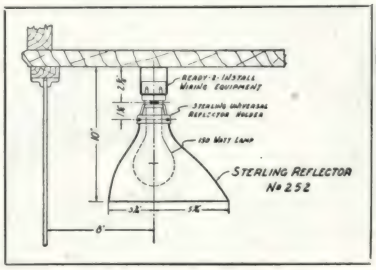
Reflector No. 252

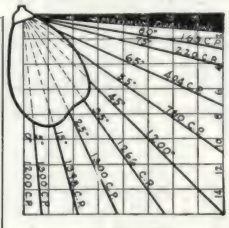
For 150-watt Mazda "C" Lamps—This new reflector has been specially designed to meet the ever increasing demand for correct reflector equipment for the popular 150-watt show window lighting installations. Reflectors Nos. 252 and 254 are engineered to precision for the specific purpose of furnishing the greatest possible efficiency when used with 150-watt Mazda "C" lamps, and since they do not have to share their efficiency are most economical and satisfactory.

This new reflector fills a long felt need by providing added efficiency in display lighting when 150-watt lamps are used. Recommended for show windows of practically every type.

No. 252

DIMENSIONS
Height, 6 7/16 in. (16.35 cm.).
Width, 8 1/16 in. (22.70 cm.).
Depth, 9⅛ in. (23.17 cm.).
Back to front.
Holder, Sterling.
Standard package, 12.
Approximate standard package weight, 51 lb. (23.2 Kilog.).
Lamp position, 2 in. (5.08 cm.).





Apparent Candlepower Distribution No. 252, 150-watt Lamp

Reflector No. 254

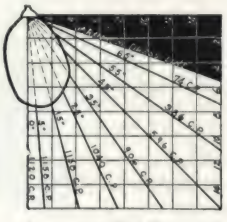
No. 254

DIMENSIONS
Height, 6⅞ in. (17.46 cm.).
Width, 8 1/16 in. (22.7 cm.).
Depth, 8 11/16 in. (22.06 cm.).
Back to front.
Holder, Sterling.
Standard package, 12.
Approximate standard package weight, 51 lb. (23.2 Kilog.).
Lamp position 2 in. (5.08 cm.).

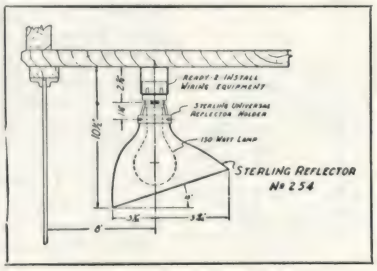
For 150-watt Mazda "C" Lamps—A companion reflector to No. 252, designed to give uniform illumination over a wide area. A particularly desirable reflector for use in show windows requiring a wide, high spread of efficient illumination.

This reflector also is specially designed for 150-watt Mazda "C" lamps and promotes increased efficiency in show window lighting without increasing the size of the lamps used, or the amount of current used, thus affording practical economy.

Sterling Reflectors are guaranteed for service and satisfaction and may be depended upon to give pleasing results. They are made from finest quality silvered glass—smooth inside—easy to clean and keep clean.



Apparent Candlepower Distribution No. 254, 150-watt Lamp



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SHOW WINDOW LIGHTING

Reflector No. 231

For 100-watt Type "A" Inside Frosted Lamps—Sterling Reflector No. 231 is specially designed for use with 100-watt "A" inside frosted lamps. The distribution performance is highly concentrated. This reflector will give excellent results in show windows of low shallow type. Highly satisfactory for island windows, as the cut off is sharp and low, and any possibility of glare is eliminated. The new 75-watt "A" inside frosted lamps may also be used in this reflector.

May be used with 60-watt Mazda "A" lamp by substituting Form "O" holder.

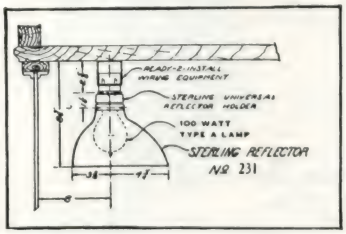
Lamp position is measured from the point of the lamp contact to the reflector holder screws.

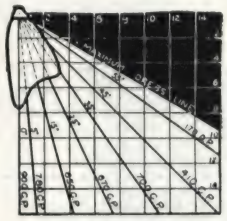
Color-Lites are not made for this reflector. Use No. 1022 flush mounting ring with this reflector.

No. 231

DIMENSIONS

Height, 5 3/32 in. (12.9 cm.).
Width, 7 5/8 in. (19.4 cm.).
Depth, 7 1/16 in. (20.1 cm.).
Back to front.
Holder, Sterling.
*Lamp position, 2 in. (5.08 cm.)





Apparent Candlepower Distribution No. 231, 100-watt Type "A" (Inside Frosted) Lamp

Reflector No. 233

No. 233

DIMENSIONS

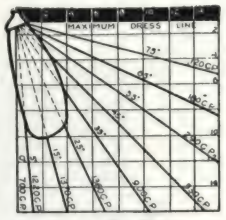
Height, 6 1/2 in. (16.5 cm.).
Width, 7 5/8 in. (19.4 cm.).
Depth, 7 1/2 in. (19.1 cm.).
Back to front.
Holder, Sterling.
Lamp position, 2 in. (5.08 cm.).

For 100-watt Type "A" Inside Frosted Lamp—Sterling Reflector No. 233 has also been specially designed for 100-watt Type "A" inside frosted lamps. For small, low and deep windows this reflector is particularly desirable as the light is efficiently distributed over wide angles with true uniformity to insure the most satisfactory results. The new 75-watt "A" inside frosted lamps may also be used in this reflector.

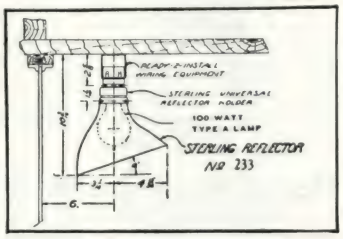
May be used with 60-watt Mazda "A" lamp by substituting Form "O" holder.

Lamp position is measured from the point of the lamp contact to the reflector holder screws.

Color-Lites are not made for this reflector. Use No. 1022 flush mounting ring with this reflector.



Apparent Candlepower Distribution No. 233, 100-watt Type "A" (Inside Frosted) Lamp



Reflector No. 401

For 300 or 500-watt Mazda "C" Lamps—The Sterling Reflector No. 401 has been designed to permit utilization of the high efficiency afforded by the 300 and 500-watt Mazda "C" lamps and is intended to be used in high shallow or medium shallow windows. This master of all reflectors has made it possible to obtain almost any intensity of illumination desired.

Sterling Special Reflector Holder, mogul receptacle and cover to fit regular 4-in. outlet box is regularly supplied with this reflector.

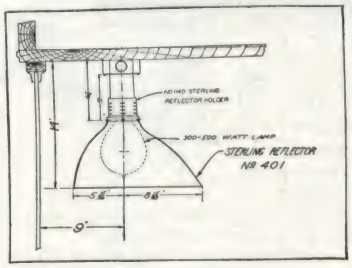
Lamp position is measured from the point of the lamp contact to the reflector holder screws.

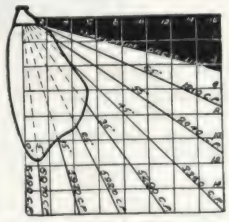
Use No. 140 Color-Lite and No. 1040 flush mounting ring with this reflector.

No. 401

DIMENSIONS

Height, 7 3/4 in. (19.7 cm.).
Width, 12 in. (30.4 cm.).
Depth, 13 1/16 in. (35.4 cm.).
Back to front.
Holder, Sterling Special.
Lamp position, 3 5/16 in. (8.41 cm.).





Apparent Candlepower Distribution No. 401, 500-watt Lamp

Reflector No. 403

No. 403

DIMENSIONS

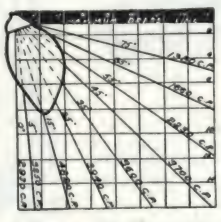
Height, 8 3/8 in. (21.4 cm.).
Width, 12 in. (30.4 cm.).
Depth, 13 1/4 in. (33.7 cm.).
Back to front.
Holder, Sterling Special.
Lamp position, 3 5/16 in. (8.41 cm.).

For 300 or 500-watt Mazda "C" Lamps—The Sterling Reflector No. 403, also a master of its line, has a wide, powerful distribution of light and is desirable where high intensities are essential over a wide area.

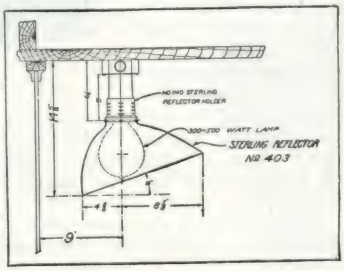
Sterling Special Reflector Holder, mogul receptacle and cover to fit regular 4-in. outlet box is regularly supplied with this reflector.

Lamp position is measured from the point of the lamp contact to the reflector holder screws.

Use No. 140 Color-Lite and No. 1040 flush mounting ring with this reflector.



Apparent Candlepower Distribution No. 403, 500-watt Lamp



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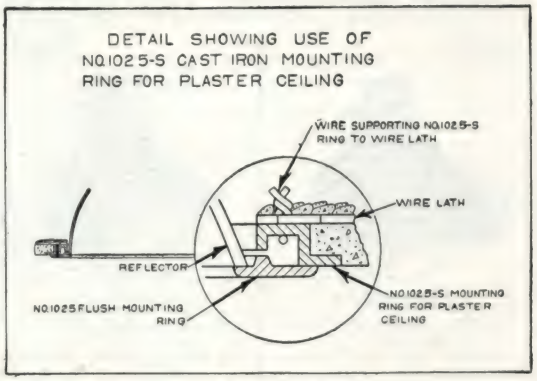
Methods of Installation to Conceal the Reflector

In preparing to install a lighting system in a window, the first consideration should be to conceal the reflector as much as possible from view. This may be done by suspending the reflector from the ceiling behind a valance draped low enough to conceal the reflector from public view, or set the reflector flush with the ceiling using Sterling cast mounting rings for finishing.

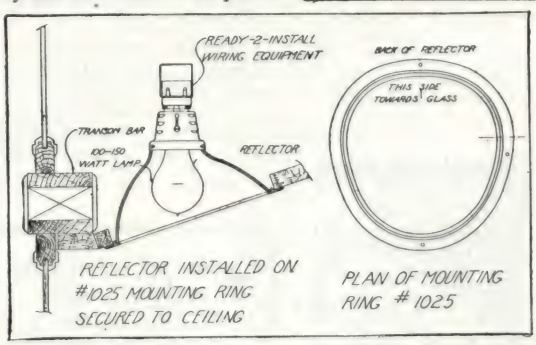
The mounting ring illustrated is constructed of cast iron with a deep shouldered ridge to securely set the reflector in place.

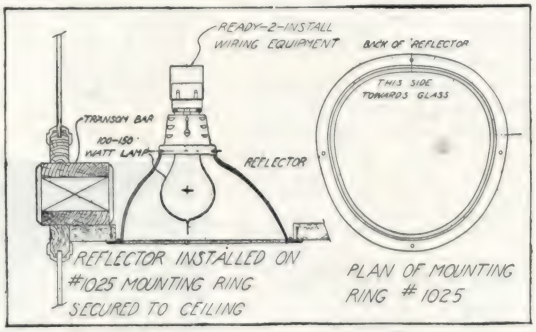


Screwholes are drilled in the casting so that it may be attached conveniently to the ceiling.

The mounting rings are made to fit Nos. 191, 221, 223, 231, 233, 252, 254, 251, 253, 255, 401 and 403 reflectors, and when ordering mention should be made for which reflector they are to be used.

We are offering these installation suggestions, realizing that many objectionable features of present day display lighting equipment are traceable to faulty installation of reflectors.





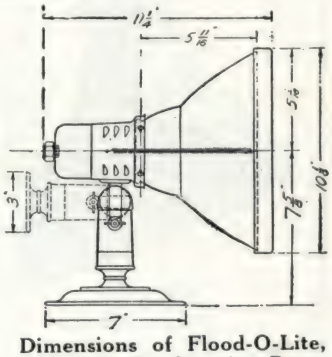
Show Window Floodlights

Flood-O-Lite Junior No. 3022

For 200-watt Mazda "C" lamps.

Form "C" for spotlighting. Form "I" for floodlighting. Equipped with Sterling silver plated glass reflector mounted on portable base. Wing-nut tightens or loosens ball and socket joint, permitting adjustment of reflector to any desired position. Flood-O-Lite Junior is equipped with combination base which provides 7-in. weighted portable base for floor use or 3-in. flange base for attachment to wall, ceiling or transom bar. Finished in rich Indian brown color.

New Combination Base



Dimensions of Flood-O-Lite, Jr., with Combination Base

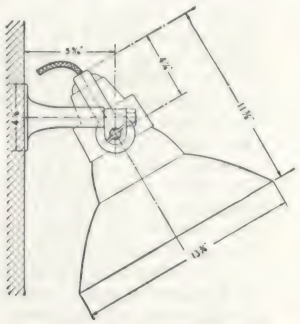
New Flood-O-Lite Senior No. 4010

For 300 and 500-watt lamps.

This new spotlight has a concentrated beam strong enough to penetrate the highest intensity of general illumination used in window displays. It "spots out" and accentuates objects in a manner that is tremendously valuable in stimulating sales.

New, improved design, universally adjustable flange base for attachment to walls, ceilings or transom bars. Equipped with Sterling guaranteed silvered glass reflector.

Flood-O-Lite Senior



Dimensions of Flood-O-Lite Senior with Adjustable Base

Sterling Lum-N-Art No. 6501

Lum-N-Art fills a long felt need by making available for the first time a picture-light of correct size, striking appearance, and guaranteed efficiency at surprisingly low cost.

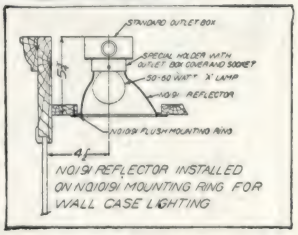
Lum-N-Art is easily mounted and has a wide range of adjustment. Regularly finished in rich gold moderne. Special finishes supplied on request.

Unit comes equipped with 10-ft. silk covered connecting cord and separable plug. Uses standard T-6½, 25-watt, intermediate screw base tubular Mazda lamp.

Kas-Lite Jr. No. 650

This show case lighting unit has been designed to meet

the insistent demand for a small fixture offering a minimum of visual obstruction in a show case with a maximum of light intensity. Designed for use with the new 25-watt T-6½ intermediate screw base tubular lamp. Attractively finished in statuary bronze to harmonize with most wood and metal trims.



Wall Case Lighting

Continued on next page

INDUSTRIAL LIGHTING

No. 255

Concentrating and distributing types of Sterling Reflectors adequately meet the requirements for efficient illumination in stores, offices, factories, mills, etc.

Lamp position is measured from the point of the lamp contact to the reflector holder screws.

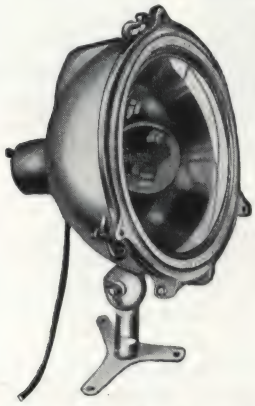
Height, 6 in. (15.2 cm.).
Diameter, 9⅛ in. (25.2 cm.).
Lamp, 100-150 or 200 watt.
Holder, Sterling.
Lamp position, 3 in. (7.62 cm.).
Note: Sterling adjustable reflector holder is furnished with this reflector.

Height, 10 1/16 in. (26.9 cm.).
Diameter, 11⅞ in. (30.2 cm.).
Lamp, 300 or 500 watt.
Holder, Sterling, mogul type, No. 1141-P.
Lamp position, 2 5/16 in. (5.88 cm.).
Note: Sterling special reflector holder and mogul receptacle are regularly furnished with this reflector.

No. 406

FLOODLIGHTING

Floodlighting is logically divided into five major classifications. It is recognized as an exclusive advertising medium, characterized by its subtleness and dignity, that attracts attention to office buildings, industrial plants, stores, banks, etc.; it is profoundly artistic and aesthetic when applied to the illumination of fountains, gardens, churches, etc.; it is paramount in its effect of stimulating civic pride by lending prominence to public buildings, memorials and monuments; it lengthens the recreational periods at playgrounds, beaches, and stadiums; and, finally, it serves to expedite night operations in railroad yards, industrial plants, shipyards, and construction work, as well as to offer a medium of protection.



Sterling Flood-O-Lite No. 3000

"Built for Long, Hard Service"

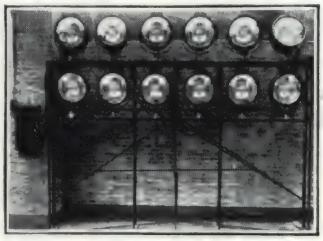
For use with 250 and 400-watt Type "C" G-30 lamps.

A simple focusing mechanism assures accurate beam control with the No. 3000-C Flood-O-Lite from 6 to 25 degrees which can be increased to 40 degrees through the use of diffusing lenses. A 90-degree beam spread is possible with the No. 3000-I Flood-O-Lite.

The housing of this weatherproof projector is composed entirely of cast aluminum with all fittings and adjustments of brass, and provides for ample radiation and ventilation.

Ventilation of this unit is the result of considerable scientific experiment and permits of rapid dissipation of heat through a series of baffles which are absolutely weatherproof and exclude dirt and dust.

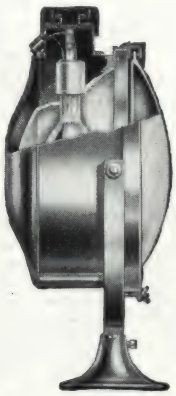
DIMENSIONS (with No. 3052 base)
Height, 18 in.
Width, 14 in.
Depth, 12¾ in.



Method of Mounting Sterling Exterior Floodlights No. 5240

General Motors Building, Detroit, Mich.

One of the world's largest office buildings is handsomely floodlighted with 324 Sterling Exterior Floodlights No. 5240



Sterling Flood-O-Lite No. 5240

"Built for Long, Hard Service"

Adjustable for 300 to 1000-watt Type "C" P. S. lamps and beam spread of from 6 to 90 degrees.

No. 5240-C, which is equipped with the No. 520 Sterling Concentrating Reflector, 16 in. in diameter, with a beam spread of 6 to 25 degrees, for use where a long throw with great intensity is required. No. 5240-I, which is equipped with 16-in. Sterling Stippled Reflector No. 525, for service where the purpose is to evenly distribute the flood of light over a wide area at a comparatively close range, as this unit will afford a beam spread of 90 degrees. The No. 5240-C will be furnished unless otherwise specified.

DIMENSIONS (with 5202 base)
Height, 27¼ in.
Width, 21½ in.
Depth, 12 in.

Sterling Flood-O-Lite No. 4000

No. 4000—A new Exterior Sterling Flood-O-Lite, for use with 300 and 500 Watt Standard P. S. Mazda "C" Lamps. An exceptionally efficient floodlight, "built for long, hard service." Unit is a new non-ventilating type with surface area constructed so as to assure rapid dissipation of heat from lamp. Absolutely weatherproof. Housing is composed entirely of aluminum, and all fittings and adjustments are of bronze.

No. 4000-C Flood-O-Lite can be focused up to 25° for long throws of great intensity.

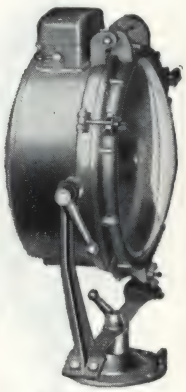
No. 4000-I provides an 80° beam spread for distributing the light over a wide area at a comparatively close range.

No. 6000—Another new Sterling Exterior Flood-O-Lite. For use with 500 to 1000 Watt Standard P. S. Mazda "C" Lamps. Housing is composed entirely of aluminum, and all fittings and parts are of bronze.

Sterling Flood-O-Lite No. 6000-C provides beam spread up to 25° for long throws of great intensity.

No. 6000-I can be adjusted to a 90° beam spread for even distribution of light over a wide area at a comparatively close range.

Note: Sterling Flood-O-Lite No. 7000 is the same in construction as Flood-O-Lite No. 6000 except that it is equipped with azimuth position and elevation locks.



Sterling Flood-O-Lite No. 6000

BEARDSLEE CHANDELIER MANUFACTURING CO.

216 South Jefferson Street
CHICAGO, ILL.

Products and Service

Our business is the design and manufacture of LIGHTING EQUIPMENT.

You can make profitable use of Beardslee's 30 years' experience in Lighting and Lighting Fixtures and of the trained expert staff of artists and artisans. Every member of our personnel is in step with all developments of modern lighting, backed by every modern facility for manufacturing accurately and economically.

You can also profit by Beardslee's large library of drawings, photographs, patterns and dies. Being instantly available, time and money is saved. This is of great importance when perfect co-ordination is essential and delivery date is unalterable. Beardslee gladly accepts responsibility to perform the promise *on time and without worry on your part.*

Intelligent Co-operation

For lighting fixtures in plans for new construction or remodeling, you naturally want the best advice and service obtainable. Our knowledge and experience in lighting problems, the ability to suggest and recommend, to interpret ideas, the skill to create, design and manufacture distinctive, artistic lighting fixtures and to work closely, co-operatively and intelligently with you, are at your disposal.

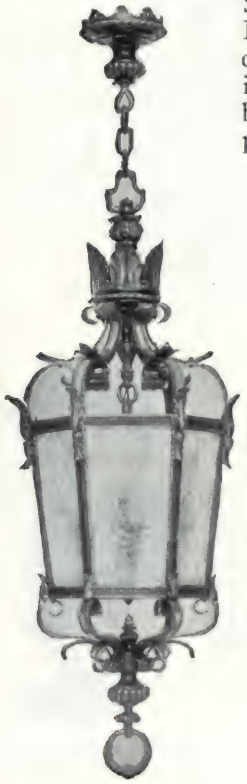
Any lighting problem of any style, Modernistic, Spanish, Colonial, Elizabethan, Renaissance, Tudor, Gothic, in new construction or remodeling, whether it be a residence, hotel, apartment building, church, bank, school, hospital, store, public building or theater, will be solved by Beardslee, as we have the ability and material to give a *full measure of satisfaction in price, and pleasure in the finished job.*

Brackets, Chandeliers and Lanterns

We have well equipped and well qualified departments with sound competent counsel and talent, specializing in Church Lighting, Commercial Lighting and Exterior Lighting. All the departments function serviceably to produce brackets, chandeliers and lanterns as sound in construction as in artistry and beauty, properly designed and finished, each to be a permanently pleasing part of the architecture.

Correspondence

Outline your lighting problem in detail in a letter, enclosing, if possible, a rough sketch or blue print, and we will despatch speedily the information wanted. You may expect real help and close co-operation from us. Distance from Chicago is no handicap to our ability to serve, for there is a Beardslee trained representative near you. Put your lighting problems up to Beardslee and enjoy the confidence and *assurance of complete satisfaction.*



CONSOLIDATED LAMP & GLASS CO.

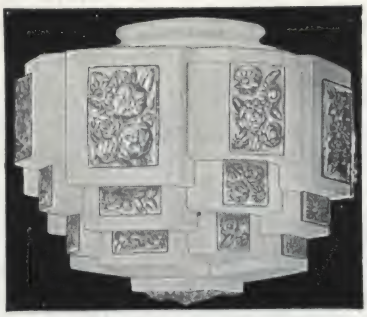
LIGHTING GLASSWARE DIVISION

CORAOPOLIS, PA.

THE MARTELE COMMERCIAL

Finishes

Nuite-Ivory
French Crystal
Honey



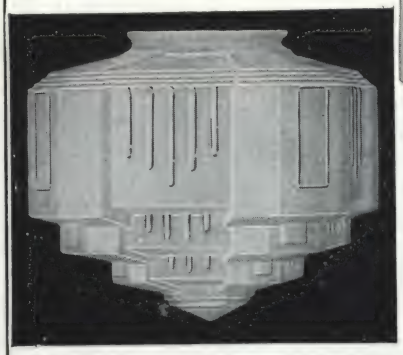
No.	Dia., in.	Depth, in.	Fitter, in.
9006	4	6	3¼
9010	4¼	10	3¼
9014	6	13½	4
9018	8	17½	6
9022	10	22½	6 or 8

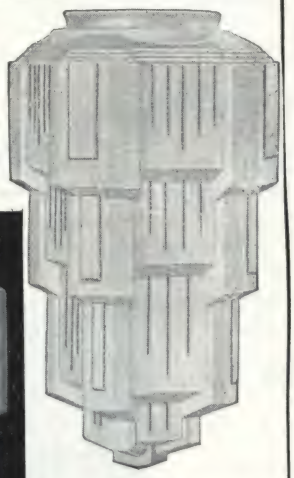
No.	Diam., in.	Depth, in.	Fitter, in.
9000	14	10	6
9012	12	8½	6

THE TOWER LINE

Finishes

Nuite-Ivory
Crystal Bright Line
Nuite Black Line





No.	Diam., in.	Depth, in.	Fitter, in.
8900	14	10	6

No.	Diam., in.	Depth, in.	Fitter, in.
8917	10	17	6
8920	12	20	6 or 8

MARTELE DUO-PENDANTS AND DUO-PLATE UNITS

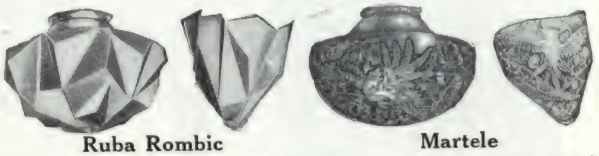
Many other modernizing specials shown in our complete catalogue.

2991-92—17x4½x6 in.—hexagon
2994-95—11½x5½x2¼ in.—square
2997-98—(12x8) x 5½x4—rectangle

3034-35—French Crystal, Honey, Jade, Rose
8½x8x2¼ in.

3037—Wall Pocket to Match Duo-Plate Units
4 in. wide, 8½ in. high—metal back plate

FUTURISTIC AND MODERNISTIC LINES



Ruba Rombic

2842–10x 7½x4 in. 2853–8 x 9 in.
2850–14x10 x6 in. 2846–8½x11 in.

Martele

2844–10x 7½x4 in. 2851–8x 9 in.
2845–14x10 x6 in. 2854–9x12 in.

CORA CASED AND NUITE UNIT LINES

The 4800 Line

The 8000 Line

The 2355 Line

The 5100 Line

The 900 Line

SIZES AVAILABLE

Diam., in.	Fitter, in.	Catalogue numbers of various lines				
		4800	8000	900	5100	2355
8	4	.....	.....	908	5108	2722
9	4	4809	.....	.....	5109	.....
10	4	.....	8010	910	5110	2353
12	4 or 6	4812	8012	912	5112	2505
14	6	4814	8014	914	5114	2354
16	6	4816	8016	916	5116	2355
18	6 or 8	.....	.....	.....	5118	.....
20	8	.....	.....	920	.....	.....

Note: Units furnished both plain and decorated.

Glassware

Cora—A cased glass made with a thin lining of perfect diffusing white glass, less than 20% of entire thickness, reinforced with a thick layer of special crystal glass. Result, added strength with low light absorption and surface brightness, with glare eliminated.

Nuite—A single ply pure white quality glass that gives not alone a perfect diffused light, but also maximum illumination with low bowl brightness.

Martele—"The American La Lique" combining the skill of artist, sculptor, and glass artisans to bring out hand wrought motifs, pleasing shapes, and color effect to blend with any interior decoration.

Ruba Rombic—(A story in crystals.) Of futuristic design, to meet the demand of the ultra-modern.

LIGHTING FIXTURES

COPPER AND BRASS RESEARCH ASSOCIATION

25 Broadway, NEW YORK, N. Y.

MIDWESTERN OFFICE
Builders' Building
CHICAGO, ILL.

CANADIAN OFFICE
67 Yonge Street
TORONTO, ONT.

SOUTHERN OFFICE
Shoreham Building
WASHINGTON, D. C.

PACIFIC COAST OFFICE
Architects Building
LOS ANGELES, CAL.

Lighting Fixtures

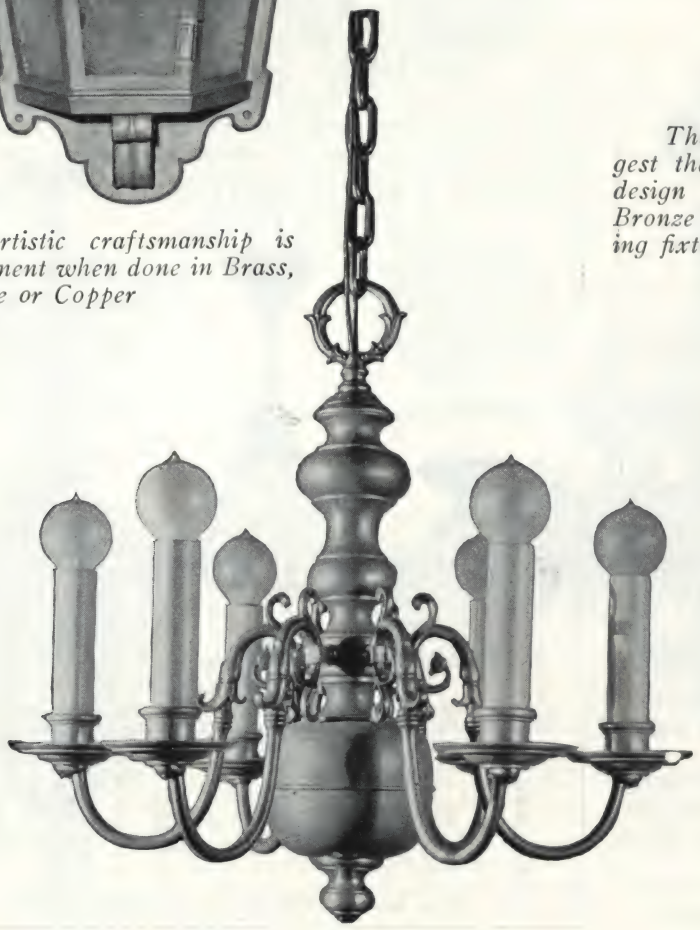
In addition to their necessity, lighting fixtures should make a pleasing contribution to the harmony of architectural composition. While beauty of design is essential in fixtures, an even greater importance attaches to the materials of which they are made. Well-designed fixtures, to be completely effective, should retain the charm of their original texture indefinitely. This cannot be assured unless they are fabricated of metals which withstand the effects of corrosion.

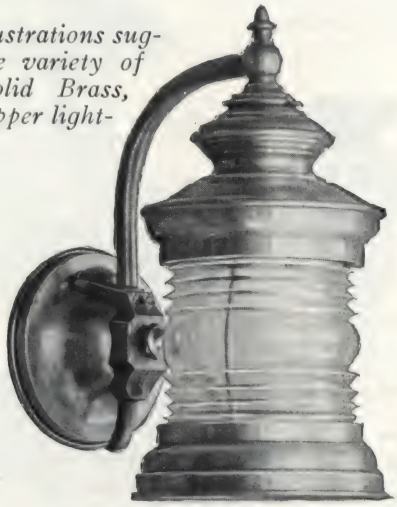
Lighting fixtures of solid Brass or Bronze are obtainable in an infinite variety of design and finish to meet all the requirements of interior treatment. Appropriate fixtures of Copper are also available for exterior use and these guarantee immunity from the marring effect of weather on parts that are exposed.

The scientific knowledge and practical experience of our Research and Building Service Departments are at your disposal. We will be glad to consult with you on all problems pertaining to the uses and applications of Copper, Brass and Bronze.

Artistic craftsmanship is permanent when done in Brass, Bronze or Copper

These illustrations suggest the wide variety of design in solid Brass, Bronze or Copper lighting fixtures





The Appeal of Brass and Bronze

Solid Brass or Bronze lighting fixtures never lose their original appeal. They do not crack, pit, streak or peel. The wearing qualities inherent in Brass, Bronze and Copper and the adaptability of these metals to high craftsmanship in design, make them ideally suited for fixtures permanently retentive of decorative motif. Brass or Bronze lighting fixtures insure lasting satisfaction in beauty and in service.

DUPLEXALITE DIVISION

OF THE MILLER COMPANY
MERIDEN, CONN.
BRANCH OFFICES
PHILADELPHIA, PA., 16th and Chestnut Streets
NEW YORK, N. Y., 24 W. 40th Street
SAN FRANCISCO, CALIF., 50 Hawthorne Street
LONDON, W. C. 2, ENGLAND, 30-35 Drury Lane

Products

DUPLEXALITE ILLUMINATING FIXTURES for offices, hospitals, banks, hotels and public buildings.

Also Duplexalite Illuminating Fixtures for residential requirements.

The Duplexalite Principle

The Duplexalite was designed to conform to the theory of best lighting practice based on the law of optics, and for the particular use of the most efficient of modern lamps in all sizes from 100 to 1500 watts. The construction is such that an even distribution of light is provided with just sufficient shadow to insure a clear and distinct vision over a continuous period of time.

The Duplexalite fixture has a very low surface brightness which makes it inconspicuous in a room. Yet, being self-illuminated, it satisfies the psychological demand for an apparent source of light. Light is distributed in so perfect a balance that its actual accomplishment is not immediately obvious—and appreciation grows with use.

Construction

The construction is extremely simple and the mechanical details are handled with minute care and precision. Because our extensive manufacturing facilities include foundries and brass rolling mill, the formula, gauge and weight of metal are controlled to meet exacting requirements.

The standard Duplexalite fixture fastens to a ceiling with a specially designed Z-hickey, ⅜-in. running thread, nipple and brass hook with screw ring supporting canopy. This construction simplifies installation and assures perfect alignment of fixtures.

The length of chain pendant may be adjusted to support the fixture in the proper relation to ceiling.

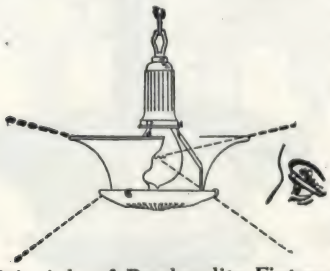
Installation of Duplexalite Fixtures in Union Trust Company, Cleveland, Ohio (Euclid Avenue Branch)

Properly focused around the lamp is a steel deflector, finished inside in white and outside in cream vitreous enamel, which forms a circular eyeshield totally insulating the eye from the direct rays of the lamp which are diffused in useful directions.

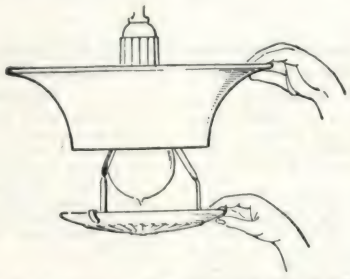
The dense glass disc at the bottom of deflector, acting as a filter for downward light, also diffuses light over the exterior of the deflector, thus avoiding contrast in brightness. Both the deflector and disc are supported from three flat metal hooks. The disc is easily removed for relamping and cleaning.

Duplexalite fixtures are most economical from standpoint of upkeep and maintenance with lowest cleaning costs and minimum number of breakable parts.

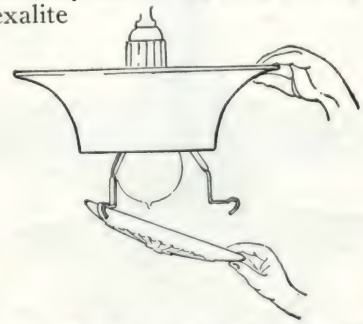
Duplexalite fixtures of special design, only a few of which are shown, embody all the lighting principles of the standard Duplexalite fixture.



Principle of Duplexalite Fixture Construction



Lift Deflector as Shown and Hold Glass

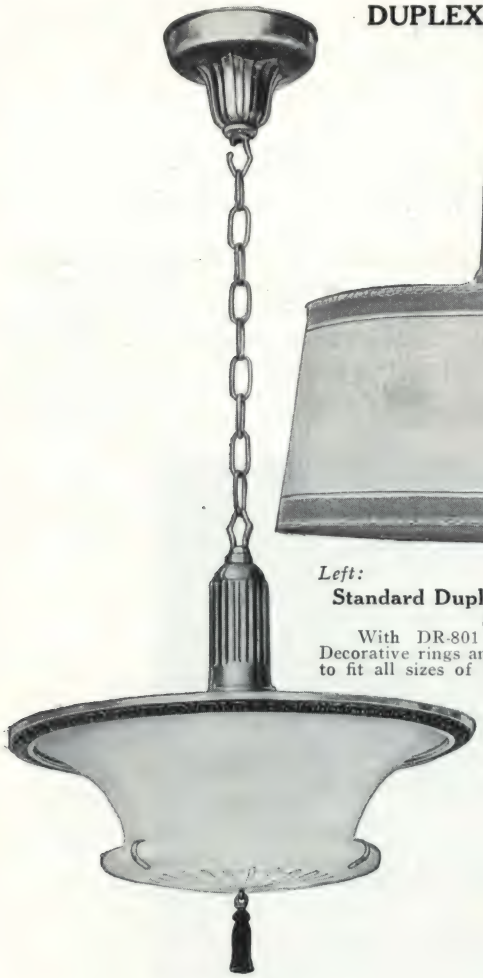


Spring Off One Hook and Slip Disc Out of Other Two

Continued on next page

DUPLEXALITE FIXTURES FOR COMMERCIAL AND HOSPITAL LIGHTING

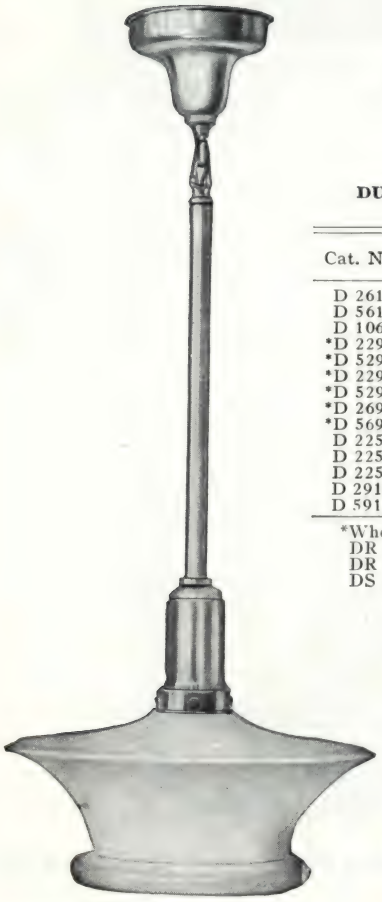
Left:
Parchment Shade DS5059 Shown on Standard Duplexalite Fixture
Stripes may be had in dark blue, dark green or maroon

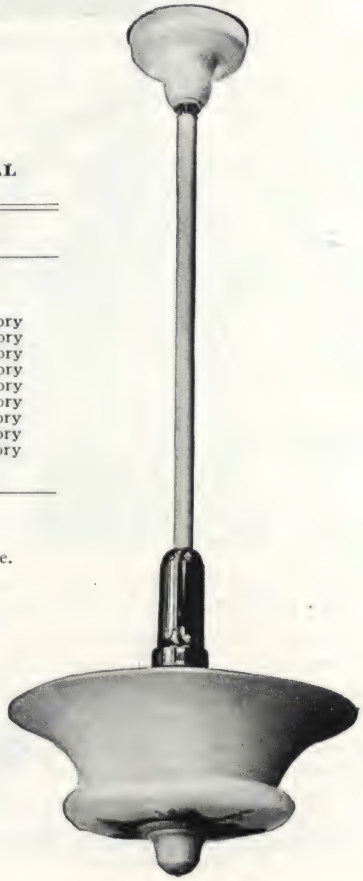


Left:
Standard Duplexalite Fixture D61 Series
With DR-801 ring and metal tassel. Decorative rings and metal tassels are made to fit all sizes of Duplexalite fixtures

Right:
Duplexalite Fixture D91 Series
With DR803 ring

Standard Duplexalite Fixture D61 Series
For average commercial lighting





DUPLEXALITE FIXTURES FOR COMMERCIAL AND HOSPITAL LIGHTING

Cat. No.	Lamp wattage	Diameter, in.	Over-all length, in.	Standard finishes
D 261	200	14	36	Antique brass or bronze
D 561	300– 500	16	48	Antique brass or bronze
D 1061	750–1500	22½	60	Antique brass or bronze
*D 229	200	14	36	Bronze, antique brass or Ivory
*D 529	300– 500	16	48	Bronze, antique brass or Ivory
*D 229½	200	14	36	Bronze, antique brass or Ivory
*D 529½	300– 500	16	48	Bronze, antique brass or Ivory
*D 269	200	14	36	Bronze, antique brass or Ivory
*D 569	300– 500	16	48	Bronze, antique brass or Ivory
D 225	200	14	36	Bronze, antique brass or Ivory
D 225½	200	14	36	Bronze, antique brass or Ivory
D 225¾	200	14	36	Bronze, antique brass or Ivory
D 291	200	15	36	Dull nickel or bronze
D 591	300– 500	17	36	Dull nickel or bronze

*When ordered in enamel finishes the socket cover will be in nickel.
DR 801 rings are finished in antique brass or bronze.
DR 803 rings are finished in dull nickel or bronze.
DS 5059 Parchment shade fits either D261 or D561 Duplexalite fixture.

Left:
D29½ Series Duplexalite Fixture for Hospital Lighting

Made with rigid stem with loops as shown. Furnished complete with enclosing glass over top and bottom.

When furnished with a rigid stem the enclosed type Duplexalite fixture is known as the D29 series or with a chain stem, as on the D61 series, this type is known as the D69 series

Right:
D225¾ Duplexalite Fixture for Hospital Lighting

Made with ball joint stem, Lunastone glass diffusing disc. Includes 10-watt night light on a separate circuit.

When furnished with a rigid stem this fixture is known as No. D225 or with a stem with two loops as No. D225½

Continued on next page

DUPLEXALITE FIXTURES FOR LARGE COMMERCIAL INSTALLATIONS

New ornamental units used effectively in banks, hotels, clubs and auditoriums.

Description of Diffusing Discs

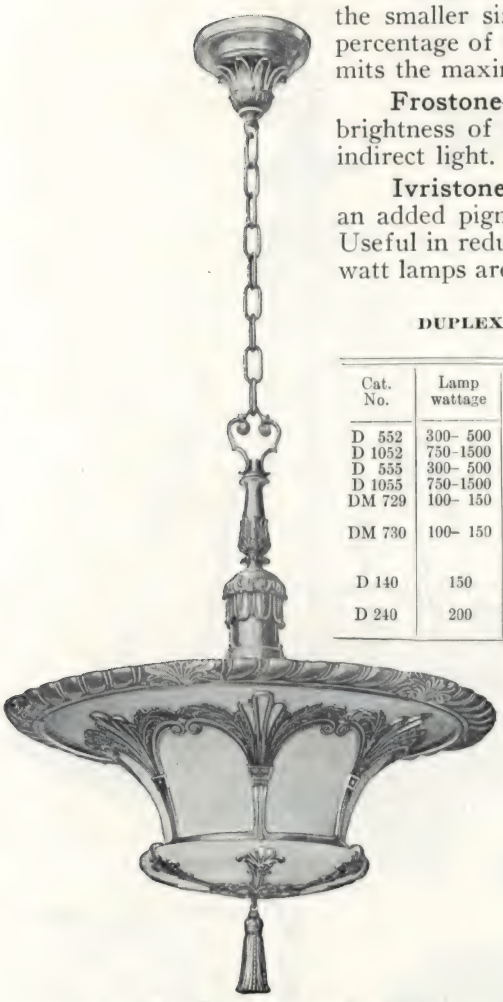
Lunastone—Recommended for commercial use on the smaller sizes of Duplexalite fixtures when a high percentage of direct lighting is desired. This glass permits the maximum light output.

Frostone—A dense white glass that reduces the brightness of the disc and increases the percentage of indirect light.

Ivristone—This is similar to Frostone but with an added pigment to produce a soft ivory appearance. Useful in reducing brightness of disc when 750 to 1500-watt lamps are used or when warmth of light is desired.

DUPLEXALITE UNITS FOR LARGE COMMERCIAL INSTALLATIONS

Cat. No.	Lamp wattage	Diameter, in.	Over-all length, in.	Standard finishes
D 552	300- 500	19	48	Antique brass, bronze or silver and black
D 1052	750-1500	26	60	Antique brass, bronze or silver and black
D 555	300- 500	22	48	Antique brass or bronze
D 1055	750-1500	26	60	Antique brass or bronze
DM 729	100- 150	Projection, 9 in. Backplate, 6 x 18½ in.		Antique brass or bronze
DM 730	100- 150	Spread, 11¾ in. Backplate, 6 x 18½ in.		Antique brass or bronze
D 140	150	14	11½	Aluminum and rose Aluminum and green Peach and green
D 240	200	14	12¾	Ivory and gold Pewter and black



D552 and D1052 Duplexalite Units

The regular ivory tinted deflector is overlaid with metal. The Ivristone disc is also overlaid with metal

D555-D1055 Duplexalite Unit

A handsome ornamental fixture with amber tinted glass, enclosed in a rich cast-metal grille covering sides and bottom. The regular Duplexalite fixture deflector is used inside

Construction of Nos. DM729 and DM730 Brackets

Opal glass reflector is used around the lamp to support the parchment shade. It diffuses the light evenly through the parchment and upward for indirect illumination. 150-watt lamps are recommended

DM730 Duplexalite Sidewall Lights

With shade No. DS5174½
Plain shade for this bracket, No. DS5174
Also made in one light, No. DM729

Duplexalite Unit for Low Ceilings

Small size D140
Large size D240

Continued on next page

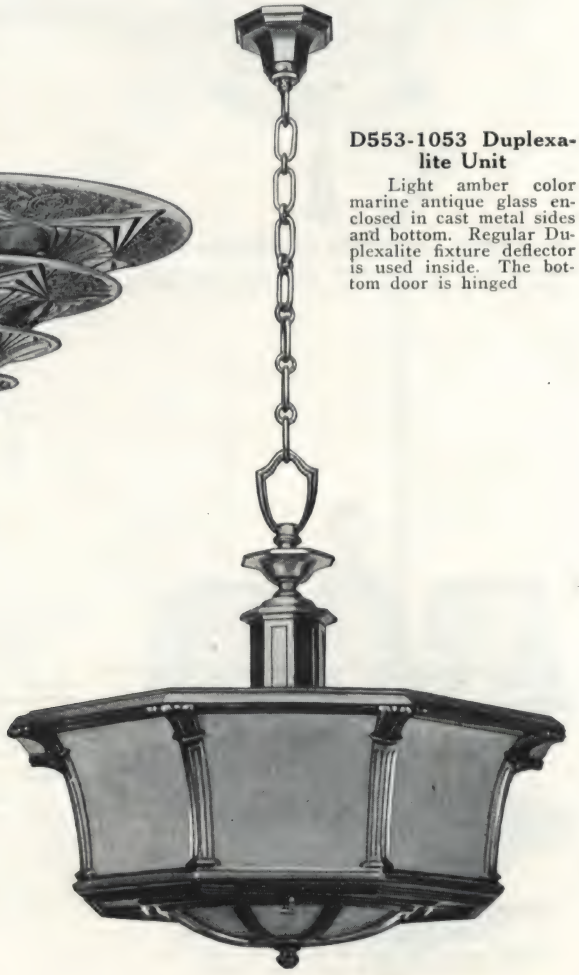
DUPLEXALITE FIXTURES FOR LARGE COMMERCIAL INSTALLATIONS

D554 Duplexalite Unit

Ornamental fixture with amberlite glass, enclosed in cast metal grill covering sides and bottom. The regular Duplexalite fixture deflector is used inside. The bottom door is hinged

Decorated Duplexalite Fixture, D45 Series

Small size, D245
Medium size, D545
Large size, D1045
Made of cast aluminum



D553-1053 Duplexalite Unit

Light amber color marine antique glass enclosed in cast metal sides and bottom. Regular Duplexalite fixture deflector is used inside. The bottom door is hinged

DUPLEXALITE UNITS

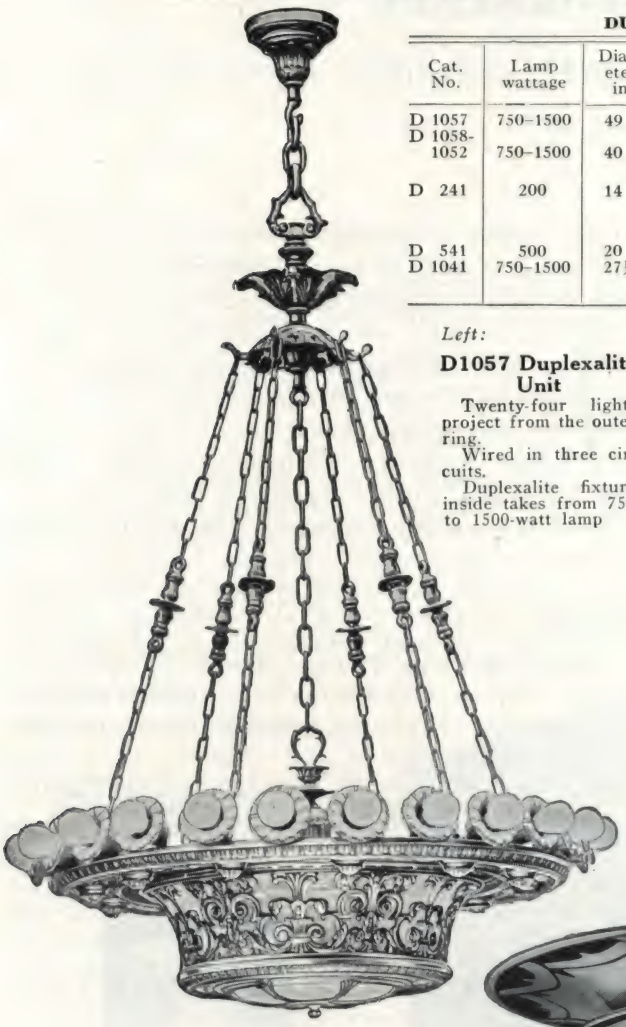
Cat. No.	Lamp wattage	Diameter, in.	Over-all length, in.	Standard finishes
D 245	200	14	36	Aluminum and sepia
D 545	300–500	20	48	Aluminum and sepia
D 1045	750–1500	28½	60	Aluminum and sepia
D 553	300–500	22	48	Antique brass or bronze
D 1053	750–1500	28	60	Antique brass or bronze
D 554	300–500	18½	48	Dull nickel and black or, bronze and pewter

Continued on next page

DUPLEXALITE FIXTURES FOR LARGE COMMERCIAL INSTALLATIONS

DUPLEXALITE UNITS

Cat. No.	Lamp wattage	Diameter, in.	Over-all length, in.	Standard finishes
D 1057	750–1500	49	96	Antique brass or bronze
D 1058-1052	750–1500	40	96	Antique brass or bronze
D 241	200	14	36	Dull aluminum Aluminum and rose Aluminum and green Peach and green
D 541	500	20	48	Bronze without decoration Pewter and black
D 1041	750–1500	27½	60	Aluminum and rose Aluminum and green Dull aluminum



Left:

D1057 Duplexalite Unit

Twenty-four lights project from the outer ring.

Wired in three circuits.

Duplexalite fixture inside takes from 750 to 1500-watt lamp

Right:

Modern Duplexalite Fixture D41 Series

Small size, D241
Medium size, D541
Large size, D1041

D1058-1052 Duplexalite Unit

Installation Data

The following table indicates the watts per square foot to obtain various levels of illumination with the Duplexalite fixture (using average lamp efficiency of the 300-watt size).

Foot candles	Small rooms (16x16 ft.) 9 to 10-ft. ceilings	Medium rooms (35x100 ft.) 10 to 12-ft. ceilings	Large rooms (100x100 ft.) Ceiling height 10 ft. or more
4	1.0	0.8	0.7
5	1.3	1.0	0.9
6	1.5	1.2	1.1
8	2.1	1.6	1.5
10	2.6	2.0	1.9
12	3.1	2.4	2.2
16	4.1	3.3	3.0
20	5.1	4.1	3.7
24	6.2	4.9	4.4
28	7.2	5.7	5.2
32	8.2	6.5	5.9
36	9.3	7.3	6.7
40	10.3	8.1	7.4

Light ceiling (70%),
Fairly light walls (50%).
Sufficient allowance has been made to cover depreciation under average conditions. (Probable average 70%.)

The following table indicates the spacing and mounting heights for Duplexalite fixtures:

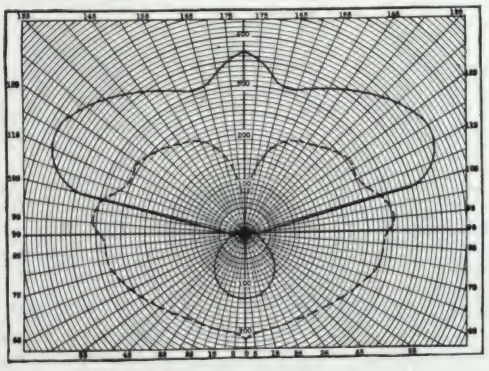
Ceiling height, ft.	Recommended distance between outlets, ft.	Recommended distance between outlets and sidewalls, ft.	Recommended hanging ht., ceiling to top of deflector, in.
9	9	4	18
10	10	5	20
11	10	5	25
12	14	6	30
13	15	8	30
15	18½	8	32
18	23	11½	42
20	26	13	48

Note: By consulting the following table, you will note the economy of using the Duplexalite fixture with a large single lamp rather than a fixture with a group of smaller size lamps.

LUMEN OUTPUT AND ACTUAL COST OF LIGHT

(Ratings and Prices as of 1930)
110-115-120-volt Standard Mazda Lamps

Size of lamp, Watts	Lumen output	List price cost of lamp (1000 hrs. life)	Current cost per hr. at 5c rate	Total cost 1 lumen of light for 1000 hrs.
25	235	$.20	$.0013	$.0063
40	396	.20	.002	.0056
60	666	.20	.003	.0049
100	1320	.35	.005	.0041
150	2300	.60	.0075	.0035
200	3200	.80	.010	.0034
300	5200	1.25	.015	.0031
500	9400	2.00	.025	.0029
750	15000	3.75	.038	.0028
1000	21000	4.00	.05	.0026



Engineering Data

BRIGHTNESS

Location	90°	65°	45°	0°
Millilamberts	100	780	930	1200
Cp. per sq. in.	.21	1.6	1.9	2.5

LIGHT DISTRIBUTION

Zone	0–45	45–90	0–90	90–180	0–180
Percentage of clear lamp lumens	6.6	6.1	12.7	62.7	75.4

EFCOLITE CORPORATION

Lighting Equipment and Specialties

TRENTON, N. J.

Product

DUROCK EFCOLITE LIGHTING UNITS in clear white, and colored vitreous china, suitable for installation in bathrooms, bedrooms, kitchens, hotels, hospitals, theatres, etc. Made in ceiling and sidewall types.

Material

Durock, the material from which all Efcolite fixtures are made, is the finest grade of vitreous china. It is the same material as that used in fine table ware. Being fired under extreme heat the glossy surface and flint underbody are permenently fused together and cannot be separated. Durock will never chip, craze or crack. The surface is impenetrable. It will never tarnish or discolor.

Description

Efcolite are styled in quality and colors for specification in the finest interiors. They are supplied with Standard Association Sockets and may be had with convenience outlets whenever specified. Each fixture is wired complete ready to hang. Thorough testing before shipping insures their giving complete satisfaction.

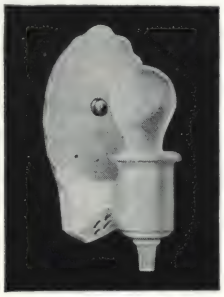
Durock Efcolites are made of the same material used in the fine plumbing fixtures of the Standard Sanitary Mfg. Co. Furnished in the same attractive colors as follows: ming green, orchid of Vincennes, rose Du Barry, ivoire De Medici, claire de lune blue, Ionian black, T'ang red, Royal Copenhagen blue.

Send for complete Catalog "B," illustrating fixtures in colors.

Distribution

Sold through all leading jobbers and dealers of electrical supplies, they are easily and readily obtained. Jobbers in most cities throughout the country stock the leading patterns.

Complete prompt delivery can be had on the special patterns direct from the factory at Trenton, N. J.



No. 240

Dim-A-Lite wall bracket. With or without convenience outlet. Four stages of light, convenient and current saving. Height 6 in. Width 4¾ in. Extension 4¼ in.

No. 115

Wall bracket for side or over mirror. Keyless or with "Association" pull chain socket and with or without convenience outlet. Base 4½ in.

No. 400

Furnished in colors or in gold or silver finish to match fine plumbing fixtures that have trimmings in gold or chromium plate

No. 125

For 150-watt lamp. Keyless or with "Association" pull chain socket and pull cord. No. 126, same unit with cord, push button, switch and plug attachment. Holder 4 in. Top base 6⅞ in. Glassware 4x9 in.

No. 750

"No-Dust" unit for hospitals, fitting flush to the ceiling. Takes 150-watt lamp. Base 10½ in. Depth 10 in.

FRANKLIN POTTERY, INC.

Manufacturers of Vitrified Pottery Lighting Fixtures and Switch Plates

LANSDALE PA.

Products

VITRIFIED POTTERY LIGHTING FIXTURES and SWITCH PLATES.

Faience and other Hand Made Plastic Tiles.

White and Colored Dry Pressed Wall Tiles.

Glazed and Unglazed Floor Tiles.

Bathroom Accessories and Electric Heaters.

Uses

Franklin Vitrified Pottery Lighting Fixtures are especially adapted to use wherever beauty and durability are considered paramount.

They make excellent fitments in bathrooms, kitchens, porches, halls, laundries, beauty parlors, garages, bedrooms. They are especially desirable in hospitals, hotels, apartment houses and places where fixtures are subjected to severe wear and places where ease of cleaning and sanitary qualities are of importance.

Properties

Vitrified pottery is made the same as the finest china. It combines beauty with utility. Being itself an insulating material adds to the safety of the product. All Franklin fixtures are approved by the National Board of Fire Underwriters.

They retain their newness for all time. Not easily soiled, but if dirt accumulates, it can be readily removed with a damp cloth. "As Easily Washed as a China Plate." Will not rust or corrode; are not injured by soap, lye or acid; never lose their beautiful glaze. All screws used are heavily nickelplated.

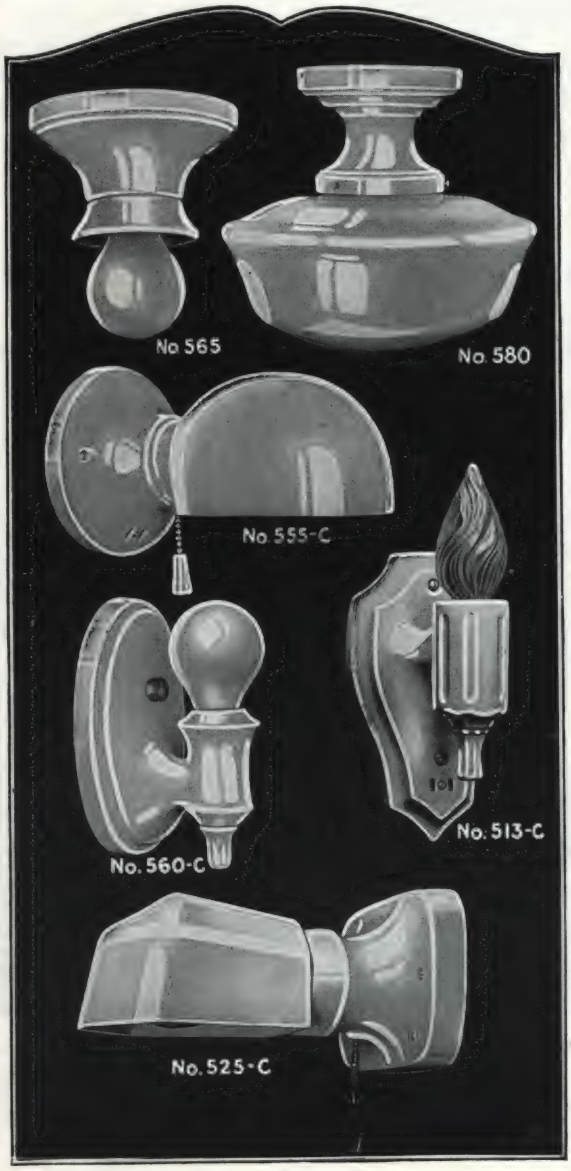
Fixtures come wired ready to hang. Wire used is No. 18 standard fixture wire, insulated $\frac{1}{32}$ in.

Designs and Colors

Fixtures are made in many designs, suitable for practically every purpose. A few are shown here, but complete catalogue shows many others.

Franklin fixtures are also furnished in a variety of colors to fit into almost any decorative scheme. They may be had in striped effects and many banded designs. Complete color chart sent on request.

Any of our sidewall brackets can be furnished either with or without convenience outlet. They may be had with levolier socket, with pull chain or without switching mechanism for use with wall switch. Ceiling units may be either keyless or with pull chain.



Special Emergency Circuit for Hospitals

We manufacture a ceiling unit fitted with special emergency light to switch on automatically from house supply if regular electric supply is interrupted. Write us for further information regarding this useful item.

We also furnish our No. 525, sidewall bracket with Dim-a-lite socket. This is extensively used in hospitals, as it furnishes a night light when dimmed, but is made a bright light by a touch of the chain.

Vitrified Pottery Switch Plates

We manufacture switch plates to match tile, fixtures and bathroom accessories.

But not alone in the bathroom are these switch plates desirable. They add a finishing touch of beauty to any room. As they come in many colors they fit any decorative scheme, while the lustre finishes are always suitable for any part of the building. They are easy to clean with a damp cloth and never lose their beautiful glaze or color.

Although made of vitrified pottery, these switch plates are not easily broken and will stand a lifetime of wear. They do not chip or craze, cannot be dented or discolored, hence are always new.

Get Complete Catalogue

Catalogue, showing all designs in lighting fixtures and switch plates, together with sheet showing various colors, should be in your files. A postal card request from any architect will bring it.

A Complete Service

Franklin Service eliminates the uncertainty that is inevitable if a harmonious color ensemble must be provided from samples and products furnished by various manufacturers.

All our materials are furnished with the same glazes and made under identical conditions as to production and selection, therefore offers true color harmony.

GILLINDER BROTHERS, INC.

Manufacturers of Glassware for Commercial Illumination

MAIN OFFICE AND FACTORY

PORT JERVIS, N. Y.

SALES OFFICES

NEW YORK, N. Y., 55 West 42nd Street

CHICAGO, ILL., 17 North Wabash Avenue

Products

COMMERCIAL, MODERNISTIC and DECORATED UNITS OF CASED and SINGLE LAYER GLASS.

TRADE-MARK

Service

Our Engineers will be glad to co-operate with architects in the solution of lighting problems.

"PEARLTONE" CASED GLASS

"Pearltone" is a three-layer glass of scientific construction.

The inner and outer layers are crystal and the middle, opal glass.

The crystal on the inside and outside serves to case the opal, adds to the strength of the finished unit and has reflection and refraction qualities which aid in distributing the light.

The opal layer is very thin, sufficient to diffuse and not greatly absorb the light.

Samuel E. Kennard School, 5031 Potomac Street, St. Louis, Mo., Equipped Throughout with "Pearltone" Unit No. 34

The "Pearltone" Unit No. 34, shown, is one of several especially suitable for installation in schools, other public buildings and offices, where a maximum glareless evenly diffused light is essential

GLEASON-TIEBOUT GLASS COMPANY

CELESTIALITE DIVISION

Manufacturers of Lighting Glassware

200 Fifth Avenue, NEW YORK, N. Y.

FACTORY: 99 Commercial Street, BROOKLYN, N. Y.

(Address all inquiries about our glass, other than Celestialite, to 99 Commercial Street, Brooklyn, N. Y.)

"Celestialite—Next to Daylight"

The question of proper illumination—the consideration of eye strain—is an important one.

Choosing the correct lighting glass for a large office building or, in fact, any structure, is one of the most important problems that confronts the specification writer.

CELESTIALITE

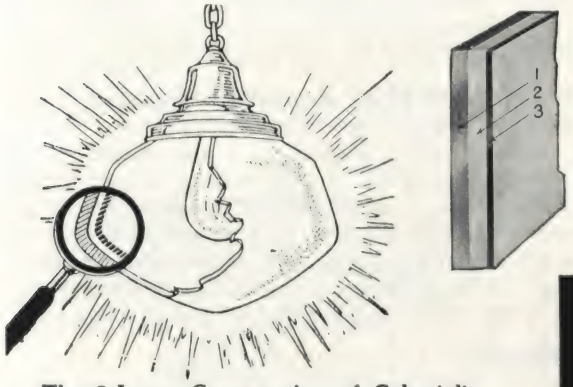
Registered U. S. Pat. Off.

Daylight is the ideal in illumination, therefore illumination can best be judged by its comparison to daylight.

Celestialite combined with the Mazda lamp furnishes illumination that is one of the most natural substitutes for actual daylight.

Construction—Celestialite is a patented glass *of three layers* made in strict accordance with the best scientific knowledge. The three layers of glass, one clear, one translucent and one blue, combine with the Mazda lamp to give an illumination as close to actual daylight as is practical for general lighting purposes. It is "next to daylight"—a light soft and restful to the eyes, but powerful to see by.

Features—The rays of light from the Mazda lamp in passing through the 3-layer Celestialite are modified and perfected in a way comparable to nature's method of producing daylight.



The 3-Layer Construction of Celestialite

First Layer—One of crystal clear transparency for body and strength.

Second Layer—One of a special white glass to diffuse the rays and filter out the glare.

Provides low intrinsic brilliancy and perfect eye comfort.

Third Layer—One of transparent blue glass to whiten, clarify and perfect the light.

This method of construction gives in practical, usable form all the most recent research developments in light combined with the highest skill of the glassmaker.

Celestialite Unit No. 5920

One of the most popular. There are sizes and shapes for every building

Strength and Finish—The special annealing process used, and the three-layer construction make Celestialite sturdy enough to withstand hard shocks, heat, cold and sudden changes of temperature. The surface is so smooth that dust does not adhere readily.

Decorated Celestialite—A wide variety of standard shapes and sizes is made in five colors and seven styles.

Celestialite Installation, Columbia University, New York

After careful comparative tests by a committee of scientific men, Celestialite was selected for the equipment of the new Physics Building

Catalogue and Sample

We will gladly send a catalogue on request. Write for a free fragment showing the unique construction of Celestialite glass.

Technical Information

Use 1½ to 2 watts per sq. ft. of floor area, never less than 1 watt per sq. ft.

The filaments of the lamps should be centered in the glass globes to avoid bright spots in the bottom.

Use globes of generous proportions to secure low intrinsic brilliancy. Too large a lamp in too small a globe produces glare. For given sizes of Mazda lamps, Celestialite globes should be at least as large as in the table herewith.

SIZE OF MAZDA LAMP RECOMMENDED WITH CELESTIALITE

Mazda lamp, watts	Size of globe, in.	Mazda lamp, watts	Size of globe, in.	Mazda lamp, watts	Size of globe, in.
40	6	200	14	500	22
60	8	300	16	750	23
100	10	500	18	1000	24
150	12	500	20	1500	26

GRAYBAR ELECTRIC COMPANY

INCORPORATED

Electrical Equipment for Home, Office and Industry

Graybar Building, Lexington Avenue and 43rd Street

NEW YORK, N. Y.

DISTRIBUTING HOUSES

AKRON	CINCINNATI	GRAND RAPIDS	MILWAUKEE	PHILADELPHIA	SAVANNAH
ALBANY	CLEVELAND	HAMMOND	MINNEAPOLIS	PITTSBURGH	SEATTLE
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	FORT WORTH	MIAMI	PEORIA	SAN FRANCISCO	

For our pages on Inter-communicating Telephone Systems, see Manufacturers' Index

Products

ELECTRICAL HOUSEKEEPING APPLIANCES; ENCLOSED AND SEMI-ENCLOSED LIGHTING UNITS; SUNBEAM MAZDA LAMPS; SOUND REPRODUCER SYSTEMS.

Also Public Address Systems; Fans, Motors, Generators, Wiring Materials, Wire, Cable; Safety Switches, Signal Call Systems.

Through 76 distributing points listed above, this company makes available everything electrical—everything to transmit, control and apply electricity in factories, hotels, apartments, stores, theaters, offices and homes.

Among those appliances particularly adapted to "The Home Electrical" are the Graybar Electric Stimulator, Health Lamp, Radio Sets, Clothes Washer, Vacuum Cleaner, Portable Sewing Machine, Electric Range, and the New Ironer.

Provision for Housekeeping Appliances

In homes, the popular demand for electrical housekeeping appliances suggests ample provision for installation space and convenience outlets.

The Graybar Electric clothes washer is 26 in. wide and 26 in. long. Ironer is 18 in. wide and 36 in. long. Alternating or direct-current motors are supplied according to local conditions.

The Graybar Electric sewing machines and vacuum cleaners, being portable, need be considered only when locating the convenience outlets. They are equipped with universal motors operating on either direct or alternating current.

Sunbeam Mazda Lamps

These famous lamps are standard for practically every use in home and industry, all over the country. They are available in all sizes and types wherever Graybar Electric supplies are sold.

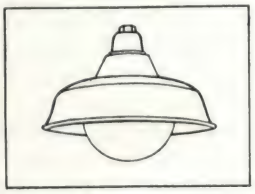
Commercial Lighting

Graybar Electric enclosed lighting units are of superior construction, suitable for public buildings, offices, stores, factories and homes. Three types of glassware may be obtained: the famous "99" Cora cased, the "66" Nuite opal, and the "Reflex" semi-indirect glass, all of which are admired for their appearance, efficiency and correctness of design. Graybar safety fixtures reduce removal or replacement of the globe to one quick operation and do away with the probability of cracking glass.

The newly introduced Graybar Shelcrest fixture is made of bakelite and contains many improvements in design in respect to holding globe and hanging holder; and offers a holder that cannot tarnish, corrode or short circuit.

Industrial and Flood Lighting

It has been proven that modern industrial lighting is very profitable to any plant or factory. Graybar carries a superior line of industrial reflectors and other lighting equipment suitable for giving industry in general economic advantages of better lighting.



The field for floodlighting has become exceedingly large. Airports, athletic events, pageants, parking areas, railroad classification yards, night construction of buildings, all call for floodlighting whether it be for utility or for display. The display of monuments and well designed buildings calls for artistic illumination. Industrial plants, signs, etc., need floodlighting for advertising value. Graybar carries a complete line of floodlights for every conceivable use.

Public Address and Music Reproducer Systems

Graybar offers the now famous Western Electric systems for electrically amplifying voice or music and "piping" them through a wiring system to any designated part or parts of a building or group of buildings. The source of the sound may be a phonograph record, an actual human voice, band, etc., on the premises, or a "picked-up" radio program. For complete description, see pages of the Western Electric Company in this issue.

Quality Supplies

The name Graybar Electric is a guarantee of quality covering the great variety of electrical supplies for building requirements. Everything for wiring installations, from wire and conduit to switch and fixture, is stocked in quantity and variety at all the Graybar Electric offices. Our national distribution makes Graybar Electric supplies obtainable everywhere.

A Few of the 60,000 Items Listed in the Graybar Electric Year Book

The above products cover only a very small portion of the 60,000 supplies mentioned in the Graybar Electric Catalogue 100, a book of 1012 pages, which has proven its value to engineers and architects.

Write for your copy, mentioning SWEET'S ARCHITECTURAL CATALOGUES, to our nearest office.

THE EDWIN F. GUTH COMPANY

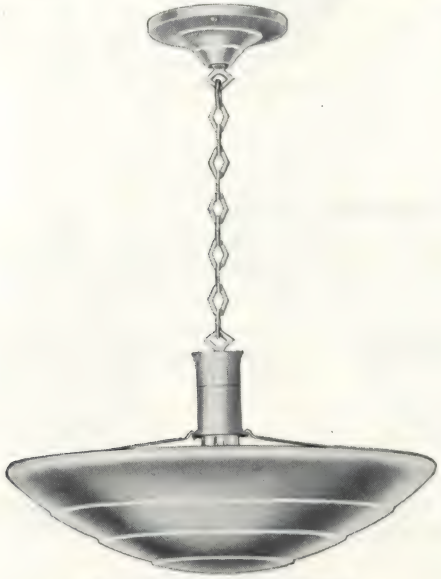
Designers and Manufacturers of Lighting Equipment

ST. LOUIS, MO.

Products and Services

LIGHTING EQUIPMENT of all kinds and for every purpose, including the New Brascolite, New Indirect, Aglites All-porcelain Enamel Reflector Flange, Industrolite and the New Guth-Fan Fixture. In addition to our large standard fixtures, a few of which are shown below, we welcome the opportunity of submitting to architects designs specially prepared for any type of building. There is no charge or obligation for this service.

Architectural Catalog No. 19, Commercial Catalog No. 25 and Guth-Fan Catalog No. 2 gladly sent upon request.



New Indirect No. R3606

New Indirect (Patent Applied for)

Guth Indirect-Lite is recommended wherever the eye is used in daily clerical work, or the hospital, for there is no eyestrain from the soft, glareless illumination.

Made in three sizes to take lamps from 150 to 1000 watts. Reflectors are made of one piece of armco iron, finished on inside with the exclusive Guth Lumo-Vitro white porcelain and finished on outside in Old Ivory.

Can be furnished with or without a china bowl inner reflector. The outstanding feature of this reflector is that it can instantly be lifted out and cleaned and set in place again, and that it retains its initial efficiency for a greater period of time, because there is a smaller dust settling area. The adjustable socket permits raising or lowering lamp to obtain proper focus. Write for descriptive literature.

New Brascolite No. W3466

New Brascolite (T.M. Reg., Pat No. 14680)

The new Brascolite embodies all of the principles of good lighting. Perfect diffusion plus reflection, and an abundance of light without glare. The high efficiency of the Brascolite is obtained by the arrangement of the bowl and reflector which directs all emitted light to the working plane. The Brascolite photometric tests show an average efficiency of over 90%.

The reflector is stamped from armco iron with three coats porcelain enamel fused on to the metal at 1700° F.

The bowl can be had either plain or with decorations as shown. Can be furnished in three sizes and in ceiling or chain hanger type.

Guth Reflector Flange (T.M. Reg., Pat. No. 1715769)

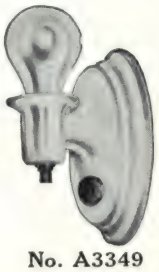
Guth One-piece Reflector Flange is stamped from armco iron, porcelain enameled. Patented spring key for engaging or releasing glass, and allows for expansion of glass.

Ideal for schools, public buildings, hospitals, etc. Furnished with Guth Fixture Supporting Sockets (U. S. Pat. No. 1745691). Made in all sizes and fits any standard glass. Standard colors White, Ivory, Green and Black. Can be furnished in any color at additional charge, depending upon quantity ordered.

Guth Flange No. K1164

No. A1064

No. A1075



No. A3349

Aglites (T.M. Reg., Pat. No. 1251406)

Aglites are stamped from polished cold rolled steel and three coats of permanent porcelain enamel are then fused on at 1700° F. in our electric enameling furnaces. Aglites will always look new and last forever. The porcelain enameled finish is everlasting and guaranteed not to discolor, tarnish, check, rust or peel.

Aglites are easily and quickly mounted on any standard outlet, connected direct to house wiring without the use of solder or tape. Aglites heavy porcelain finish is of vitreous glass material, non-porous and its electrical insulation resists penetration up to 1200 volts.

Aglites are furnished in Shaded Orchid, Shaded Apple Green, Solid Ivory, Gray or White.

Guth Glass Steel Unit No. R3726

Guth Glass Steel Unit (Patent Applied for)

Guth Glass Steel Unit is stamped of armco iron, finished inside with White Lumo-Vitro Enamel and outside in Brown Lumo-Vitro.

The guard provides protection to the rugged glass bowl and is adaptable for gymnasiums, minature golf courses, tennis courts as well as factories, warehouses, railway sheds, etc. The guard is so attached to enameled reflector that when it is unhooked from one side it carries the pressed glass bowl down with it so that replacing lamps or cleaning is very simple.

The luminous bowl being below the lower edge of the reflector, there is a very wide angle of light distribution and light is properly diffused. The holes at the top also permit some ceiling lighting so that fixture is not in entire darkness.

Made in 13-in. diameter for 200-watt lamps; also in 16-in. diameter for 300 and 500-watt lamps.

All above except Aglites are equipped with Guth Fixture Supporting Socket

HOLOPHANE COMPANY, INC.

Illuminating Engineers and Manufacturers of Scientific Lighting Equipment

342 Madison Avenue
NEW YORK, N. Y.

WORKS: NEWARK, OHIO

SAN FRANCISCO, CAL. · CHICAGO, ILL. · MILWAUKEE, WIS. · TORONTO, ONT. · PHILADELPHIA, PA. · BALTIMORE, MD. · CLEVELAND, OHIO · ST. LOUIS, MO. · SYRACUSE, N. Y. · HARTFORD, CONN. · CINCINNATI, OHIO · BIRMINGHAM, ALA. · LOS ANGELES, CAL. · BOSTON, MASS.

TORONTO, CANADA, HOLOPHANE CO., LTD., 385 Yonge Street

The Holophane Company

The HOLOPHANE COMPANY was the pioneer company in the field of scientific illumination and has been a leader in this field for more than a quarter of a century. Our immense business with architects has been built through our knowledge of the fundamentals of correct lighting.

Holophane Engineering Service

The maximum service from a lighting installation requires careful engineering design and planning. To this end the HOLOPHANE COMPANY maintains a competent engineering department which will draw up complete illumination specifications without charge.

Planned Lighting

The public is urged to take advantage of Holophane engineering service to ensure the selection and correct use of proper lighting equipment and to gain the full benefits of Holophane Planned Lighting.

Advantages of Holophane

All Holophane products are prismatic. The prism offers the most accurate and scientific means for controlling light. In the prism the change in light direction is a function of its shape and independent of its surface. There is nothing to deteriorate. A prismatic light director can always be restored to 100% performance by cleaning.

Holophane Specifics

The HOLOPHANE COMPANY believes it is better to design lighting units to exactly fit given needs than to offer to the public "general service," all-purpose units that may go on all jobs yet fit none. Therefore each Holophane unit is a "specific" that fits the needs it is designed to meet, better than general purpose units. Holophane specifics cover every known requirement of lighting.

TABLE OF TYPES OF HOLOPHANE FOR VARIOUS LOCATIONS

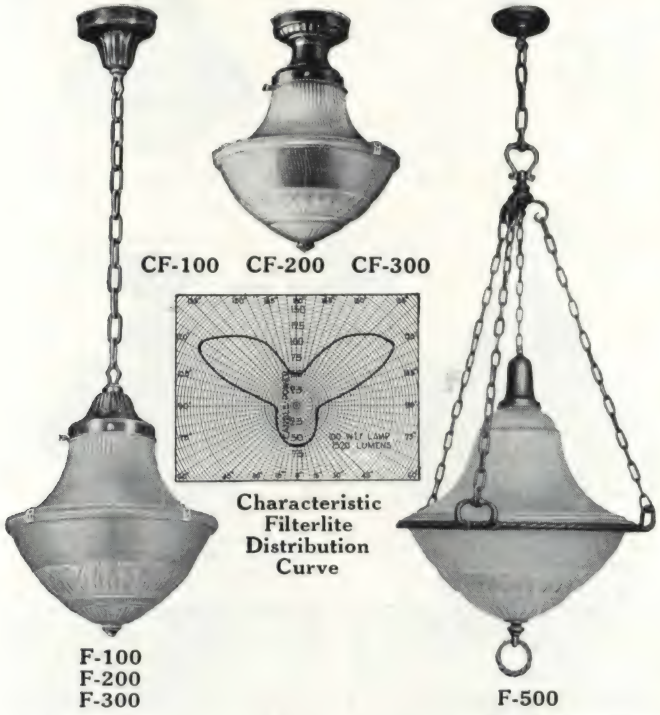
Location	Holophane Specific	Holophane Bulletin
Armories	No. 691 Line	No. 1
Art galleries	Lenses	Data Sheet
Auditoriums	No. 691 Line and 752 Lens	No. 375H
Aviation fields	No. 2203 Line	No. 6
Banks	Send plans for layout	No. 375H
Barber shops	Filterlites	No. 375H
Chemical plants	No. 02328 Line	No. 448B
Churches	Send plans for layout	Sketches
Clubrooms	Send plans for layout	Sketches
Corridors	No. C-2172 and 1011-8420 Lines	No. 375H
Courtrooms	Ornamental Holophane	No. 900
Dance halls	Send plans for layout	Sketches
Dental offices	No. 3354	No. 1200
Drafting rooms	Filterlite with opaque liner	No. 375H
Dyehouses	No. 02328 Line	No. 448B
Factories	Industrial Line	No. 448B
Foundries	No. 691 Line	No. 1
Garages	No. 02328 and 6541 Line	No. 375H
Gasoline stations	No. 830 Line	No. 600
Gymnasiums	No. 691 Line with wire guards	No. 10
Handball courts	Lenses	Data Sheets
Hospitals:		
Corridors	No. C-7327 (write for data)	
Operating rooms	M. C. L. S. Nos. 15, 18 and 21, etc.	No. 1200
Wards	Twilites	No. 1200
Hotels	Send plans for layout	Sketches
Libraries	R-r and Filterlites	No. 375H
Library stacks	No. 02176	No. 375H
Markets	R-r, 6541 Line and Lenses	No. 375H
Museums	Lenses	No. 375H
Offices	R-r and Filterlite Lines	No. 500
Outdoor tennis courts	No. 691 A. L. W. Line	No. 375H
Outside working and storage areas	No. 830 Line	No. 4 / No. 475
Prize fight rings	No. 691 A. L. W.	No. 10
Psychiatric wards	No. A-755	Data Sheet
Powerhouses	Industrial Line	No. 448B
Restaurants	Send plans for layout	Sketches
Schools	R-r and Filterlites	No. 344A
Show windows	Window Reflectors	No. 480
Silk mills	Industrial Line	No. 5
Skating rinks	No. 691 AL Line	No. 10
Steel plants	Industrial Line	No. 448B
Stock bins	No. 02176 or No. C-2172	No. 1000
Stores	R-r Filterlites and Special Lenses	No. 444A / No. 375H
Studios	Send plans for layout	Special
Swimming pools	Send plans for layout	Special
Theaters	No. 02176	No. 1000
Vaults	No. 830 or 2328 Line	No. 375H
Warehouses	No. 830 or 2328 Line	No. 375H
Wharves		

Continued on next page

Holophane Filterlite (Indirect) Light Director

The Filterlite is one of the latest, most efficient, and most successfully dust-resisting enclosing units of the indirect lighting type. All the prismatic surfaces are on the inside and all outside surfaces are smooth. Fixtures are furnished with sockets and wire but are not wired.

The fixtures are of special design to harmonize with the pattern of the glass and are made of heavy gauge drawn brass. These fixtures are equipped with porcelain sockets. A ⅜-in. hickey is furnished on suspension type, permitting installation on outlet box with fixture stud. Canopy strap construction on ceiling type. The F-100 has a 4-in. fitter, thus permitting use of 100 or 150-watt Mazda lamps maximum. The F-200 and F-300 have 5½-in. fitter, thus permitting use of 200 or 300-watt Mazda lamps maximum. This prevents using oversized lamps to the detriment of the installation.



The Following Combined Qualities Make Filterlite Illumination Ideal for Sustained Work Without Fatigue—

(1) The utilization efficiency is unexcelled.
(2) The ceiling is uniformly lighted without markings.
(3) The spread of light on ceiling is widest of any unit.
(4) There is no light cut-off on the ceiling.
(5) Dust and dirt depreciation is lower than for any other unit made.
(6) The brightness is very low—no glare.
(7) The appearance of the Filterlite is attractive.
(8) There is no permanent depreciation.

Cat. No.	Dimensions, in.		Lamp size, watts
	Diam.	Depth	
Filterlite F-100	12	37⅜	*100–150
Filterlite CF-100	12	15⅜	*100–150
Filterlite F-200	14	48⅜	200
Filterlite CF-200	14	18¼	200
Filterlite F-300	14	48⅜	300
Filterlite CF-300	14	18¼	300
Filterlite F-500	21¾	75¼	500

*Use ⅞-in. socket extension with inside frosted lamp.

Holophane Window Reflectors

Holophane Prismatic Reflectors for show window lighting will accomplish the following:

(1) Make lighted windows attract more trade.
(2) Make a middle of the block or side street window as prominent as the ordinary lighted corner or Main Street store.
(3) Will help to overcome distracting sunlight reflections in costly show windows thus enhancing the value of the display space.
(4) Holophane Reflectors are permanent; they cannot check, peel nor tarnish.

No. 944
For use in open back windows and main thoroughfare windows, requiring high lighting intensity

No. 922
For 100 or 150-watt lamps. The most popular window reflector. The diffusing plate eliminates glare

Nos. 981 and 983
For 75 and 100-watt lamps. No. 983 for 100 or 150-watt lamps. For deep enclosed back windows where the added refinement of the antiglare plate is unnecessary

No. 938
For 150-watt lamps. For flush ceiling mounting in windows in which the depth does not exceed the height. Excellent for closed back windows

Cat. No.	Dimensions, in.			Lamp size, watts
	Diam.	Depth	Holder	
938	12	7⅜	2¼ O	150
981	8½	5	2¼ O	100
983	10⅜	6½	2¼ H	100*–150
922	9½	7½	2¼ H	100*–150
944	10	9¼	2¼ O	200

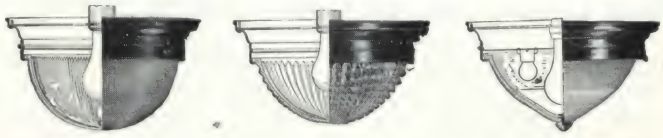
*Use ⅞-in. socket extension with inside frosted lamp or change to "O" holder.

Holophane Hemispheres for Corridors and Low Ceilings

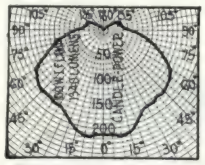
Nos. C-1011, 1211 and 1411 are diffusing blondel hemispheres of pleasing appearance.

Nos. C-8420, 8422 and 8424 are ornamental, square-cut prism hemispheres.

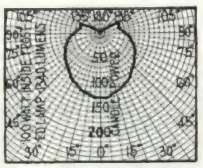
Nos. C-7327 and 7347 are indirect luminous bowls of extremely low brightness giving wide and softly diffused illumination for hospital corridors with an auxiliary source for night lighting.



No. C-1011-1211-1411 No. C-8420-8422-8424 No. C-7327-7347



Use where ornamental effect is more important than scientific distribution and efficiency



Characteristic Distribution Curves

Cat. No.	Dimensions, in.		Lamp size, watts
	Diam.	Depth	
C-1011	13	7¼	**100** I.F.
C-1211	15½	8⅝	**150**
C-1411	18	10⅛	200
C-8420	13	6½	60
C-8422	15½	7⅝	100 I.F.
C-8424	18	9	150
C-7327	15½	8½	100 I.F.
C-7347	18	10½	100*–150

Note: Above fixtures all have supplementary intermediate base socket for 10-watt night light service on separate circuit.
*Use ⅞-in. socket extension with inside frosted lamp.

Continued on next page

Specific Types of Holophane Lighting Equipment for Specific Purposes

Holophane Reflector-Refractor Enclosing Light Directors, Complete Luminaires—(R-r's).

Description

Holophane direct lighting units are totally enclosing units of the Reflector-Refractor type (R-r). The top part has accurately formed reflecting prisms which reflect the light downward onto the lower part which has refracting prisms that direct the light into the required directions. The inside surface of the unit is velvet finished and emits the light in a well diffused manner with high efficiency.

The fixtures are made of heavy gauge brass. They are equipped with canopy strap for mounting and include porcelain socket with quick wiring arrangement. They are embossed with an attractive fluted design to harmonize with the prismatic glass design. The standard finish of the fixture is statuary bronze. Hospital gray, white, or other finishes can be supplied on request at a small extra cost, depending on the finish.

Use

These enclosing light directors are designed for use in stores, public buildings, offices, schools and all interior locations where a high level of uniform illumination is desired.

Spacing

Not to exceed twice the mounting height.

Extensive distribution, up to twice mounting height.

Intensive distribution, up to 1¼ times mounting height.

UTILIZATION FACTOR

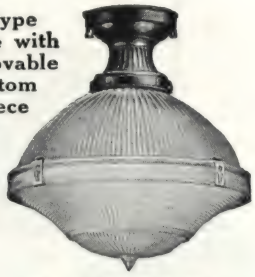
Room index	Ceiling reflection factor			
	50		70	
	Walls		Walls	
	30	50	30	50
1	.36	.39	.37	.41
1.5	.42	.45	.43	.48
2	.46	.50	.49	.53
3	.52	.55	.56	.60
5	.58	.62	.61	.65

S-Type One-piece Globe

Nos. S-2170, S-2180

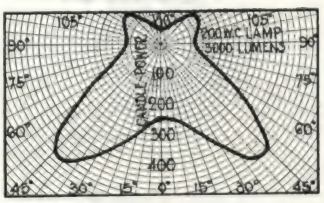
C-Type One-piece Globe

Nos. C-2170, C-2180

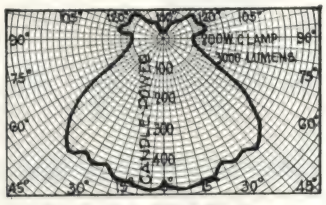


C-Type Globe with Removable Bottom Piece

Nos. C-2110, C-2120, C-2130, C-2140



Extensive Distribution



Intensive Distribution

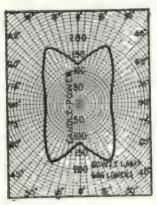
Cat. No.	Dimensions, in.		Lamp size, watts	Depth of "S" types, in.
	Depth	Diam.		
C-2110	10½	7½	75–100	29½
C-2120	12	9¾	100†–150	31⅛
C-2130	13¾	12	200	32¾
C-2140	15¼	14	300–500	34
C-2170	12	9⅞	100†–150	31
C-2180	15	12	200	33¼

†Use ⅞-in. socket extension with inside frosted lamp.

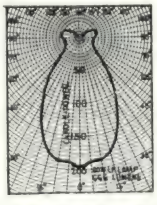
Stack Lighting Unit (for Library Book Stacks, etc.)

This unit is similar to the above with the difference that it has a two-way vertical distribution so that objects forming the vertical sides of the aisles (books, charts, vaults, lockers, bins) are brightly illuminated while the aisle itself, and therefore the observer, is in a shadow zone.

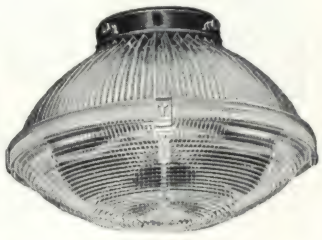
Spacing—7 ft. high, by 6 ft. apart in center of aisle.



Distribution in Plan



Distribution in Vertical Plane



02176

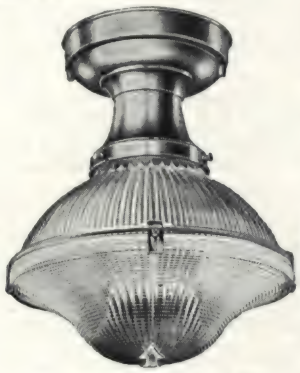
Cat. No.	Dimensions, in.		Lamp size, watts
	Depth	Diam.	
02176	6¾	9⅞	50–60 I. F.

Corridor Lighting Unit

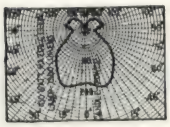
Similar to the stack lighting unit with the difference that it has a two-way distribution for lighting areas longer than they are wide. An arrow is moulded on the bottom of the unit to show main direction of light.

Use in all locations such as corridors, aisles, passages and similar places having extreme length in relation to the width.

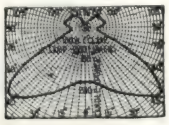
Spacing—Two and one-half times mounting height.



C-2172



Distribution Across Passage



Distribution Along Passage

Cat. No.	Dimensions, in.		Lamp size, watts
	Depth	Diam.	
C-2172	12	9⅞	75*–100*–150

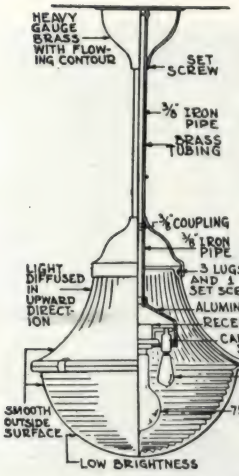
*Use ⅞-in. socket extension with inside frosted lamp.

Continued on next page

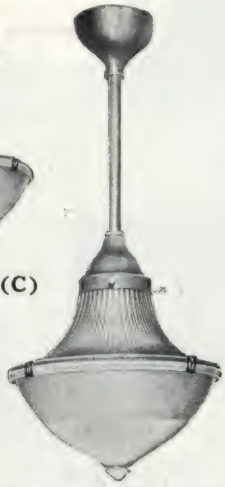
Holophane Hospital Lighting Specifics

Holophane Twilite (Indirect) for Wards, etc.—
Similar construction and lighting principles as the Filterlite but with modified bottom member to reduce brightness to lowest degree possible, and with auxiliary lamp (2 auxiliaries in 14-in. diameter unit) for night illumination. Fixture finish, hospital gray.

(1) Glareless.
(2) Dirttight.
(3) No tiring ornamentation.
(4) Smooth outside.
(5) Efficient.
(6) Economical.
(7) Two lighting levels:
  (a) For reading
  (b) Night light for nurses, etc.



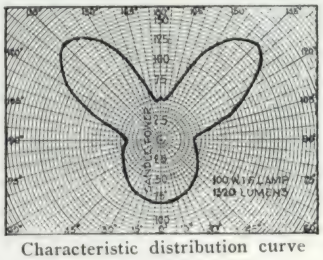
Ceiling Type (C)



Suspension Type (S)

Cat. No.	Dimensions, in.		Lamp size, watts
	Diam.	Depth	
C-7326	12	16⅞	75 –100
C-7346	14	17	100*–150
S-7346	14	31¾	100*–150

*Use ⅞-in. socket extension with inside frosted lamps.



Characteristic distribution curve

Holophane M. C. L. Systems for Surgeries—
All metal dirttight box, finished white inside, hospital gray duco outside, shipped in sections for easy assembly, supplied complete with wiring, sockets and reflectors.

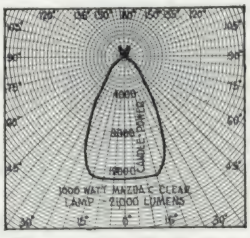
Takes 15, 18 or 21, 150-watt lamps. Intensity in spot—1300-1400 foot candles.

Illustration of Holophane No. 18 M. C. L. S. for Major Surgeries

No.	Dimensions of M. C. L. systems		
	Length, ft.—in.	Width, ft.—in.	Depth, in.
15	11—6⅛	6—6½	22½
18	13—7⅜	6—6½	22½
21	15—7⅞	6—6½	22½

Holophane Industrial Lighting Specifics

The Unit



Characteristic distribution

Specific for High Mounting

No. 671—13¼-in. diam. 20⅝-in. length, 200w. lamp.

No. 681-AL—15¾-in. diam. 20⅝-in. length, 300-500w. lamp.

No. 691-AL—19¾-in. diam., 27-in. length, 500-1500w. lamp.

All furnished with aluminum cover upon request.

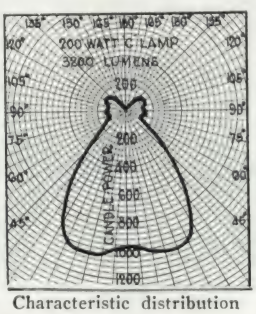
No. 654—for attachment to "O" holder. 10⅜-in. diam., 8½ in. deep, 200w. lamp.

No. 6541—with box cover attachment. 10⅜-in. diam., 10⅝-in. deep, 200w. lamp.

No. 6543—for ½-in. pipe suspension. 10⅜-in. diam., 11¾-in. deep, 200w. lamp.

No. 6583—for ½-in. pipe suspension. 11⅜-in. diam., 12½ in. deep, 300w. lamp.

The Unit



Characteristic distribution

Specific for Low Mounting

Holophane Publications

(1) Lighting Specific for High Bays.
(2) Lighting Specific for Sports.
(3) Lighting Specific for Outdoor Sub-stations.
(4) Lighting Specific for Industrial Yards.
(5) Lighting Specific for Silk Mills.
(6) Lighting Specific for Air Fields.
(8) Lighting Specific for Planned Street Lighting.
(9) Lighting Specific for Storage Warehouses.
(10) Lighting Specific for Printing Plants.
250 Scientific Street Lighting.
344B The Lighting of Schools.
350 Streets That Are Safe.
375H Holophane Datalog.
444A Modern Retailing Success.
448B Industrial Lighting.
500 The Lighting of Modern Office Buildings.
600 Lighting Specifics for Gasoline Stations.
700 Holophane Traficons.
1000 Lighting Specifics for Library Bookstacks.
1100 The City with Planned Street Lighting.
1200 Lighting Specifics for Hospitals.

HOLOPHANE COMPANY, INC., 342 Madison Avenue, New York, N. Y.

INDUSTRIAL ARTS

Hand Wrought Lighting Fixtures

39 North Bennet Street

BOSTON, MASS.

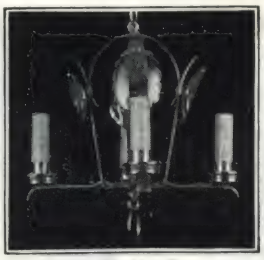
DISPLAY ROOMS AT 65 BEACON STREET, BOSTON, MASS.

Products

"INDUSTRIAL ARTS" HAND WROUGHT LIGHTING FIXTURES in original modern decorative designs and reproductions of artistic old pieces.

"Industrial Arts" Lighting Fixtures

Sconces, lamps, lanterns, ceiling lights, chandeliers, etc., of which only a few of the very extensive line are illustrated here. All of these fixtures are handmade and give an atmosphere of taste and distinction to the rooms where used.



Butterfly

Materials

All "Industrial Arts" lighting fixtures are furnished in tin, copper, brass or pewter as desired, and are furnished with or without attachments for electric lights.

Catalogue

Complete catalogue, showing over forty-five designs with prices, and size specifications, on request.

Pilgrim

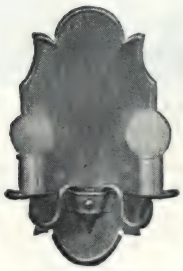
Jeanne D'Arc

Amato Hammered *White House* *Amato Plain*

One Leaf

Puritan

Acanthus



Chippendale Double

Star

Glass Rosette

Daisy

Palm

Sudbury

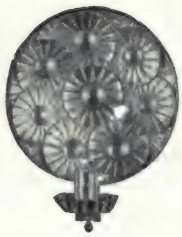
Italian

Five Leaf

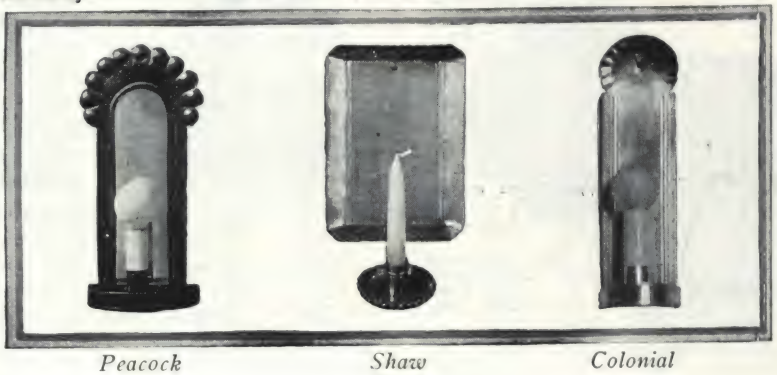
Chandler *Richardson* *Barnes*

Sheraton

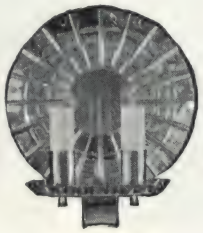
Antonio



Rose



Peacock *Shaw* *Colonial*



Double Wheelwright

KOPP GLASS, INC.

Modernistic and Conventional Lighting Units

SWISSVALE, PA.

Kopp Lighting Units

Below are illustrated some of the Lighting Units we manufacture.

These are furnished in the usual sizes in various Modernistic and Conventional effects.

Detail information pertaining to sizes, finishes and prices will be gladly furnished on request.

MIDWEST METAL ART DIVISION, THE NEWMAN MFG. CO.

Manufacturers of Wrought and Cast Iron. Copper and Bronze Lighting Fixtures

PLANT

CINCINNATI, OHIO

BRANCHES: CHICAGO, ILL. and NEW YORK, N. Y.
Sales Offices in the Principal Cities of the United States

Products

WROUGHT and CAST BRONZE, IRON and COPPER LIGHTING FIXTURES of every description, and particularly Ceiling Fixtures, Brackets, Lanterns and Standards, especially designed and fabricated.

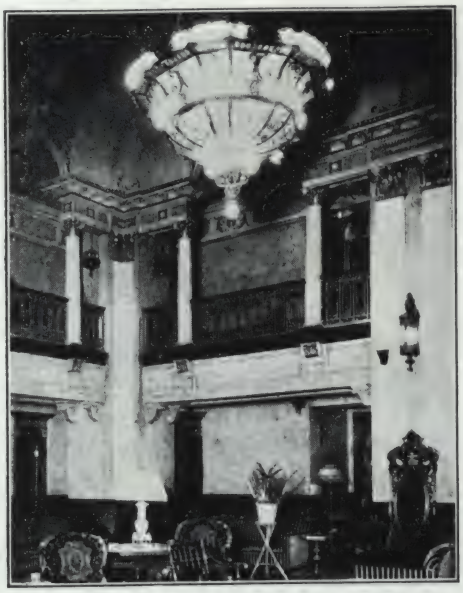
For our page on Ornamental Metal Work, see Manufacturers' Index.

Facilities

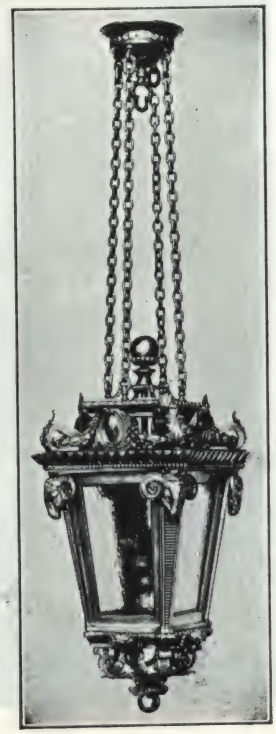
Unsurpassed facilities for hand-crafting period fixtures for the finer theatres, banks, public buildings, hotels, apartment houses, residences, etc. Foundry, forge and finishing departments second to none. Midwest lighting fixtures are produced by a corps of the best artisans in this country.

Architectural Service

Our Midwest Division maintains a splendid Sketch and Drafting Department to serve its friends among the architects. It will be a pleasure to offer suggestive sketches or work up complete details, and prepare estimates of cost, as well as submit complete layouts in open competition, positively without fee or obligation. We solicit opportunities to co-operate with architects on projects of every size.



Midwest Lighting Fixtures in the Bankhead Hotel, Birmingham, Ala.
H. L. STEVENS & Co., Architects



MACBETH GLASSWARE *for* COMMERCIAL LIGHTING

Macbeth-Evans Glass Company
Charleroi — Pennsylvania

CATALOG NO. 209-A

Foreword

Appreciating the fact that the architect is desirous of having at his command a selection of materials and patterns which he can use to add the final touch in bringing the building which he has designed to that state of perfection in which he has conceived it, MACBETH-EVANS GLASS COMPANY offers for the consideration of the architect a complete line of lighting glassware for schools, churches, stores and all other types of public buildings.

Macbeth enclosing globes are available in five distinctly different glasses, namely, Monax, Galax, Cremax, Lumite and Alba. Each of these are physically homogeneous single layer glasses, and, consequently, are as strong mechanically as it is possible to make glass. Since they are single layer glasses they are not subject to the differential expansion strains and the consequent breakage when in service, inherent to the multi-layer (cased) enclosing globes.

An extremely high standard of selection for glass quality as well as for uniformity in weight is maintained at all times. Macbeth Illuminating Glassware is free from such defects as streaks, cords, stones, blisters, checks or other imperfections which will impair the strength and appearance or detract from the general quality. The net result of such a high standard of selection is a uniform installation of attractive appearance and maximum efficiency.

Each type of Macbeth glass possesses desirable illuminating qualities of a very high degree. A trained technical staff, highly specialized in illuminating glassware research, is not only continuously at work seeking to improve Macbeth quality and pioneering into new types of illuminating glasses, but is constantly on the alert to see that improved quality is carefully maintained. As an aid in their work, there is maintained at the Charleroi Works a complete photometric laboratory, the facilities of which are also available to the architect for any special investigations he may desire to have made.

Macbeth enclosing globes further possess the advantages of extremely low depreciation in illuminating efficiency while in service. One piece in construction, they are as nearly dust-tight as is possible to make a lighting unit. Smooth-surfaced initially, since they are especially resistant to weathering attack, they continue to be smooth-surfaced and, accordingly, dust and dirt do not settle upon them to the extent that they do on less resistant glasses. In the latter even a slight weathering film renders the glass surface such that atmospheric dust adheres strongly to the glass and quickly depreciates its illuminating efficiency.

MACBETH LIGHTING GLASSWARE

In each of the several illuminating glasses marketed by MACBETH-EVANS GLASS COMPANY, a certain nicety of balance has been struck between the two important illuminating considerations, efficiency and surface brightness, which enables each glass to fulfill to maximum advantage its particular purpose.

Macbeth Monax is the pioneer white diffusing glass for illuminating purposes. It has through the medium of constant research in the Macbeth Laboratories, maintained its position as the peer in its field. Highly diffusing in character, Monax also possesses maximum lighting efficiency. Each enclosing globe is stamped "Macbeth Monax."

Macbeth Cremax is a patented composition yielding a glass of rich creamy tint. Cremax illumination is of a warm, welcoming quality and is essentially decorative in character. Each enclosing globe is stamped "Macbeth Cremax."

Macbeth Galax Semi-Indirect Lighting Enclosing Globes combine high efficiency with all the desirable eye-protecting qualities of this type of lighting. They are single piece units of physically homogeneous texture, but of dual opacity. The bottom of the globe is of a dense white, highly reflecting opacity, assuring low intrinsic brightness with a high percentage of light directed upward. The top of the globe is of much lighter opacity, but sufficient to eliminate lamp filament striations and shadows on the ceiling and walls. It permits a very high proportion of the upward light to be transmitted without material absorption loss. Macbeth Galax should not be confused with either enameled or cased bottom enclosing globes which are in reality not truly semi-indirect either in the character of their distribution of the light or in their glare characteristics. The two opacities found in the top and bottom respectively of a Galax globe result from a special manufacturing treatment of a single piece of physically homogeneous glass of patented composition. Because of its permanently high lighting efficiency, simplicity of installation and maintenance, and its inherent strength, Macbeth Galax should find application in every place where the semi-indirect type of lighting can be advantageously used. Each enclosing globe is stamped "Macbeth Galax."

The Semi-indirect Hallstadt Galax Glass

Macbeth Lumite (Crystal) is a clear glass of high lustre. It is extremely resistant to weathering. The present vogue of modernistic lighting has brought with it a certain demand for crystal etched glassware, for which Macbeth Lumite has proven itself unexcelled.

Macbeth Alba is a transluscent diffusing glass specially adaptable for manufacture of heavy pressed ware.

These five inherently different types of glass are available in different shapes ranging from conservative commercial to distinct modernistic.

From a variety of decorations, the architect may select one suitable for almost any interior where decorative treatment is desirable. All colors are permanently fired on the globes, thus becoming an inherent part of the glass.

MACBETH-EVANS GLASS COMPANY offers a comprehensive line of lighting glassware embracing a high standard of quality and varied design, coupled with technical assistance. This service has been planned to assure a complete and efficient lighting installation with a minimum expenditure of time and effort on the part of the architect.

Continued on next page

INTERPRETATION OF PHOTOMETRIC DATA

When comparing the photometric data for a number of different illuminating enclosing globes, caution should be exercised to make certain:

(1) That the tests have been made under conditions as nearly approaching the actual conditions of installation as possible.

(2) That the test data has been obtained on a sufficient number of pieces of the ware to make the data actually representative of the manufacturers' product.

To assist prospective purchasers of lighting glassware in making an accurate estimate of the merits of enclosing globe lighting units, the Illuminating Engineering Society, the National Electric Light Association and the Illuminating Glassware Guild have sponsored a procedure for testing, known as IES-NELA specifications for testing diffusing type enclosing glassware, which is based on the above considerations.

The photometric data for the glassware represented herein has been obtained in tests made by the Electrical Testing Laboratories, New York City, in accordance with the IES-NELA specifications.

These specifications for testing differ from the procedure commonly used in the past in three important particulars, namely: 1. The method of selecting the samples for test. 2. The position of the light source within the globe. 3. The cover used over the fitter opening of the globe. These aspects are discussed briefly below.

Selection of Samples

A common practice in the past has been to have photometric tests made on a single piece of glass, which in some cases may have been a specially made sample, and the data thus obtained was submitted as being representative of the manufacturers' product. Such data was obviously questionable and at best, altogether incomplete. The IES-NELA specifications provide that the selection of the samples for test be made by a representative of the testing laboratory, and that he shall examine and weigh no less than 25 pieces chosen at random from the lot of ware which is to be inspected. From this group of 25 or more globes thus examined, one globe representing the minimum, one the maximum and four of medium weight (six globes in all), shall be selected and forwarded to the testing laboratory for photometric tests. After determining the transmission efficiency for these six units, the globe which most nearly approaches the average efficiency of the six is further tested for distribution characteristics and brightness values. The data thus obtained on this average globe is considered to be as nearly representative an estimate of the illuminating qualities of the manufacturers' product as it is readily possible to obtain.

Lamp Position

The position of the light sources within an enclosing globe has a great influence upon the photometric characteristics of the unit. Thus in general the closer the lamp is placed to the bottom of the enclosing globe, the greater the transmission efficiency which is obtained. At the same time, however, the brightness values over the bottom will be increased, thus making the globe less desirable from this standpoint.

Because of these possible variations, the IES-NELA specifications have provided that globes of a given diameter shall be tested with the lamp in prescribed position. Where this position has been deviated from in the test, as it may be advisable to do in the case of an enlongated or stalactite shaped globe, this departure must be cited in the test report as an exception.

Cover for Fitter Opening

The resulting illuminating efficiency is likewise influenced by the material used as a cover for the fitter opening of the globe in the test. The cover material adopted as standard in the past was a white blotter having a reflection factor of about 70%. It was recognized that the white blotter reflected more and absorbed less of the light which fell on the fitter opening than would practically all of the canopy materials on the market, but that it did establish a standard on which comparisons could be intelligently based. An investigation of a number of representative canopies disclosed that a material having a reflection factor of 40% more nearly represented the average value for the materials most generally used for fitter canopies. The test report shown herewith gives the values for transmission efficiency under each of these two conditions of test for the same group of globes. The values given under the column heading "Test in Accordance with Specifications" are those obtained using a material of 40% reflection factor, while the figures in the column headed "Exception" are the transmission efficiencies for the same group of globes in a test in which a white blotter was used as the cover material. These two sets of values illustrate very effectively the importance of having photometric tests made under conditions which simulate very closely the actual installation conditions.

SUGGESTED SPECIFICATIONS FOR LIGHTING GLASSWARE OF MACBETH QUALITY

(1) General

This specification outlines the detailed requirements of enclosing globes for use in the (name of building). Enclosing globes will be required for all ceiling outlets. These outlets together with respective lamp sizes are shown in the architect's plans for this building.

(2) Shape and Size of Globe

The globes shall conform in contour to shape exemplified by MACBETH-EVANS GLASS COMPANY'S (name of globe) shown in SWEET'S ARCHITECTURAL CATALOGUES for 1931.

Enclosing globes shall be in accordance with the following schedule of sizes for respective lamp wattages:

Lamp size	Minimum diam. of globe	Lamp size	Minimum diam. of globe
100 watts	10 in.	300 watts	16 in.
150 watts	12 in.	500 watts	18 in.
200 watts	14 in.	750 watts	20 in.

(3) Material

(a) *(Specification for Monax Type Glassware)*—

Glassware to be furnished on this installation shall be of Macbeth Monax or its equivalent. Units shall be of highly diffusing white glass of homogeneous texture throughout.

(a) *(Specification for Galax Type Glassware)*—

Glassware to be furnished on this installation shall be of Macbeth Galax or its equivalent. Units shall be totally enclosed except for fitter opening, and constructed of a uni-layer, physically homogeneous glass in such manner that the bottom of the globe is of a dense white highly reflecting character causing a major portion of the light emitted by the enclosed lamp to be reflected upward according to the semi-indirect lighting principle, while the upper portion of the globe is of a slightly diffusing, highly transmitting character, permitting a large percentage of the upwardly directed light to be transmitted.

(a) *(Specification for Cremax Type Glassware)*—

Glassware to be furnished on this installation shall be of Macbeth Cremax or its equivalent. Units shall be of a rich

Continued on next page

creamy tint, highly diffusing glass of homogeneous texture throughout.

(b) All of the glassware supplied shall be uniform in quality and shall be free from such imperfections as streaks, cords, stones, blisters, checks, etc., as will impair the strength or appearance or otherwise detract from the general quality of the glassware for lighting purposes.

(c) Glassware shall be highly resistant to attack by weathering and shall show no sign of disintegration or attack after being immersed in boiling distilled water for two hours.

(d) The glassware shall be mechanically strong.

(e) The glassware shall be properly annealed and free from any internal strains which may cause breakage.

(f) Enclosing globes when suspended from three points shall hang plumb.

(4) Photometric Characteristics

The bidder shall submit data showing results of photometric tests on the glassware which he proposes to supply, made by a competent testing laboratory according to the provisions of the "IES-NELA Specifications for Testing Diffusing Type Enclosing Glassware" or,

If the architect so elects he may require the bidder to submit photometric tests made by a competent Testing Laboratory on samples selected by the architect's representative from the bidder's or manufacturer's warehouse stock, said samples to be selected and tests made exactly in accordance with the "IES-NELA Specifications for Testing Diffusing Type Enclosing Glassware" with the exception that the samples for test shall be selected by the architect's representative instead of a representative of the Testing Laboratory.

Test reports submitted in accordance with either of the above specifications shall show that the proposed glassware meets the following requirements for illuminating efficiency (ratio of light output of unit to light output of bare lamp) and for surface brightness:

(For Monax Type Glassware.) Efficiency shall be not less than 82%. The maximum surface brightness at any point on the globe in the line of vision when installed shall not exceed 4 candle power per sq. in.

(For Galax Type Glassware.) The efficiency shall be not less than 75%. The maximum surface brightness at any point on the globe in the line of vision when installed shall not be in excess of 2 candle power per sq. in. It is further specified that the distribution of the light shall be such that not more than 25% of the light output of the bare lamp shall be directed below the horizontal plane passing through the lamp filament.

(For Cremax Type Glassware.) The efficiency shall be not less than 65% The maximum surface brightness at any point on the globe in the line of vision when installed shall not be in excess of 3 candle power per sq. in.

(5) Inspection

All globes delivered for this installation will be subject to inspection by the architect or his representative and if any are found not to conform to these specifications, the entire lot or any individual globe may be rejected.

(6) Types of Globes and Locations

(Under this heading the architect should include in either list or table form the selected types of globes and the locations in which they are to be installed. For data on code numbers which will assure the proper style, size, decoration, etc., see "To Specify" for each type of globe illustrated on the following pages.)

SOME USERS OF MACBETH LIGHTING GLASSWARE AND SOME TYPICAL INSTALLATIONS

Schools

Duke University
Durham, N. C.

West Gray Elementary School
Houston, Tex.

Germantown Academy
Germantown, Pa.

St. Peter's Seminary
London, Ont.

Connecticut College for Women
New London, Conn.

Glendale Union High School
West Glendale, Cal.

East Orange Junior High School
East Orange, N. J.

McKinley High School
St. Louis, Mo.

Monax glass has been used in a great many of the public schools of New York City, Cleveland, Detroit and Los Angeles.

Cremax glass has been installed in the group of new Wesleyan College buildings at Macon, Ga.—Laurel School, Shaker Heights, Cleveland—Baldwin Wallace College, Berea, Ohio—and some of the buildings in the Detroit University, Detroit, Mich.

Office Buildings, Hospitals, Hotels, and Churches

National Life Building
Toronto, Ont.

Palmolive Building
Chicago, Ill.

Ross S. Sterling Building
Houston, Tex.

Shaker Square Group
Shaker Heights,
Cleveland, Ohio

Provincial Parliament Building
Toronto, Ont.

Merchants National Bank Building
Mobile, Ala.

State Capitol
Harrisburg, Pa.

Paramount Hotel
New York, N. Y.

St. Cecilia's Church
Louisville, Ky.

Medical Arts Building
Columbus, Ohio

Boston Store
Milwaukee, Wis.

Mt. Sinai Hospital
Cleveland, Ohio

American Women's Association Building
New York, N. Y.

Benjamin Franklin Hotel
Seattle, Wash.

Toronto General Hospital
Toronto, Ont.

Medical Arts Building
Chattanooga, Tenn.

Continued on next page

SIMPLIFIED ILLUMINATION CALCULATION PROCEDURE FOR MACBETH ILLUMINATING GLASSWARE

First

Determine foot candles required from Table I.

Second

Determine "Conditions Factor" for the interior, whether "Favorable," "Average" or "Unfavorable," from Table II, following page. The "Conditions Factor" will depend upon the room proportions, color of ceiling and upper walls, and the maintenance of equipment. Typical "Average Conditions Factor" consists of:

Room proportions.....
Width approximately twice ceiling height
Color of ceiling and walls.....Medium
Maintenance of equipment.....Fair

The "Conditions Factor" becomes more "favorable" as the width of the interior increases in proportion to its height; as the color of ceiling and upper walls becomes lighter; and as the maintenance of equipment improves.

Third

Decide which type of illuminating glassware (Monax, Galax or Cremax) is desired.

Fourth

Decide mounting height. Ordinarily, an overall fixture length (ceiling to underside of enclosing globe) of one-fourth ceiling height may be used for all Macbeth enclosing globes. Ceiling type fitters should be used on low ceilings.

Fifth

Locate in first column, Table II, the contemplated "Area Per Outlet" or "Approximate Spacing" and further narrow this down to the "Conditions Factor" determined in second step. Then traverse Table II horizontally to the right until the desired foot-candle intensity (as determined in first step) is located in the correct glassware section. If not so found, then go to a closer spacing until desired foot-candle intensity is located. Directly above in the column heading is the required lamp size.

TABLE I. LIGHTING INTENSITIES FOR GENERAL ILLUMINATION OF COMMERCIAL INTERIORS

Specific Commercial Interiors	Foot-Candles	
	Recommended	Minimum
Auditoriums	5	3
Automobile Show Rooms	15	10
Bank Lobby	10	6
Barber Shop	15	10
Churches		
Auditorium	3	2
Sunday School Room	8	5
Club Rooms		
Lounge	5	3
Reading Room	12	8
Court Rooms	10	6
Dance Halls	6	4
Depot Waiting Room	8	5
Drafting Room	25	15
Gymnasiums		
Main Exercising Floor	12	8
Swimming Pool	8	5
Shower and Locker Rooms	6	4
Halls, Passageways in Interiors	3	2
Hospitals		
Corridors	3	2
Private Rooms	8	5
Wards (with local illumination)	5	3
Laboratories	15	10
Hotels		
Lobby	8	5
Dining Room	6	4
Bed Rooms	8	5
Corridors	3	2
Library		
Reading Rooms	12	8
Lodge Rooms	6	4
Lunch Room	12	8
Market	12	8
Office Buildings		
Private and General	15	10
Same—no close work	10	8
File Room	6	4
Corridors	5	3
Restaurants	8	5
Schools		
Auditorium	8	5
Class Rooms, Library and Office	12	8
Corridors and Stairways	5	3
Drawing Rooms	25	15
Manual Training	12	8
Laboratories	12	8
Sewing Rooms	25	15
Study	12	8
Stores—Department and Large Specialty		
Main Floors	15	10
Basement Store	15	10
Other Floors	12	8
Stores—Medium Size		
Clothing	15	10
Drug	15	10
Dry Goods	15	10
Grocery	12	8
Furniture	15	10
Shoe	15	10
Confectionery	12	8
Meat	12	8
Toilet and Wash Rooms	6	4

Continued on next page

TABLE II. DETERMINATION OF LAMP SIZE AND OUTLET SPACING

Using the proper section for glassware selected, the mounting height* and conditions factor decided upon, choose such spacing and lamp size as will give the desired foot-candle intensity

Area per outlet or †approximate spacing	Conditions factor	Macbeth Monax — Average foot-candles					Macbeth Cremax — Average foot-candles					Macbeth Galax For semi-indirect lighting — Average foot-candles				
		100-watt	150-watt	200-watt	300-watt	500-watt	100-watt	150-watt	200-watt	300-watt	500-watt	100-watt	150-watt	200-watt	300-watt	500-watt
55 to 65 sq. ft.	Favorable	8–10	12–15	18–23			5–7	9–12	13–18			7–9	10–14	15–22		
or	Average	6–7	9–12	12–16			3–5	6–9	8–13			5–6	7–10	11–15		
7¾x7¾-ft. spacing	Unfavorable	4–5	6–8	9–11			2.5–3.0	4–6	5–8			3–4	4–6	7–9		
65 to 75 sq. ft.	Favorable	7–8	11–15	15–20			4–6	8–11	11–15			6–7	9–13	13–19		
or	Average	5.0–5.5	8–11	11–15			3–4	5–8	7–11			4.5–5.0	6–9	9–13		
8½x8½-ft. spacing	Unfavorable	3.0–3.5	5–7	7–9			2–3	3.5–5.0	5–7			2.5–3.0	4–6	6.5–8.0		
75 to 85 sq. ft.	Favorable	6–7	10–13	13–18			3.5–5.0	7–9	8–12			5–6	8–11	11–17		
or	Average	4.5–5.0	7–10	10–13			2.5–3.5	4–7	6–8			4.0–4.5	5–8	8–11		
9x9-ft. spacing	Unfavorable	3.0–3.5	5–6	6–8			1.5–2.5	3–4	4–6			2.5–3.0	3.5–5.0	6–7		
85 to 95 sq. ft.	Favorable	4.5–6.0	8–11	11–16	18–25		3–4	6–8	8–11	14–19		4.0–5.5	7–10	10–14	17–24	
or	Average	4.0–4.5	6–8	8–10	12–18		2–3	4–6	5–8	9–14		3.5–4.0	5–7	7–9	11–17	
9½x9½-ft. spacing	Unfavorable	2.5–3.0	4–5	6–7	8–12		1.5–2.0	2.5–4.0	4–5	6–9		2.0–2.5	3–4	5–6	7–11	
95 to 110 sq. ft.	Favorable	4.0–5.5	7–10	10–14	16–22		3.0–3.5	5–7	7–10	12–17		3.5–5.0	6.9	9–12	15–21	
or	Average	3.5–4.0	5–7	7.5–9.0	11–16		2.0–2.5	3–5	5–7	8–12		3.0–3.5	4–6	6–8	9–15	
10x10-ft. spacing	Unfavorable	2.0–2.5	3–4	5–6	7–10		1.5–2.0	2.5–3.0	3.5–5.0	5–8		1.5–2.0	2.5–4.0	4.5–5.0	6–9	
110 to 125 sq. ft.	Favorable	4–5	6–9	9–12	14–20		2.5–3.5	4–6	6–9	11–15	20–27	3–4	5–7	8–11	13–19	
or	Average	3.0–3.5	4.5–6.0	7.0–8.5	10–14		1.5–2.0	3–4	4–6	7–11	13–20	2.5–3.0	4.5–5.0	5.5–7.0	8–13	
11x11-ft. spacing	Unfavorable	2.0–2.5	3–4	4.5–5.5	7–9		1.0–1.5	2–3	3–4	5–7	9–13	1.5–2.0	2.5–3.0	4.0–4.5	6–8	
125 to 145 sq. ft.	Favorable	3.5–4.5	5.5–8.0	8–11	12–17		2–3	3.5–5.0	5–7	9–13	17–23	2.5–3.5	5–6	7–9	11–16	
or	Average	2.5–3.5	4.5	6.5–8.0	9–13		1.0–1.5	2.5–3.5	3.5–5.0	6–9	11–17	2.0–2.5	3.5–4.5	5–6	7–11	
11½x11½-ft. spacing	Unfavorable	1.5–2 0	2.5–3.5	4–5	6–8		....	1.5–2.5	2.5–3.5	4–6	8–11	1.0–1.5	2–3	3.5–4.0	5–7	
145 to 170 sq. ft.	Favorable	3–4	5–6	7–10	10–15	18–25		3.5–4.0	4–6	8–11	15–20	2–3	3.5–5.0	6–8	9–14	17–25
or	Average	2.0–2.5	3.5–4.0	6–7	8–10	12–18		2.0–3.5	3–4	5–8	9–15	1.5–2.0	3.0–3.5	4.5–5.0	6–9	11–17
12½x12½-ft. spacing	Unfavorable	1.0–1.5	2–3	3.5–4.0	5–7	8–12		1.5–2.0	2–3	3.5–5.0	6–9	0.5–1.0	1.5–2.5	3.0–3.5	4–6	7–11
170 to 200 sq. ft.	Favorable	2–3	4.5–5.5	6–8	9–12	16–22		3–4	3.5–5.0	7–9	12–17	1.5–2.5	4–5	5–6	8–11	14–21
or	Average	1.5–2.0	3.0–3.5	5–6	6–9	11–16		1.5–3.0	2.0–3.5	4–7	8–12	1.0–1.5	2.5–3.0	4.0–4.5	5–8	9–14
13½x13½-ft. spacing	Unfavorable	1.0–1.5	2.0–2.5	3.0–3.5	4–6	7–10		1.0–1.5	1.5–2.0	3–4	5–8	....	1.5–2.0	2.5–3.0	3.5–5.0	6–9
200 to 230 sq. ft.	Favorable		4–5	5–6	8–11	14–20		2.5–3.5	3.5–4.0	6–8	10–14		3–4	4–5	7–10	12–18
or	Average		2.5–3.0	4.0–4.5	5–8	10–14		1.5–2.5	2–3	4–6	7–10		2.0–2.5	3.5–4.0	4–7	8–12
14¾x14¾-ft. spacing	Unfavorable		1.5–2.0	2.5–3.0	3.5–4.5	7–9		....	1.5–2.0	2.5–4.0	5–7		1.0–1.5	2.0–2.5	3–4	5–8
230 to 260 sq. ft.	Favorable		3.5–4.0	4.0–4.5	7–10	12–17		2–3	3–4	5–7	9–12		2.5–3.5	3.5–4.0	6–9	10–14
or	Average		2.0–2.5	3.5–4.0	4.5–7.0	9–13		1.5–2.0	2.0–2.5	3–5	6–9		1.5–2.0	3.0–3.5	3.5–6.0	7–10
15½x15½-ft. spacing	Unfavorable		1.5–2.0	2.0–2.5	3–4	6–8		....	1.5–2.0	2.5–3.0	4–6		1.0–1.5	1.5–2.0	2.0–3.5	5–7
260 to 300 sq. ft.	Favorable		3–4	3.5–4.0	6–8	10–15			2.5–3.0	4–6	8–11		2–3	3–4	5–7	9–13
or	Average		1.5–2.0	3.0–3.5	4–5	8–10			1.5–2.0	3–4	6–8		1.0–1.5	2.5–3.0	3–5	6–9
16¾x16¾-ft. spacing	Unfavorable		1.0–1.5	1.5–2.0	3–4	6–8			1–2	2–3	3–4		....	1.0–1.5	2.5–3.0	4–6
300 to 340 sq. ft.	Favorable			3.5–4.0	5–7	9–12			2–3	3.5–5.0	7–9			3–4	4–6	8–10
or	Average			2.5–3.0	3.5–4.0	6–9			1.0–1.5	2.5–3.5	5–7			2.0–2.5	3–4	5–8
18x18-ft. spacing	Unfavorable			1.0–1.5	2.5–3.0	4–6			....	1.5–2.5	3–5			....	2.5–3.0	3.5–5.0
340 to 390 sq. ft.	Favorable			3.0–3.5	4–6	8–10				3–4	6–8			2.5–3.0	3.5–4.5	7–10
or	Average			2.0–2.5	3.0–3.5	5–8				2–3	4–6			1.5–2.0	2.5–3.5	4–7
19x19-ft. spacing	Unfavorable			1.0–1.5	2.5–3.0	3.5–5.0				1.5–2.0	3–4			....	2.0–2.5	3–4
390 to 440 sq. ft.	Favorable			2.5–3.0	3.5–5.5	7–9				3–4	5–7			2.0–2.5	3–5	6–9
or	Average			1.5–2.0	2.5–3.0	4.5–7.0				1.5–3.0	3.5–5.0			1.0–1.5	2.0–3.5	4–6
20½x20½-ft. spacing	Unfavorable			1.0–1.5	2.0–2.5	3–4				1.0–1.5	2.5–3.5			....	1.5–2.0	3–4
440 to 500 sq. ft.	Favorable			2.0–2.5	3–4	5–8				2.5–3.5	4–6			1.5–2.5	3–4	5–8
or	Average			1.0–1.5	2–3	3–5				1.5–2.5	3–4			....	2–3	3–5
21¾x21¾-ft. spacing	Unfavorable			....	....	2.5–3.0				....	2–3			....	....	2.5–3.0

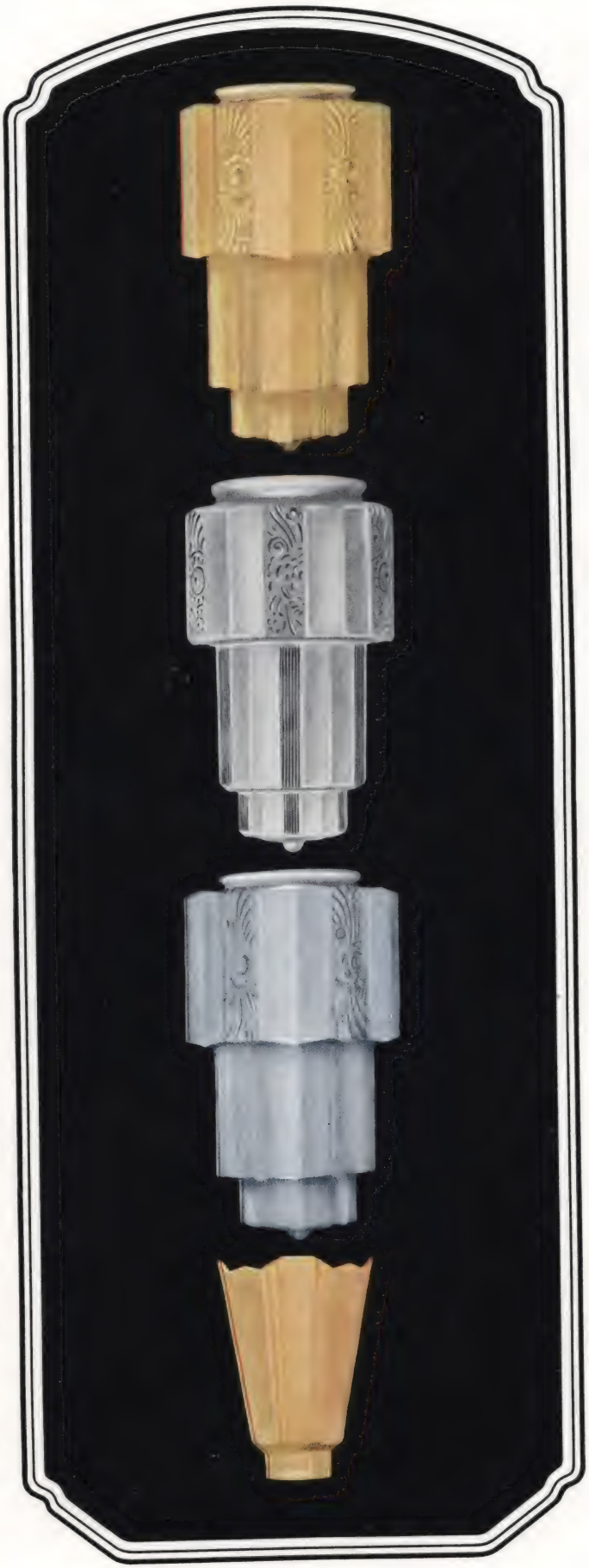
Note: Ordinarily units may be mounted using an over-all fixture length equal to one-fourth the ceiling height. For low ceilings fitters of the ceiling type should be used.
†*Note:* Between walls and first rows of lights allow not more than ½-in. spacing.

Continued on next page

"The Modernistic"

The "Modernistic" displays modern French influence combined with the popular reverse "set back." The design is restrained in form and decoration, without bizarre characteristics and is thus suitable for use in almost any location.

In the table below the number D-144 indicates a gray fired color tint applied to the elaboration in Monax glass. On Cremax glass the same number indicates a brown fired tint. "Art Moderne" indicates a crystal glass having a satin finished background with the relief in crystal high lights.



To Specify

The architect should write into his own specification the data under the headings "Mould No." and "Description" for the particular globe desired. This will automatically assure the selected style, size, color, glass and decoration. For example, "Macbeth Modernistic 5698 D-144 Cremax" will designate the design shown in Cremax glass with a brown fired color tint applied to the decoration of a globe 6 in. in diameter, 9 1/16 in. in depth with a fitter 4 in. in diameter.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position	Recommended wattage
5698	D-144 Cremax	6	9 1/16	4	1 in. above	100
5695	D-144 Cremax	8 1/16	13 1/2	6	1/2 in. above	150
5980	D-144 Cremax	10	16 3/8	6	1/4 in. below	200
5696	D-144 Cremax	12	20	8	1 in. below	300
5697	D-144 Cremax	16	27	12	3 in. below	500
5698	Art Moderne	6	9 1/16	4	1 in. above	100
5695	Art Moderne	8 1/16	13 1/2	6	1/2 in. above	150
5980	Art Moderne	10	16 3/8	6	1/4 in. below	200
5696	Art Moderne	12	20	8	1 in. below	300
5697	Art Moderne	16	27	12	3 in. below	500
5698	D-144 Monax	6	9 1/16	4	1 in. above	100
5695	D-144 Monax	8 1/16	13 1/2	6	1/2 in. above	150
5980	D-144 Monax	10	16 3/8	6	1/4 in. below	200
5696	D-144 Monax	12	20	8	1 in. below	300
5697	D-144 Monax	16	27	12	3 in. below	500

*Lamp position—Represents the distance in inches of the lamp contact above or below the plane of the fitter screws in the fixture.

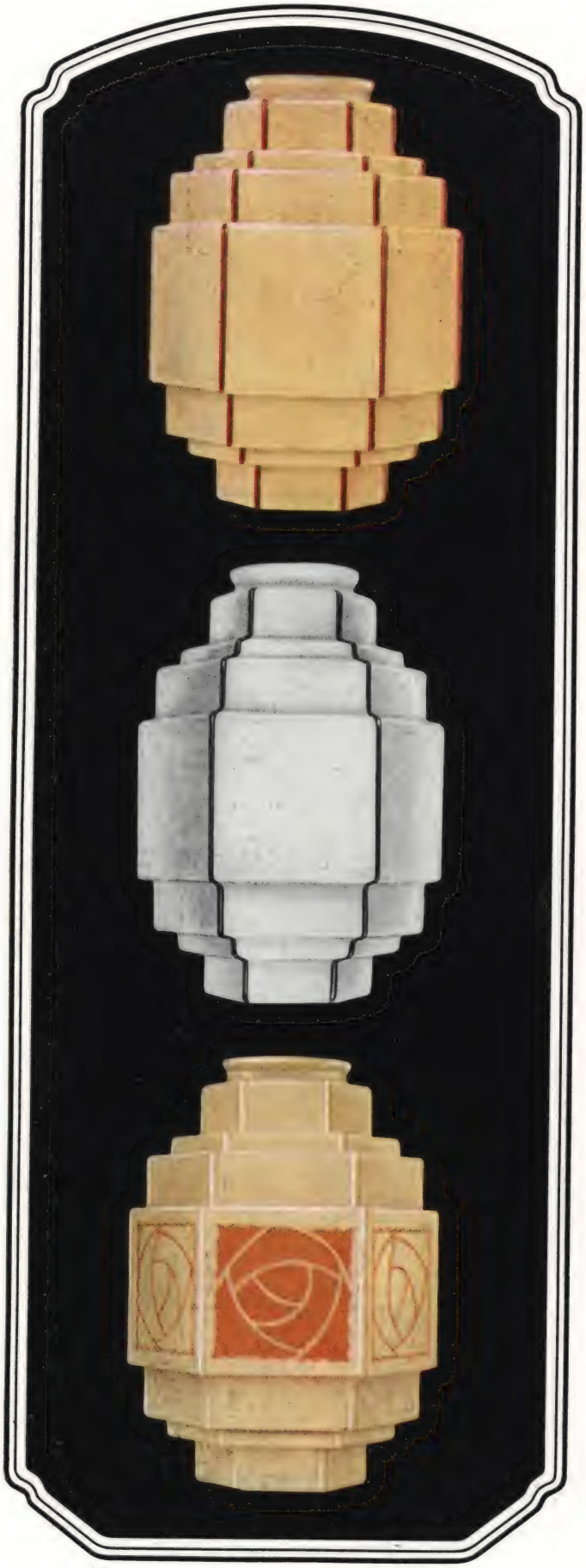
Note: Due to the very large size and great weight of globe No. 5697 safety should be insured by means of auxiliary support such as an inside safety holder, ring and chains, rods or other safety devices recommended by the fixture manufacturer.

Upright Bracket Shade

Supplied in same glass and finishes as "The Modernistic" globes.

Mould No.	Description	Diameter, in.	Height, in.	Outside diameter of heel, in.	Recommended wattage
2324	D-144 Cremax	4 3/16	5 7/8	1 3/4	25–50–60
2324	Art Moderne	4 3/16	5 7/8	1 3/4	25–50–60
2324	D-144 Monax	4 3/16	5 7/8	1 3/4	25–50–60

Continued on next page



"The Cubistic"

Again modernism with cubist influence and the double "set back." Simplicity is the keynote of this design which is suitable for almost any location where modernistic lighting is desired.

In the table below, D-120 indicates a leaded effect upon the vertical ribs of the globe—black is used with Monax globes and brown with Cremax. K-309 indicates a brown modernistic decoration in negative and positive etching on alternate panels. All colors are permanently fired on the glass.

To Specify

The architect should write into his own specification the data under the headings "Mould No." and "Description." This will automatically assure the selected style, size, color, glass and decoration. For example, "Macbeth Cubistic 5677 D-120 Monax" will designate the decoration shown in Monax with black vertical lines upon a globe 12 in. in diameter, 16⅜-in. in depth and with a 6-in. fitter diameter.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, below, in.	Recommended wattage
5676	D-120 Cremax	9¼	12½	4	2	100
5677	D-120 Cremax	12	16⅜	6	2½	200
5678	D-120 Cremax	14	19	6	2½	300
5676	D-120 Monax	9¼	12½	4	2	100
5677	D-120 Monax	12	16⅜	6	2½	200
5678	D-120 Monax	14	19	6	2½	300
5676	K-309 Cremax	9¼	12½	4	2	100
5677	K-309 Cremax	12	16⅜	6	2½	200
5678	K-309 Cremax	14	19	6	2½	300

*Lamp position—Represents the distance in inches of the lamp contact below the plane of the fitter screws in the fixture.

Continued on next page

"The Semi-indirect Hallstadt"

The Semi-indirect Hallstadt, manufactured from Macbeth Galax Glass, was designed to utilize most effectively the upward component of light reflected from the dense white reflecting lower portion of the globe. It is freely transmitted through the light opacity slightly diffusing upper section of the globe, its freedom unhampered by restricting angles. Below is shown a reproduction of Electrical Testing Laboratories' report on 3756 Galax. The results obtained from this test are representative for all sizes. Additional data will be furnished upon request.

MACBETH-EVANS GLASS COMPANY
(EASTERN DIVISION)
CHARLEROI, PENNSYLVANIA

PHOTOMETRIC ANALYSIS OF No. 3756 Galax

TESTED AT Charleroi Laboratories

GLASS Galax LAMP Gen'l Service PHOTOMETER Distribution
Sample No 911-505 WATTS 200 ROTATING No
WEIGHT 5 LB 9 OZ VOLTS 115 TEST DISTANCE 9 feet
NO SUBMITTED 6 LUMENS CLEAR 8340 TESTED BY R W J
BULB PS 30 CHECKED BY R W A
Light output range 78.5%-79.5% DATE OF TEST 7/25/30

ANGLE IN DEGREES	CANDLE POWER	ZONE	LUMENS
0	185		
5	180	0-10	17
15	178	10-20	51
25	169	20-30	78
35	151	30-40	95
45	137	40-50	106
55	133	50-60	119
65	135	60-70	134
75	141	70-80	149
85	152	80-90	165
90	161		
95	181	90-100	199
105	242	100-110	255
115	286	110-120	283
125	310	120-130	277
135	336	130-140	261
145	326	140-150	205
155	319	150-160	147
165	317	160-170	89
175	334	170-180	31

ZONE	LUMENS	CLEAR LAMP	MEAN C.P.
0-40	468	13.5	
0-90	914	27.3	
90-180	1745	52.3	
120-180			
0-180	2659	79.6	

EFFICIENCY OF UNIT 73.6 %

BRIGHTNESS VALUES

LOCATION	A	B	C	D	E	F	G	H	I	J	K
MILLI-LAMBERTS C-P PER SQ. IN	1.0	1.1	1.7		1.1	1.2	1.5	2.1	1.0	1.2	1.1

NO 97 DATE 7/31/30

Approved by

To Specify

The architect should write into his own specification the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Semi-Indirect 4309A Galax." The light etched decoration shown in the lower illustration may be obtained in brown or gray fired colors in all sizes by adding K-325 and the color desired, after the mould number. For example, "3756 K-325 Galax Gray 14 in."

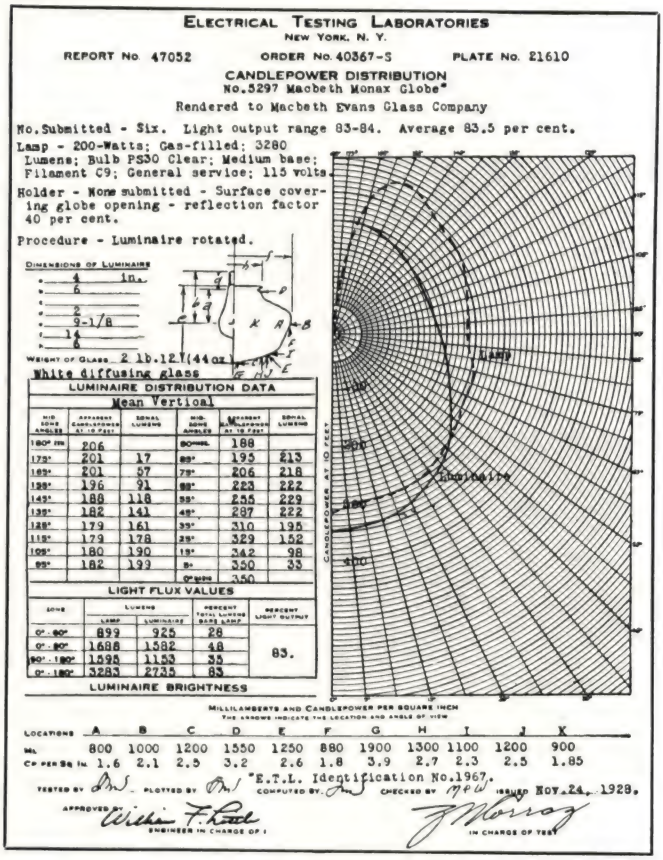
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
4385	Galax	10	7⅝	4	½	100
4309	Galax	12	9½	6	¼	150
4309A	Galax	12	9½	4	¼	150
3756	Galax	14	10	6	1	200
4386	Galax	16	12	6	1	300
5667	Galax	18	13⅛	8	zero	500
4385	K-325 Galax	10	7⅝	4	½	100
4309	K-325 Galax	12	9½	6	¼	150
4309A	K-325 Galax	12	9½	4	¼	150
3756	K-325 Galax	14	10	6	1	200
4386	K-325 Galax	16	12	6	1	300
5667	K-325 Galax	18	13½	8	zero	500

*Lamp position—Indicates the distance in inches of the lamp contact above the plane of the fitter screws in the fixture. Zero indicates the lamp contact is in the same plane as the fitter screws in the fixture.

Continued on next page

"The Seville"

The Seville may be obtained in all sizes in Monax or Cremax glass, both plain and decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 5297 Monax which is representative for all sizes in Monax glass, tested according to the IES-NELA specifications.



ELECTRICAL TESTING LABORATORIES
New York, N. Y.

REPORT No. 47052 ORDER No. 40367-S PLATE No. 21610

CANDLEPOWER DISTRIBUTION
No. 5297 Macbeth Monax Globe*
Rendered to Macbeth Evans Glass Company

No. Submitted - Six. Light output range 83-84. Average 83.5 per cent.

Lamp - 200-Watts; Gas-filled; 3280 Lumens; Bulb PS30 Clear; Medium base; Filament C9; General service; 115 volts.

Holder - None submitted - Surface covering globe opening - reflection factor 40 per cent.

Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE

a	4 in.
b	6
c	
d	2
e	9-1/8
f	1/4
g	6

WEIGHT OF GLASS 2 lb. 12.1 (44 oz.)

White diffusing glass

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° ITR	206		ZONAL	188	
175°	201	17	85°	195	213
165°	201	57	75°	206	218
155°	196	91	65°	223	222
145°	188	118	55°	255	229
135°	182	141	45°	287	222
125°	179	161	35°	310	195
115°	179	178	25°	329	152
105°	180	190	15°	342	98
95°	182	199	5°	350	35
			ZONAL	350	

LIGHT FLUX VALUES

ZONE	LUMENS LAMP	LUMENS LUMINAIRE	PERCENT TOTAL LUMENS RATED LAMP	PERCENT LIGHT OUTPUT
0°-90°	892	925	28	83.
0°-90°	1686	1582	48	
90°-180°	1595	1153	35	
0°-180°	3283	2735	83	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	X
ML	800	1000	1200	1550	1250	880	1900	1300	1100	1200	900
CP PER SQ IN.	1.6	2.1	2.5	3.2	2.6	1.8	3.9	2.7	2.3	2.5	1.85

TESTED BY D.W.S. PLOTTED BY D.W.S. COMPUTED BY J.J. CHECKED BY W.F.C. "E.T.L. Identification No. 1967." ISSUED Nov. 24, 1928.

APPROVED Wilbur F. Rood ENGINEER IN CHARGE OF L

J. Morray IN CHARGE OF TEST

To Specify

The architect should write into his own specification data tabulated below under headings "Mould No." and "Description," thus, "Macbeth Seville 5340 Cremax." The brown printed decoration with color permanently fired in the glass as shown in third illustration may be applied to all sizes in either Monax or Cremax glass by adding J-103 and glass desired after the mould number. For example, "Macbeth Seville 5297 J-103 Monax 14 in." The banded decoration shown in lower illustration may be applied to all sizes in blue, green, brown or gray by adding D-56 and color desired. For example, "Macbeth Seville 5296 D-56 Cremax Brown 12x6 in."

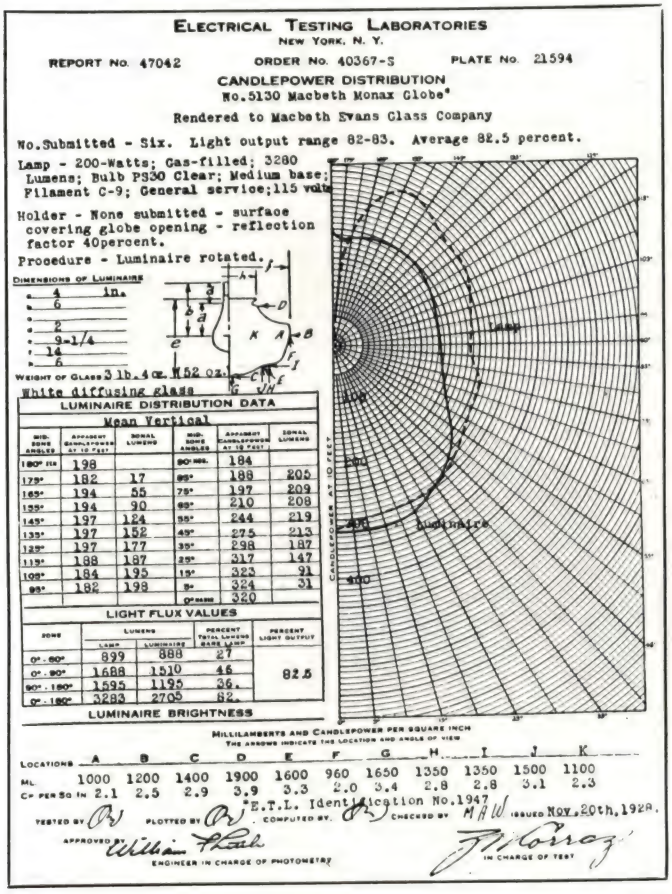
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5294A	Monax or Cremax	8½	5 9/16	4	1½	100
5340	Monax or Cremax	9	6½	4	1½	100
5295	Monax or Cremax	10	6½	4	1½	100
5296	Monax or Cremax	12	7¾	6	2	150
5296A	Monax or Cremax	12	7¾	4	1½	150
5297	Monax or Cremax	14	9	6	2	200
5298	Monax or Cremax	16	10¼	6	2	300
5645	Monax or Cremax	18	11⅜	8	3	500
5666	Monax or Cremax	20	12¾	8	3	750
5294A	J-103 Monax or Cremax	8½	5 9/16	4	1½	100
5340	J-103 Monax or Cremax	9	6½	4	1½	100
5295	J-103 Monax or Cremax	10	6½	4	1½	100
5296	J-103 Monax or Cremax	12	7¾	6	2	150
5296A	J-103 Monax or Cremax	12	7¾	4	1½	150
5297	J-103 Monax or Cremax	14	9	6	2	200
5298	J-103 Monax or Cremax	16	10¼	6	2	300
5645	J-105 Monax or Cremax	18	11⅜	8	3	500
5666	J-103 Monax or Cremax	20	12¾	8	3	750
5294A	D-56 Monax or Cremax	8½	5 9/16	4	1½	100
5340	D-56 Monax or Cremax	9	6½	4	1½	100
5295	D-56 Monax or Cremax	10	6½	4	1½	100
5296	D-56 Monax or Cremax	12	7¾	6	2	150
5296A	D-56 Monax or Cremax	12	7¾	4	1½	150
5297	D-56 Monax or Cremax	14	9	6	2	200
5298	D-56 Monax or Cremax	16	10¼	6	2	300
5645	D-56 Monax or Cremax	18	11⅜	8	3	500
5666	D-56 Monax or Cremax	20	12¾	8	3	750

*Lamp position—Represents distance in inches of lamp contact above plane of fitter screws in fixture.

Continued on next page

"The Florentine"

The Florentine in a complete range of sizes may be obtained in Monax or Cremax glass, plain and decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 5130 Monax, tested according to the IES-NELA specifications. Results obtained from this test are representative for all sizes in Monax glass. Additional data will be furnished upon request.



ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47042 ORDER No. 40367-S PLATE No. 21594

CANDLEPOWER DISTRIBUTION
No.5130 Macbeth Monax Globe*
Rendered to Macbeth Evans Glass Company

No.Submitted - Six. Light output range 82-83. Average 82.5 percent.

Lamp - 200-Watts; Gas-filled; 3280 Lumens; Bulb PS30 Clear; Medium base; Filament C-9; General service;115 volts

Holder - None submitted - surface covering globe opening - reflection factor 40percent.

Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE

	in.
a	4
b	6
c	
d	2
e	9-1/4
f	14
g	5

WEIGHT OF GLASS 3 lb. 4 oz. M 52 oz.

White diffusing glass

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° Fix	198		90° Horiz.	184	
175°	182	17	85°	188	205
165°	194	55	75°	197	209
155°	194	90	65°	210	208
145°	197	124	55°	244	219
135°	197	152	45°	275	213
125°	197	177	35°	298	187
115°	188	187	25°	317	147
105°	184	195	15°	323	91
95°	182	198	5°	324	31
			0° Zone	320	

LIGHT FLUX VALUES

ZONE	LUMENS: LAMP	LUMENS: LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0° - 60°	899	888	27	82.5
0° - 90°	1688	1510	46	
90° - 180°	1595	1195	36	
0° - 180°	3283	2705	82	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K
ML	1000	1200	1400	1900	1600	960	1650	1350	1350	1500	1100
CP PER SQ IN	2.1	2.5	2.9	3.9	3.3	2.0	3.4	2.8	2.8	3.1	2.3

*E.T.L. Identification No.1947

TESTED BY OJ PLOTTED BY OJ COMPUTED BY CHECKED BY MAW ISSUED Nov. 20th, 1928.

APPROVED BY William Plaub
ENGINEER IN CHARGE OF PHOTOMETRY

J. M. Conroy
IN CHARGE OF TEST

To Specify

The architect should write into his own specification data tabulated below under headings "Mould No." and "Description," thus, "Macbeth Florentine 5122 Monax." The brown printed decoration with color permanently fired on glass as shown in third illustration may be applied to all sizes in either Monax or Cremax glass by adding J-104 and glass desired after mould number. For example, "Macbeth Florentine 5123-A J-104 Cremax 12x4." The brown light etched Gothic fired color decoration as shown in lower illustration may be applied to all sizes by adding K-1080 after mould number—for example, "Macbeth Florentine 5138 K-1080 Monax 18 in."

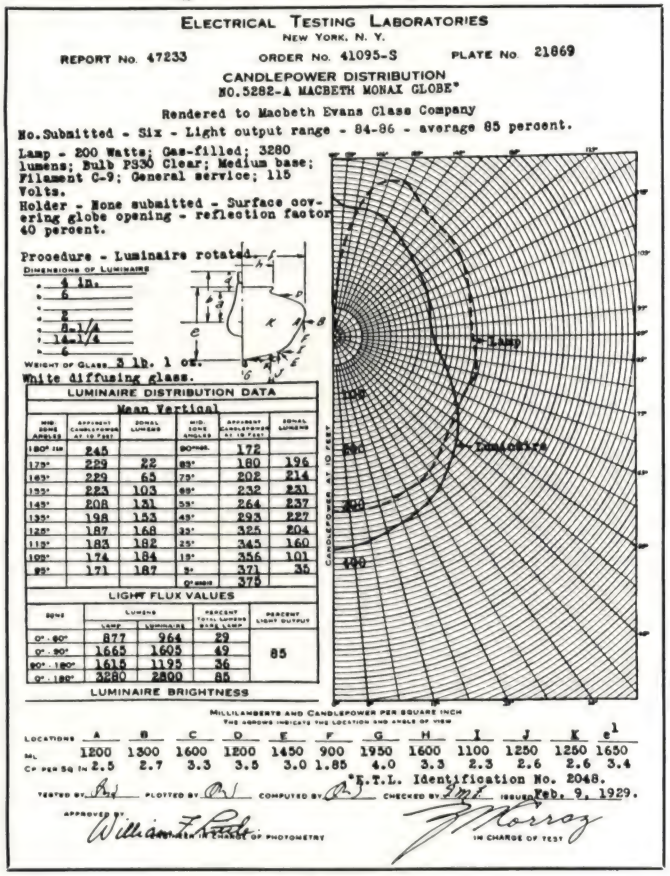
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5122	Monax or Cremax	9	5 7/8	4	1 1/2	100
5123	Monax or Cremax	12	7 5/8	6	2	150
5123A	Monax or Cremax	12	7 5/8	4	1 1/2	150
5130	Monax or Cremax	14	9 3/16	6	2	200
5133	Monax or Cremax	16	10 1/4	6	2	300
5138	Monax or Cremax	18	11 1/2	8	3	500
5122	J-104 Monax or Cremax	9	5 7/8	4	1 1/2	100
5123	J-104 Monax or Cremax	12	7 5/8	6	2	150
5123A	J-104 Monax or Cremax	12	7 5/8	4	1 1/2	150
5130	J-104 Monax or Cremax	14	9 3/16	6	2	200
5133	J-104 Monax or Cremax	16	10 1/4	6	2	300
5138	J-104 Monax or Cremax	18	11 1/2	8	3	500
5122	K-1080 Monax or Cremax	9	5 7/8	4	1 1/2	100
5123	K-1080 Monax or Cremax	12	7 5/8	6	2	150
5123A	K-1080 Monax or Cremax	12	7 5/8	4	1 1/2	150
5130	K-1080 Monax or Cremax	14	9 3/16	6	2	200
5133	K-1080 Monax or Cremax	16	10 1/4	6	2	200
5138	K-1080 Monax or Cremax	18	11 1/2	8	3	500

*Lamp position—Represents distance in inches of lamp contact above plane of fitter screws in fixture.

Continued on next page

"The Cataldo"

The Cataldo may be obtained in all sizes in Monax glass, plain or decorated. This design is standard equipment for the lighting of New York City Public Schools. Below is the Electrical Testing Laboratories' report on 5282A Monax, which is representative for all sizes, tested according to IES-NELA specifications.



ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47233 ORDER No. 41095-S PLATE No. 21869

CANDLEPOWER DISTRIBUTION
NO. 5282-A MACBETH MONAX GLOBE*

Rendered to Macbeth Evans Glass Company

No. Submitted - Six - Light output range - 84-86 - average 85 percent.

Lamp - 200 Watts; Gas-filled; 3280 lumens; Bulb PS30 Clear; Medium base; Filament C-9; General service; 115 Volts.

Holder - None submitted - Surface covering globe opening - reflection factor 40 percent.

Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE

a 4 in.
b 6
c
d 2
e 8-1/4
f 14-1/4
h 6

WEIGHT OF GLASS 3 lb. 1 oz.

White diffusing glass.

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° ISB	245		BOTTOM	172	
175°	229	22	85°	180	196
165°	229	65	75°	202	214
155°	225	103	65°	232	231
145°	208	131	55°	264	237
135°	198	153	45°	293	227
125°	187	168	35°	325	204
115°	183	182	25°	345	160
105°	174	184	15°	356	101
95°	171	187	5°	371	35
			ZENITH	375	

LIGHT FLUX VALUES

ZONE	LUMENS LAMP	LUMENS LUMINAIRE	PERCENT TOTAL LUMENS EACH LAMP	PERCENT LIGHT OUTPUT
0° - 60°	877	964	29	85
0° - 90°	1665	1605	49	
90° - 180°	1615	1195	36	
0° - 180°	3280	2800	85	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K	e^1
ML	1200	1300	1600	1200	1450	900	1950	1600	1100	1250	1250	1650
CP PER SQ IN	2.5	2.7	3.3	3.5	3.0	1.85	4.0	3.3	2.3	2.6	2.6	3.4

*E.T.L. Identification No. 2048.

TESTED BY [illegible] PLOTTED BY [illegible] COMPUTED BY [illegible] CHECKED BY [illegible] ISSUED Feb. 9, 1929.

APPROVED BY William F. Little
ENGINEER IN CHARGE OF PHOTOMETRY

[illegible] Morroz
IN CHARGE OF TEST

To Specify

The architect should write into his own specification the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Cataldo 5282-A Monax." The light etched two tone decoration permanently fired on the glass as shown in the center illustration may be applied to all sizes by adding K-313 after the mould number. For example, "Macbeth Cataldo 5270 K-313 16 in." The lined decoration in bottom illustration, in blue, brown, gray or green fired colors, may be applied to all sizes by adding D-121 after the mould number. For example, "Macbeth Cataldo 5326 D-121 Gray 9 in."

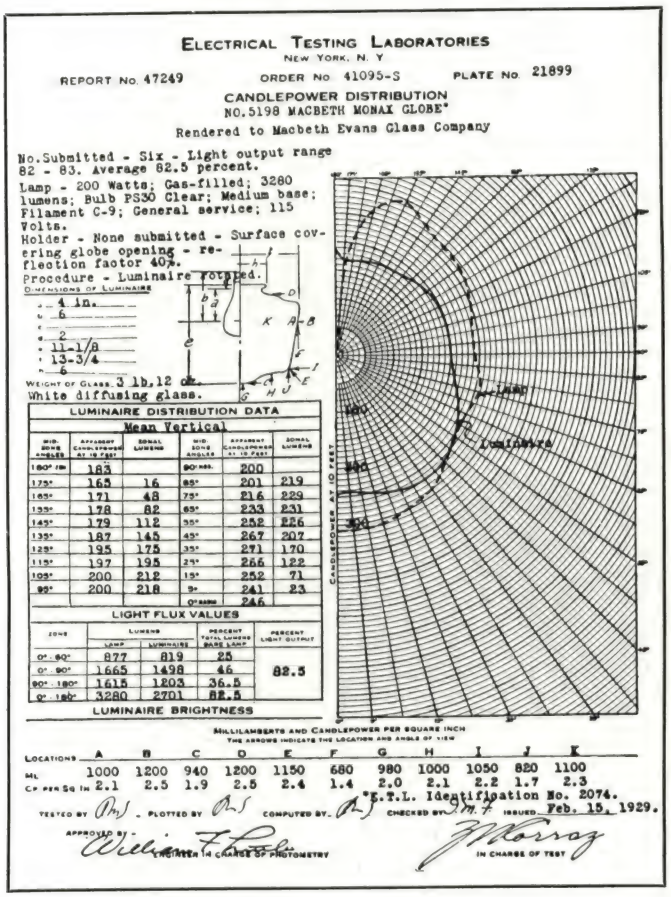
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5263	Monax	8½	5½	4	1½	100
5326	Monax	9	6	4	1½	100
5268	Monax	10	6⅜	4	1½	100
5269	Monax	12	7¾	6	2	150
5269A	Monax	12	7¾	5	1½	150
5269B	Monax	12	7¾	4	1½	150
5282	Monax	14	8⅜	5	2	200
5282A	Monax	14	8⅜	6	2	200
5270	Monax	16	10	6	2	300
5263	K-313 Monax	8½	5½	4	1½	100
5326	K-313 Monax	9	6	4	1½	100
5268	K-313 Monax	10	6⅜	4	1½	100
5269	K-313 Monax	12	7¾	6	2	150
5269A	K-313 Monax	12	7¾	5	1½	150
5269B	K-313 Monax	12	7¾	4	1½	150
5282	K-313 Monax	14	8⅜	5	2	200
5282A	K-313 Monax	14	8⅜	6	2	200
5270	K-313 Monax	16	10	6	2	300
5263	D-121 Monax	8½	5½	4	1½	100
5326	D-121 Monax	9	6	4	1½	100
5268	D-121 Monax	10	6⅜	4	1½	100
5269	D-121 Monax	12	7¾	6	2	150
5269A	D-121 Monax	12	7¾	5	1½	150
5269B	D-121 Monax	12	7¾	4	1½	150
5282	D-121 Monax	14	8⅜	5	2	200
5282A	D-121 Monax	14	8⅜	6	2	200
5270	D-121 Monax	16	10	6	2	300

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture

Continued on next page

"The Ravenna"

The Ravenna, in a complete range of sizes, may be obtained in Monax glass, plain or decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 5198 Monax, tested according to the IES-NELA specifications. The results obtained from this test are representative for all sizes. Additional data will be furnished upon request.



ELECTRICAL TESTING LABORATORIES
New York, N. Y.

REPORT No. 47249 ORDER No. 41095-S PLATE No. 21899

CANDLEPOWER DISTRIBUTION
NO. 5198 MACBETH MONAX GLOBE*
Rendered to Macbeth Evans Glass Company

No. Submitted - Six - Light output range 82 - 83. Average 82.5 percent.
Lamp - 200 Watts; Gas-filled; 3280 lumens; Bulb PS30 Clear; Medium base; Filament C-9; General service; 115 Volts.
Holder - None submitted - Surface covering globe opening - reflection factor 40%.
Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE
a — 4 in.
b — 6
c —
d — 2
e — 11-1/8
f — 13-3/4
h — 6

WEIGHT OF GLASS 3 lb. 12 oz.
White diffusing glass.

LUMINAIRE DISTRIBUTION DATA
Mean Vertical

MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° (Nadir)	183		90° (Horiz.)	200	
175°	165	16	85°	201	219
165°	171	48	75°	216	229
155°	178	82	65°	233	231
145°	179	112	55°	252	226
135°	187	145	45°	267	207
125°	195	175	35°	271	170
115°	197	195	25°	266	122
105°	200	212	15°	252	71
95°	200	218	5°	241	23
			0° (Zenith)	246	

LIGHT FLUX VALUES

ZONE	LUMENS: LAMP	LUMENS: LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0°-90°	877	819	25	
0°-90°	1665	1498	46	82.5
90°-180°	1615	1203	36.5	
0°-180°	3280	2701	82.5	

LUMINAIRE BRIGHTNESS
Millilamberts and Candlepower per Square Inch
The arrows indicate the location and angle of view

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K
ML	1000	1200	940	1200	1150	680	980	1000	1050	820	1100
CP per Sq In	2.1	2.5	1.9	2.5	2.4	1.4	2.0	2.1	2.2	1.7	2.3

*I.T.L. Identification No. 2074.
TESTED BY RJ PLOTTED BY RS COMPUTED BY RJ CHECKED BY WH ISSUED Feb. 15, 1929.
APPROVED BY William F. Lucke, Engineer in Charge of Photometry
J. Morray, In Charge of Test

To Specify

The architect should write into his own specification the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Ravenna 5179 Monax 8 in." The brown light etched decoration shown in the lower illustration, with color permanently fired on the glass, may be applied to all sizes by adding the number K-314 after the mould number. For example, "Macbeth Ravenna 5179 K-314 Monax 8 in."

Mold No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5179	Monax	8	6	4	1½	100
5881	Monax	9	6¾	4	1½	100
5196	Monax	10	7½	6	2	100
5196A	Monax	10	7½	4	1½	100
5197	Monax	12	9½	6	2	150
5197A	Monax	12	9½	4	1½	150
5198	Monax	14	11⅛	6	2	200
5199	Monax	14	12¾	6	2	300
5179	K-314 Monax	8	6	4	1½	100
5881	K-314 Monax	9	6¾	4	1½	100
5196	K-314 Monax	10	7½	6	2	100
5196A	K-314 Monax	10	7½	4	1½	100
5197	K-314 Monax	12	9½	6	2	150
5197A	K-314 Monax	12	9½	4	1½	150
5198	K-314 Monax	14	11⅛	6	2	200
5199	K-314 Monax	14	12¾	6	2	300

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

Continued on next page

"The Hallstadt"

The Hallstadt, in a complete range of sizes, may be obtained in Monax or Cremax glass, plain or decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 3756 Monax, tested according to IES-NELA specifications. The results obtained from this test are representative for all sizes in Monax glass. Additional data will be furnished upon request.

ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47046 ORDER No. 40367-S PLATE No. 21607

CANDLEPOWER DISTRIBUTION
NO. 3756 "MACBETH MONAX GLOBE"
Rendered to Macbeth-Evans Glass Company

Number Submitted - Six - Light output range 83-86. Average 84.5 percent.

Lamp - 200-Watts; Gasfilled; 3280 Lumens; Bulb PS30 Clear; Medium base; Filament C9; General Service; 115 Volts.

Holder - None submitted - Surface covering globe opening; refl. fac. 40 percent.

Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE
a - 4 in.
b -
c -
d - 8
e - 10-1/4
f - 13-3/4
h -

WEIGHT OF GLASS 3 lb. 6 oz. (54 oz.)

White Diffusing Glass

LUMINAIRE DISTRIBUTION DATA
Mean Vertical

Mid-zone angles	Apparent candlepower at 10 feet	Zonal lumens	Mid-zone angles	Apparent candlepower at 10 feet	Zonal lumens
180° to	200		90° Mid.	201	
173°	200	17	80°	207	226
165°	200	57	70°	212	224
155°	200	93	60°	223	221
145°	200	126	50°	234	210
135°	200	155	40°	261	202
125°	197	177	30°	290	188
115°	189	188	20°	312	144
105°	190	201	10°	330	93
95°	200	218	0°	330	31
			0° Mean	330	

LIGHT FLUX VALUES

Zone	Lumens: Lamp	Lumens: Luminaire	Percent total lumens of the lamp	Percent light output
0°-90°	899	862	26	84.5
0°-90°	1688	1533	47	
90°-180°	1595	1238	37.5	
0°-180°	3283	2765	84.5	

LUMINAIRE BRIGHTNESS
MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
The arrows indicate the location and angles of view

Locations	A	B	C	D	E	F	G	H	I	J	K	E 1
Ml.	1100	1300	1150	1800	1300	960	1150	1250	1200	1250	1200	1400
Cp per Sq. in.	2.3	2.7	2.4	3.7	2.7	2.0	2.4	2.6	2.5	2.6	2.5	2.9

*E.T.L. Identification No. 1957.

TESTED BY W PLOTTED BY J COMPUTED BY — CHECKED BY — ISSUED NOV. 22, 1928.

APPROVED William F. Little, Engineer in Charge of Photometry

J. Morraz, In Charge of Test

To Specify

The architect should write into his own specification the data tabulated below under the headings "Mould No." and "Description," thus, "Maxbeth Hallstadt 4309 Monax." The brown printed decoration with color permanently fired on the glass as shown in the bottom illustration may be applied to all sizes by adding the number J-95 after the mould number. For example, "Macbeth Hallstadt 3756 J-95 Cremax 14."

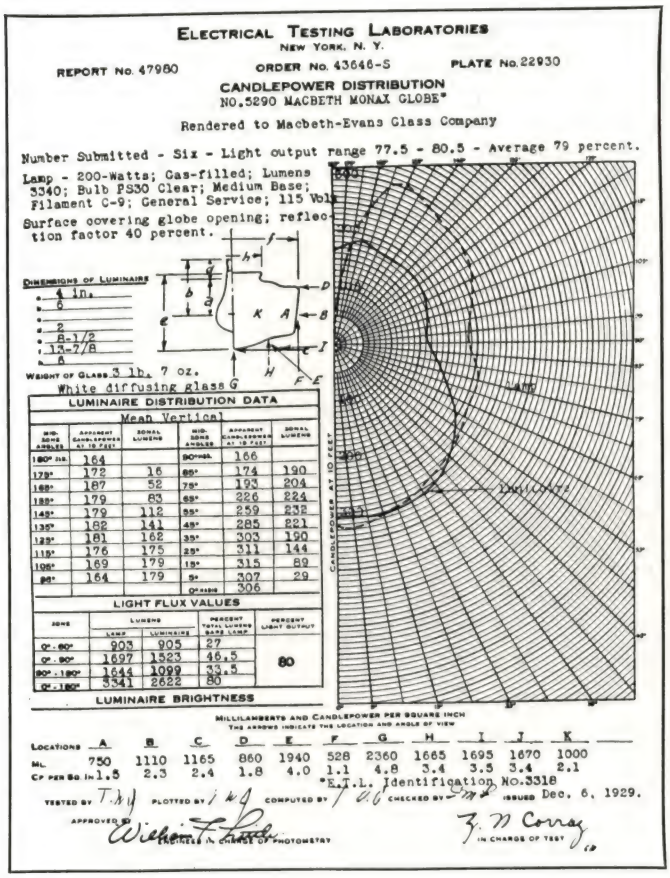
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
4385	Monax or Cremax	10	7⅝	4	1½	100
4309	Monax or Cremax	12	9½	6	2	150
4309A	Monax or Cremax	12	9½	4	1½	150
3756	Monax or Cremax	14	10	6	2	200
4386	Monax or Cremax	16	12	6	2	300
5667	Monax or Cremax	18	13½	8	3	500
4385	J-95 Monax or Cremax	10	7⅝	4	1½	100
4309	J-95 Monax or Cremax	12	9½	6	2	150
4309A	J-95 Monax or Cremax	12	9½	4	1½	150
3756	J-95 Monax or Cremax	14	10	6	2	200
4386	J-95 Monax or Cremax	16	12	6	2	300
5667	J-95 Monax or Cremax	18	13½	8	3	500

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

Continued on next page

"The Norman"

The Norman, in a complete range of sizes, may be obtained in Monax glass, plain or decorated. Below is shown a reproduction of Electrical Testing Laboratories' report on 5290 Monax. The results obtained from this test are representative for all sizes. Additional data will be furnished upon request.



ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47980 ORDER No. 43646-S PLATE No. 22930

CANDLEPOWER DISTRIBUTION
NO. 5290 MACBETH MONAX GLOBE*

Rendered to Macbeth-Evans Glass Company

Number Submitted - Six - Light output range 77.5 - 80.5 - Average 79 percent.

Lamp - 200-Watts; Gas-filled; Lumens 3340; Bulb PS30 Clear; Medium Base; Filament C-9; General Service; 115 Volts

Surface covering globe opening; reflection factor 40 percent.

DIMENSIONS OF LUMINAIRE
A 4 in.
B 6
C
D 2
E 8-1/2
F 13-7/8
A

WEIGHT OF GLASS 3 lb. 7 oz.

White diffusing glass G

LUMINAIRE DISTRIBUTION DATA

Mean Vertical

MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS	MID-ZONE ANGLES	APPARENT CANDLEPOWER AT 10 FEET	ZONAL LUMENS
180° no.	164		90° hor.	166	
178°	172	16	85°	174	190
168°	187	52	75°	193	204
158°	179	83	65°	226	224
148°	179	112	55°	259	232
138°	182	141	45°	285	221
128°	181	162	35°	303	190
118°	176	175	25°	311	144
108°	169	179	15°	315	82
98°	164	179	5°	307	29
			0° zone	306	

LIGHT FLUX VALUES

ZONE	LUMENS: LAMP	LUMENS: LUMINAIRE	PERCENT TOTAL LUMENS BARE LAMP	PERCENT LIGHT OUTPUT
0°-60°	903	905	27	
0°-90°	1697	1523	46.5	80
90°-180°	1644	1099	33.5	
0°-180°	3341	2622	80	

LUMINAIRE BRIGHTNESS

MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
THE ARROWS INDICATE THE LOCATION AND ANGLE OF VIEW

LOCATIONS	A	B	C	D	E	F	G	H	I	J	K
ML	750	1110	1165	860	1940	528	2360	1665	1695	1670	1000
CP PER SQ. IN.	1.5	2.3	2.4	1.8	4.0	1.1	4.8	3.4	3.5	3.4	2.1

*E.T.L. Identification No. 3318

TESTED BY T.H.H. PLOTTED BY J.W.J. COMPUTED BY J.A.C. CHECKED BY J.M.C. ISSUED Dec. 6, 1929.

APPROVED Wilhelm L. Lindo ENGINEER IN CHARGE OF PHOTOMETRY

F. M. Conroy IN CHARGE OF TEST

To Specify

The architect should write into his own specification the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Norman 5274 Monax 12x6 in." The brown printed decoration with color permanently fired on the glass as shown in lower illustration may be applied to all sizes by adding the number J-105 after the mould number. For example, "Macbeth Norman 5291 J-105 Monax 16 in."

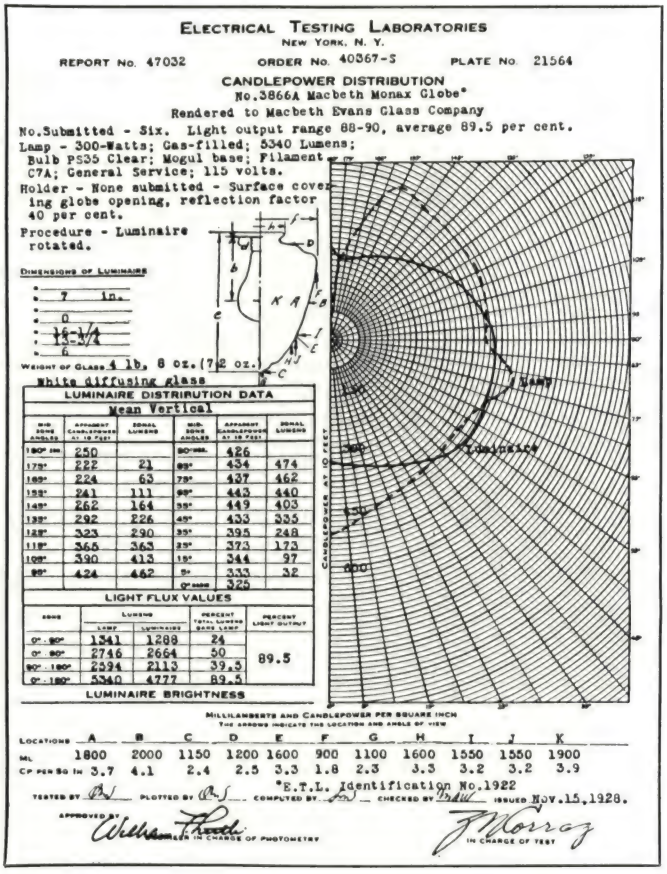
Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5288	Monax	8	5¾	4	1½	100
5257	Monax	9	6⅜	4	1½	100
5285	Monax	10	7⅛	4	1½	100
5274	Monax	12	7¼	6	2	150
5289	Monax	12	7¼	5	2	150
5290	Monax	14	8¼	6	2	200
5291	Monax	16	11 7/16	6	2	300
5288	J-105 Monax	8	5¾	4	1½	100
5257	J-105 Monax	9	6⅜	4	1½	100
5285	J-105 Monax	10	7⅛	4	1½	100
5274	J-105 Monax	12	7¼	6	2	150
5289	J-105 Monax	12	7¼	5	2	150
5290	J-105 Monax	14	8¼	6	2	200
5291	J-105 Monax	16	11 7/16	6	2	300

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

Continued on next page

"The Acorn"

The Acorn, in a complete range of sizes, may be obtained in plain or decorated Monax glass. Below is shown a reproduction of Electrical Testing Laboratories' report on 3866A Monax, tested according to IES-NELA specifications. The results obtained from this test are representative for all sizes. Additional data will be furnished upon request.



ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.

REPORT No. 47032 ORDER No. 40367-S PLATE No. 21564

CANDLEPOWER DISTRIBUTION
No.3866A Macbeth Monax Globe*
Rendered to Macbeth Evans Glass Company

No.Submitted - Six. Light output range 88-90, average 89.5 per cent.
Lamp - 300-Watts; Gas-filled; 5340 Lumens; Bulb PS35 Clear; Mogul base; Filament C7A; General Service; 115 volts.
Holder - None submitted - Surface covering globe opening, reflection factor 40 per cent.
Procedure - Luminaire rotated.

DIMENSIONS OF LUMINAIRE
7 in.
0
16-1/4
6

WEIGHT OF GLASS 4 lb. 8 oz. (72 oz.)
White diffusing glass

LUMINAIRE DISTRIBUTION DATA
Mean Vertical

Mid-zone angles	Apparent candlepower at 10 feet	Zonal lumens	Mid-zone angles	Apparent candlepower at 10 feet	Zonal lumens
180° zen.	250		80°-90°	426	
170°	222	21	85°	434	474
160°	224	65	75°	427	462
150°	241	111	65°	443	440
140°	262	164	55°	449	403
130°	292	226	45°	433	335
120°	323	290	35°	395	248
110°	365	363	25°	373	173
100°	390	413	15°	344	97
90°	424	462	5°	333	32
			0° nadir	325	

LIGHT FLUX VALUES

Zone	Lumens: Lamp	Lumens: Luminaire	Percent total lumens each lamp	Percent light output
0°-90°	1341	1288	24	
0°-80°	2746	2664	50	89.5
90°-180°	2594	2113	39.5	
0°-180°	5340	4777	89.5	

LUMINAIRE BRIGHTNESS
MILLILAMBERTS AND CANDLEPOWER PER SQUARE INCH
The arrows indicate the location and angle of view.

Locations	A	B	C	D	E	F	G	H	I	J	K
ML	1800	2000	1150	1200	1600	900	1100	1600	1550	1550	1900
CP per sq in	3.7	4.1	2.4	2.5	3.3	1.8	2.3	3.3	3.2	3.2	3.9

*E.T.L. Identification No.1922
TESTED BY ... PLOTTED BY ... COMPUTED BY ... CHECKED BY ... ISSUED Nov. 15, 1928.
APPROVED BY ... ENGINEER IN CHARGE OF PHOTOMETRY ... ENGINEER IN CHARGE OF TEST

To Specify

The architect should write into his own specification the data tabulated below under the headings "Mould No." and "Description," thus, "Macbeth Acorn 3869 Monax." The light etched decorations with colors permanently fired on the glass may be applied to all sizes. For the center decoration add K-181 after the mould number. For example, "Macbeth Acorn 3870 K-181 Monax Gray." K-181 may be ordered in either gray or brown. For the bottom decoration which is furnished in brown or gray add K-307. For example, "Macbeth Acorn 3866-A K-307 Monax Brown."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position	Recommended wattage
3870	Monax	8	9 5/8	4	zero	100
3864	Monax	10	11 7/8	6	zero	150
3869	Monax	12	14	6	zero	200
3866A	Monax	14	16 1/2	6	zero	300
3870	K-181 Monax	8	9 5/8	4	zero	100
3864	K-181 Monax	10	11 7/8	6	zero	150
3869	K-181 Monax	12	14	6	zero	200
3866A	K-181 Monax	14	16 1/2	6	zero	300
3870	K-307 Monax	8	9 5/8	4	zero	100
3864	K-307 Monax	10	11 7/8	6	zero	150
3869	K-307 Monax	12	14	6	zero	200
3866A	K-307 Monax	14	16 1/2	6	zero	300

*Lamp position—Zero under the heading "lamp position" indicates that the lamp contact should be in the same plane with the fitter screws of the fixture.

Continued on next page

"The Gothic"

The Gothic, especially suitable for church lighting, is available in a complete range of sizes in both Monax and Cremax glass.

To Specify

The architect should write into his own specification the data tabulated under the headings "Mould No." and "Description," thus, "Macbeth Gothic 3804 Monax" (or Cremax if the more colorful glass is desired).

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
3801	Monax	6	6 5/8	3 1/4	1/2	60
3802	Monax	8	8 7/8	4	zero	100
3803	Monax	10	11 1/4	5	zero	150
3804	Monax	12	13 1/2	6	zero	200
3805A	Monax	14	15 1/2	6	zero	300
3801	Cremax	6	6 5/8	3 1/4	1/2	60
3802	Cremax	8	8 7/8	4	zero	100
3803	Cremax	10	11 1/4	5	zero	150
3804	Cremax	12	13 1/2	6	zero	200
3805A	Cremax	14	15 1/2	6	zero	300

*Lamp position—Represents distance in inches of the lamp contact above the plane of the fitter screws in the fixture. Zero indicates same plane as the fitter screws.

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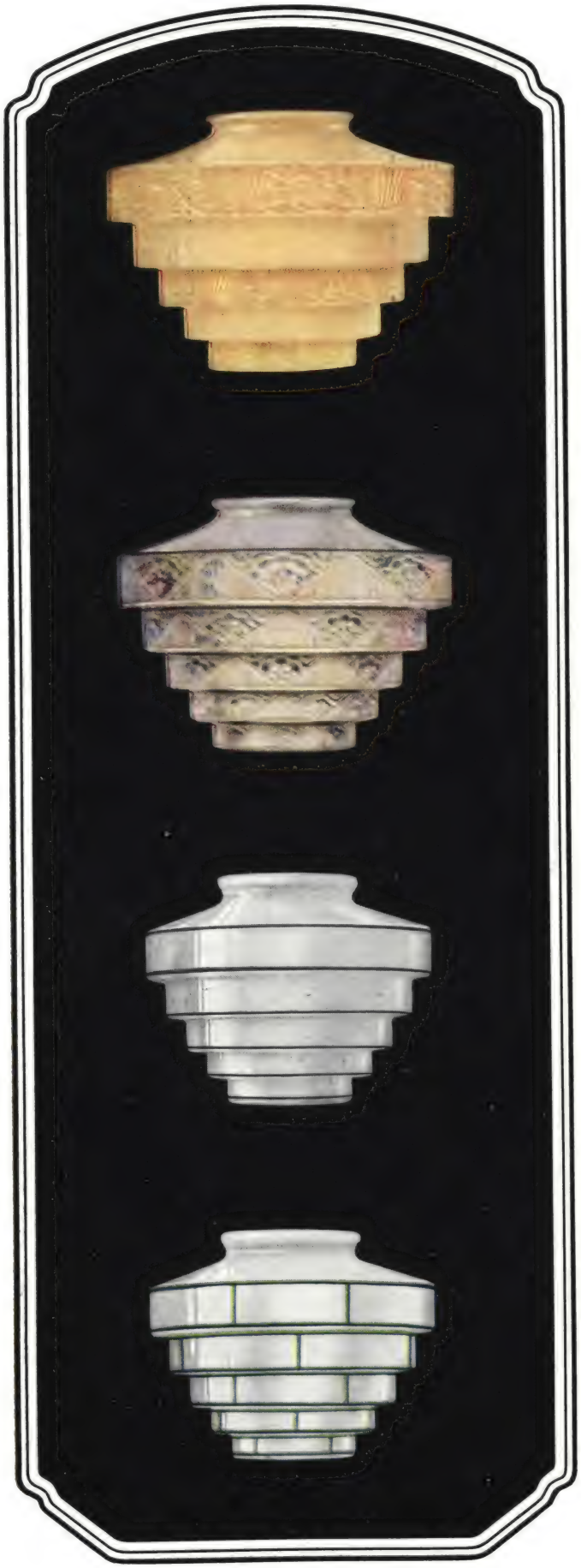

"The Terrell"

(Original)

Etched and Decorated in Colors

Distinctly "moderne" design by Miss Maude P. Terrell, erstwhile dramatic artist whose success in selling artistic lighting effects has been definitely established in metropolitan New York. This globe in Cremax glass is used in lighting the American Woman's Association Building recently completed in New York.

In the table below K-308 indicates a lightly etched and permanently fired brown decoration on Cremax globes; E-3, a deeply etched modernistic design on crystal iridescent globes; D-121, lines of blue, green, brown or black fired colors around the steps of either Monax or Cremax globes; D-143, a tile decoration in green, brown, blue or black fired colors applied to Monax or Cremax globes.

To Specify

The architect should write into his own specification the data under the headings "Mould No." and "Description" for the particular globe desired. This will automatically assure the selected style, size, color, glass and decoration. For example, "Macbeth Terrell 5651-D-121 Cremax Black" will designate a Cremax globe, 14 in. in diameter, 10⅜ in. deep with a fitter 6 in. in diameter, the globe decorated with black lines permanently fired on the glass.

Note: Macbeth-Evans Glass Company is licensed by M. P. Terrell to manufacture and sell "The Terrell Globes" under U. S. Patent 77794.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
5649	K-308 Cremax	8	6 1/16	4	1½	100
5652	K-308 Cremax	10	7 5/8	4	1½	100
5653	K-308 Cremax	12	9	6	2	150
5653A	K-308 Cremax	12	9	4	1½	150
5651	K-308 Cremax	14	10 3/16	6	2	200
5654	K-308 Cremax	16	11½	6	2	300
5649	E-3 Crystal Etched	8	6 1/16	4	1½	100
5652	E-3 Crystal Etched	10	7 5/8	4	1½	100
5653	E-3 Crystal Etched	12	9	6	2	150
5653A	E-3 Crystal Etched	12	9	4	1½	150
5651	E-3 Crystal Etched	14	10 3/16	6	2	200
5654	E-3 Crystal Etched	16	11½	6	2	300
5649	D-121 Monax or Cremax	8	6 1/16	4	1½	100
5652	D-121 Monax or Cremax	10	7 5/8	4	1½	100
5653	D-121 Monax or Cremax	12	9	6	2	150
5653A	D-121 Monax or Cremax	12	9	4	1½	150
5651	D-121 Monax or Cremax	14	10 3/16	6	2	200
5654	D-121 Monax or Cremax	16	11½	6	2	300
5649	†D-143 Monax or Cremax	8	6 1/16	4	1½	100

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

†D-143 tile decoration regularly supplied in the 8-in. size only.

Continued on next page

"The Terrell"

(Original)

Plain

The Terrell design in plain Monax and Cremax globes with auxiliary equipment in electric shades and close ceiling bowls. The shades and bowls as indicated in the table below are furnished plain and with K-308, E-3 and D-121 and D-143 decorations (see previous page). No. 2266 shades may be used on either upright or inverted brackets. No. 5646 bowls may be used advantageously under balconies where low ceilings necessitate the use of a hinged ceiling band. D-121 and D-143 decorations are furnished in green, brown, blue or black.

To Specify

The architect should write into his own specification the data under the headings "Mould No." and "Description" for the particular glass desired. This will automatically assure the selected style, color, glass and decoration. For example, "Macbeth Terrell Shade 2266 K-308 Cremax" will designate a Cremax shade with 2¼-in. fitter and brown modernistic fired color decoration to match globe on page 17. Macbeth 5646 E-3 will designate Crystal iridescent ceiling bowl with deep etched modernistic design to match globe on page 17.

Note: Macbeth-Evans Glass Company is licensed by M. P. Terrell to manufacture and sell "The Terrell Globes" under U. S. Patent 77794.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position, above, in.	Recommended wattage
2266	Monax or Cremax	4	4¼	2¼		25 to 60
2266	K-308 Cremax	4	4¼	2¼		25 to 60
2266	E-3 Crystal Etched	4	4¼	2¼		25 to 60
2266	D-121 Monax or Cremax	4	4¼	2¼		25 to 60
2266	D-143 Monax or Cremax	4	4¼	2¼		25 to 60
5646	Monax or Cremax	10	4½			60 to 100
5646	K-308 Cremax	10	4½			60 to 100
5646	E-3 Crystal Etched	10	4½			60 to 100
5646	D-121 Monax or Cremax	10	4½			60 to 100
5649	Monax or Cremax	8	6 1/16	4	1½	100
5652	Monax or Cremax	10	7⅝	4	1½	100
5653	Monax or Cremax	12	9	6	2	150
5653A	Monax or Cremax	12	9	4	1½	150
5651	Monax or Cremax	14	10 3/16	6	2	200
5654	Monax or Cremax	16	11½	6	2	300

*Lamp position—Represents the distance in inches of the lamp contact above the plane of the fitter screws in the fixture.

Continued on next page

Romanesque Stalactites and Shallow Bowls in Cremax Glass

Romanesque stalactites in a variety of sizes are especially suitable for church lighting. They are regularly supplied only in Cremax glass.

In the table below you will note that the shallow bowls may be secured in plain or iridescent Cremax; D-121 Black fired color lines; K-300 decoration, a light etching in black with touches of red fired colors; K-301 light etched design in brown fired color. The bowls will be drilled with a ½-in. hole in the center for supporting stem unless other drilling is specified.

To Specify

The architect should write into his own specification the data under the headings "Mould No." and "Description" for the particular glass desired. This will automatically assure the selected style, size, color, glass and decoration. For example, "Macbeth Romanesque Stalactite 4683 Cremax" will designate a Cremax stalactite with 6-in. diameter, 11-in. depth and fitter diameter of 6 in., or "Macbeth Shallow Bowl 5013 K-300 Cremax" will designate a Cremax bowl 14 in. in diameter, 4 1/16 in. in depth with K-300 light etched decoration and ½-in. hole drilled in the center of the bottom.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	Recommended wattage
2346	Cremax Stalactite	4	6	4	60
4468	Cremax Stalactite	4	8	4	100
4682	Cremax Stalactite	5	9½	5	100
4683	Cremax Stalactite	6	11	6	150
4686	Cremax Stalactite	7	14	7	200
4684	Cremax Stalactite	8	16	8	300
4685	Cremax Stalactite	9	14	9	200
4691	Cremax Stalactite	9	18	9	500
4695	Cremax Stalactite	10	20	10	750
4999	Cremax Bowl	10	3⅛		100
5012	Cremax Bowl	12	3¾		100
5013	Cremax Bowl	14	4 1/16		150
5014	Cremax Bowl	16	5		200
4999	Cremax, iridescent Bowl	10	3⅛		100
5012	Cremax, iridescent Bowl	12	3¾		100
5013	Cremax, iridescent Bowl	14	4 1/16		150
5014	Cremax, iridescent Bowl	16	5		200
4999	D-121 Cremax Bowl	10	3⅛		100
5012	D-121 Cremax Bowl	12	3¾		100
5013	D-121 Cremax Bowl	14	4 1/16		150
5014	D-121 Cremax Bowl	16	5		200
4999	K-300 Cremax Bowl	10	3⅛		100
5012	K-300 Cremax Bowl	12	3¾		100
5013	K-300 Cremax Bowl	14	4 1/16		150
5014	K-300 Cremax Bowl	16	5		200
4999	K-301 Cremax Bowl	10	3⅛		100
5012	K-301 Cremax Bowl	12	3¾		100
5013	K-301 Cremax Bowl	14	4 1/16		150
5014	K-301 Cremax Bowl	16	5		200

Continued on next page

"The Dijon"

The Dijon, a lantern of interesting design, may be obtained in three sizes. Three distinctive decorations on Cremax glass may be applied to all sizes. The colors are permanently fired on the glass.

To Specify

The architect should write into his own specification the data under the headings "Mould No." and "Description" for the particular globe desired. This will automatically assure the selected size and decoration. For example, "Macbeth Dijon 4454 K-291 Cremax" indicates a lantern 7½x10⅝x4 in. decorated as shown in the top illustration. "Macbeth Dijon 4470 K-284 Cremax" indicates a lantern 10x13⅞x6 in. with the decoration shown in the center illustration and "Macbeth Dijon 4477 K-108 Cremax" indicates a lantern 12x16½x6 in. with the Gothic decoration shown in the bottom illustration. All decorations are lightly etched on the glass.

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	*Lamp position	Recommended wattage
4454	K-291 Cremax	7½	10⅜	4	zero	100
4470	K-291 Cremax	10	13⅞	6	zero	200
4477	K-291 Cremax	12	16½	6	zero	300
4454	K-284 Cremax	7½	10⅜	4	zero	100
4470	K-284 Cremax	10	13⅞	6	zero	200
4477	K-284 Cremax	12	16½	6	zero	300
4454	K-108 Cremax	7½	10⅜	4	zero	100
4470	K-108 Cremax	10	13⅞	6	zero	200
4477	K-108 Cremax	12	16½	6	zero	300

*Lamp position—Zero indicates that the lamp contact is in the same plane as the fitter screws of the fixture.

Continued on next page

Monax, Cremax and Alba Shades

The first three illustrations represent No. 4221 half shades, particularly suitable for bath rooms. The fourth illustration from the top, the ever popular Mission Bell shade in four sizes; the fifth illustration, another popular shade of bowl type available in three sizes. The three lower illustrations, pressed shades of Alba translucent glass—first the bell type with scalloped edge available in five sizes, the shallow type available in three sizes, and the bell type with plain edge available in four sizes.

To Specify

The architect should write into his own specification the data under the headings "Mould No." and "Description." This will automatically assure the correct style, size, color, decoration and glass. Half shade No. 4221 is available in Monax or Cremax plain. D-121 lined decoration in blue, green or brown on Monax or Cremax glass, and banded decoration D-56 in blue, green or brown on Monax or Cremax glass. All colors are permanently fired on the glass. Specifications should read, for example, "Macbeth 4221 D-121 Monax Blue"; "Macbeth 4221 D-56 Cremax Green"; "Macbeth 1623-A Monax Bowl Type"; "Macbeth 3431 Alba Flat Type."

Mould No.	Description	Diam., in.	Depth, in.	Fitter in.	Recommended wattage
4221	Monax or Cremax, half shade	6	3 7/32	2 1/4	40
4221	D-121 Monax or Cremax, half shade	6	3 7/32	2 1/4	40
4221	D-56 Monax or Cremax, half shade	6	3 7/32	2 1/4	40
1358	Monax, mission bell	4 1/2	4 1/8	2 1/4	25
1391	Monax, mission bell	6	4 1/4	2 1/4	40
1460	Monax, mission bell	7	4 1/2	2 1/4	50
1461	Monax, mission bell	8	5	2 1/4	60
5307	Monax, bowl type	6 1/4	4 3/4	2 1/4	40
1623A	Monax, bowl type	7	5	2 1/4	50
5308	Monax, bowl type	8	5 3/4	2 1/4	60
3419	Alba, scalloped bottom	5 1/8	3 5/8	2 1/4	25
3420	Alba, scalloped bottom	5 3/4	4 5/8	2 1/4	40
3424	Alba, scalloped bottom	7 1/4	4 3/4	2 1/4	50
3429	Alba, scalloped bottom	8 1/4	6	2 1/4	60
3446	Alba, scalloped bottom	10 5/16	6 3/4	3 1/4	100
3431	Alba, flat type	7 3/4	3 1/8	2 1/4	50
3432	Alba, flat type	9	3 5/8	2 1/4	60
3438	Alba, flat type	11	4 3/8	2 1/4	100
3816	Alba, plain bottom	6 5/8	4 1/8	2 1/4	40
3817	Alba, plain bottom	7 1/4	4 1/4	2 1/4	50
3818	Alba, plain bottom	8 1/2	5 5/8	2 1/4	60
3819	Alba, plain bottom	10 1/4	6 3/4	3 1/4	100

Continued on next page

Monax, Cremax and Alba Hemispheres and Porch Globes

The first two illustrations in the panel show blown lip type hemispheres in Monax and Cremax. They are for use particularly in close ceiling bands and are available in three popular sizes. The third hemisphere is in pressed, ribbed, Alba glass and available in five sizes. No. 4261 ribbed porch globes may be secured in Monax glass with black lines or Cremax Iridescent glass with brown lines permanently fired on the glass. The bottom illustration shows an enclosing globe of rather staple design in plain Monax, primarily intended for commercial lighting. There are three sizes.

To Specify

The architect should write into his own specification the data under the headings, "Mould No." and "Description." This will automatically assure the correct style, size, color, decoration and glass. Blown hemispheres in Monax or Cremax are covered by Nos. 175, 165 and 160-A. Pressed ribbed Alba hemispheres are covered by Nos. 3484, 5382, 5383, 5385 and 3461. Ribbed porch globes, No. 4261, should be written in thus: "Macbeth 4261 D-120 Cremax Iridescent," or "Macbeth 4261 D-120 Monax." The commercial globe in bottom illustration would be specified thus: "Macbeth 2482 Monax 10."

Mould No.	Description	Diam., in.	Depth, in.	Fitter diam., in.	Recommended wattage
175	Monax or Cremax	8	4		60
165	Monax or Cremax	10	5		100
160A	Monax or Cremax	12	6		150
3484	Alba	8	4		60
5382	Alba	10	5		100
5383	Alba	12	6		150
5385	Alba	14	7		200
3461	Alba	16	8		300
4261	D-120 Monax	6¼	6⅝	3¼	60
4261	D-120 Cremax iridescent	6¼	6⅝	3¼	60
5183	Monax	8	7½	4	100
2482	Monax	10	9	6	100
5184	Monax	12	10⅜	6	150

ESTABLISHED 1890

PASS & SEYMOUR, INC.

Manufacturer National Code Standard Electric Wiring Devices

Solvay Station
SYRACUSE, N. Y.

NEW YORK OFFICE, 71-73 Murray Street
CHICAGO OFFICE, 605 West Washington Boulevard
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P&S Alabax Lighting Units

P & S Alabax Receptacles

Electric units which are ideally adapted for ceiling and sidewall outlets in kitchen, bathroom, bedroom, pantry, laundry, hall, closet, breakfast nook, nursery, sunroom and garage, and all places where trim lighting fixtures are in order. Supplied either for use with glassware or without. Designs are made for either individual or wall switch control.

P&S
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ALABAX
LIGHTING
UNITS

P & S Alabax Brackets

Particularly recommended for use as a sidewall unit in any room where beauty, cleanliness, safety and sanitation are considered.

Made with or without convenience outlets which permit use of electrical appliances. Designed for either pull chain or wall switch control.

Features of Alabax Lighting Units

P & S Alabax Porcelain Receptacles and Brackets are made in a plain white finish and in a variety of beautiful pastel colors and stripings that harmonize with any decorative scheme. The colors are "fired in" the porcelain for permanence.

Heat, moisture or bright sunshine cannot injure the rich lustre of P & S Alabax Units. Nor will the finish chip, peel, tarnish or rust.

A damp cloth cleans the surface of P & S Alabax spotlessly. Soaps, lye products and germicidal solutions will not harm the finish.

P & S Alabax Receptacles and Brackets are made under the rigid specifications of the National Electrical Code and the Underwriters' Laboratories, Inc.

In many localities porcelain fixtures are required by local ordinances.

Uses

P & S Alabax Brackets and Receptacles will give most satisfactory service in homes, hotels, hospitals, factories, clubs, stores, offices, beauty parlors, barber shops and other places where safety, durability and beauty are factors in the selection of lighting fixtures.

Leaflet

Complete illustrated leaflet showing P & S Alabax Units in full colors sent free, upon request. Glassware and lamps are not supplied and are not included in trade numbers.

The Alabax devices above illustrated are only a few of a complete line.

A Few P & S Standard Electric Wiring Devices

Alabax brackets
Alabax receptacles
Aluminum sockets
Attachment plugs
Brass shell sockets
Candelabra sockets
Canopy switches
Convenience outlets
Decorative sockets
Festoon sockets
Fixture sockets
Intermediate base sockets
Mogul sockets
Pendant switches
Porcelain receptacles
Porcelain sockets
Push button switches
Receptacles, brass and porcelain
Rosettes, brass and porcelain
Shade holders
Shurlock lock sockets, brass and porcelain
Sign receptacles
Snap switches
Switch bases
Switches, tumbler or toggle
Transformer cut-outs

Catalogue

Complete catalogue of P & S Standard Wiring Devices sent free upon request.

THE PHOENIX GLASS COMPANY

Manufacturers of Illuminating Glassware

MONACA, PA

SALES OFFICES

BOSTON, MASS., 161 Summer Street
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Product

LIGHTING GLASSWARE, including Alabaster and Radiant Glass for commercial lighting.

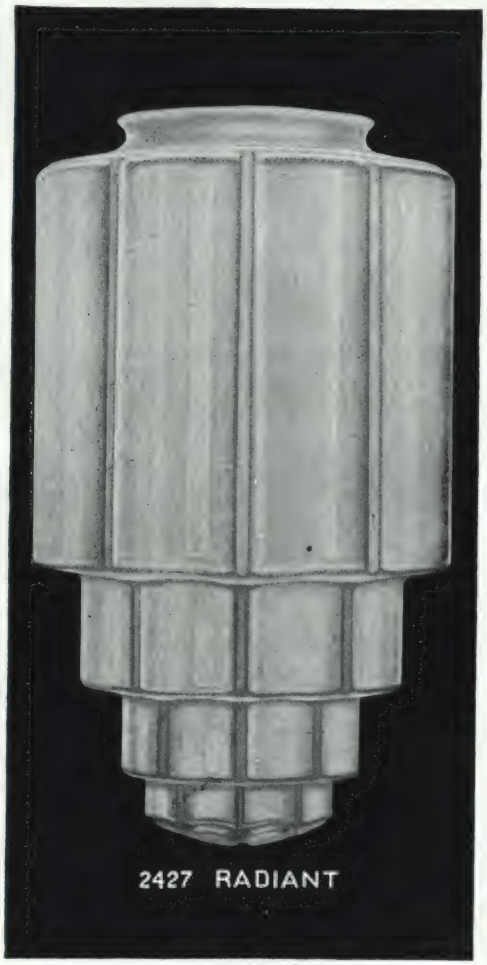
Modernistic Glassware for Public Buildings

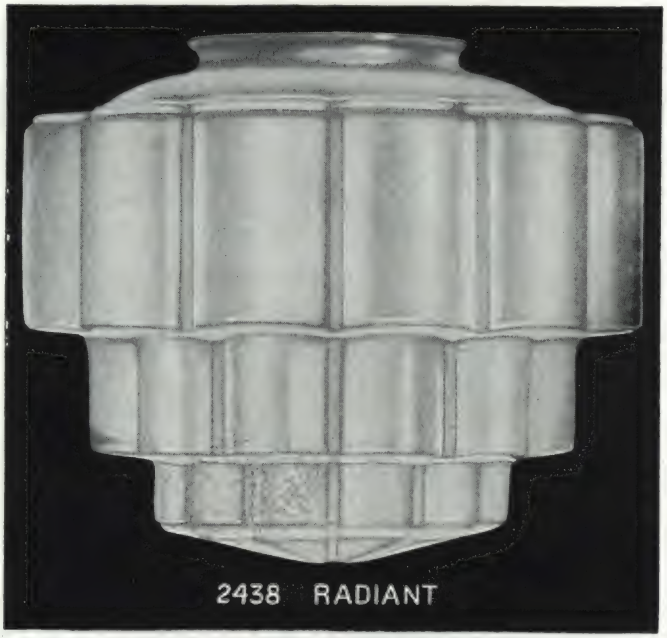
The attractive pieces illustrated on this page typify advanced modern lighting coupled with a sane practicability in harmony with present day lighting standards.

Designed by authorities in the field of lighting they possess beauty and symmetry of line.

Service

Photographs or samples with further information will be furnished upon request.





Installation

Any fixture manufacturer or dealer in artistic lighting equipment can install these pieces.

Description of Finishes for 2427 and 2438

Regularly furnished in:

(1) Plain Alabaster or Radiant Glass with a satin finish. (The satin finish results from depolishing the glossy surface.)

(2) Alabaster or Radiant Glass with vertical black lines.

(3) Frostell Antique Etched. Frostell Antique Etched is an unusual acid treatment simulating the effect of heavy frost on a window pane. A rich tan color slightly iridescent is permanently fired into the glass.

See our Catalogs Nos. 45 and 46.

Radiant Glass

Radiant Glass possesses a deep lustrous beauty that is transformed when lighted into a snow white light of even intensity. Glare is filtered out and the light is perfectly diffused with a minimum of absorption. Its fine texture permits rapid and easy cleaning and its heat-resisting properties minimize breakage. You will find Radiant Glass often specified for schools and public building work.

2427

Diam. in.	Depth, in.	Fitter, in.	Lamp, watts	Standard package
4½	7	3¼	40	12 pc. ctn.
6	9	4	75	6 pc. ctn.
8	12	4	150	1 pc. ctn.
10	16	6	200	1 pc. ctn.
12½	20½	8	300	1 pc. ctn.

2438

Diam., in.	Depth, in.	Fitter, in.	Lamp, watts	Standard package
9	7¾	4	75	8 pc. ctn.
10	8	4	100	4 pc. ctn.
12	10	6	150	1 pc. ctn.
14	12	6	200	1 pc. ctn.
16	14	6	300	1 pc. ctn.

PLANETLITE CO., INC.

Manufacturers of Artistic Lighting Fixtures

342 Madison Avenue, NEW YORK, N. Y.

A Complete Lighting Service for Architects

In addition to the Planetlite line described and illustrated below, this organization is equipped to co-operate with the architect in planning and executing special lighting fixtures to meet any unusual or individual architectural treatment.

Where special lighting problems arise our Designing Department is prepared to make recommendations and otherwise assist the architect.

Planetlite Lighting Fixtures

The Planetlite fixture consists of a concave reflecting disc of fibre composition with a white matt surface, under which is suspended a bowl of two-case glass, opal flashed on crystal, of correct density to give proper light diffusion with a minimum of absorption.

The glass bowl is supported by three buttons and links fitted with felt washers to prevent the metal coming into contact with the glass, thus relieving the pressure. Its construction permits the air to circulate around the lamp, cooling it and insuring long life.

A variety of stock designs provides a fixture that will fit into any decorative scheme—artistically correct and the ultimate in lighting efficiency.

Planetlite fixtures can be installed by any electrician in ten minutes. They are equipped with their own ceilings and are therefore independent of room ceilings in height, color, shape or condition. May be attached flush with ceiling or suspended from one or more chains of any desired length. Four-chain plain hangers are standard; other arrangements are special. The entire fixture is easily cleaned with a damp cloth.

Planetlite tests certified by the Electrical Testing Laboratories, New York, show a light output of 82%. This lighting efficiency is due to Planetlite's perfected principle of light diffusion plus light reflection. The light output is made 100% useful by being concentrated and directed within a radius of less than 90°.

Sizes, Designs and Finishes—Standard finish is ivory; special finishes to order. Glassware furnished in any period design, either plain or etched with blue, tan or pink.

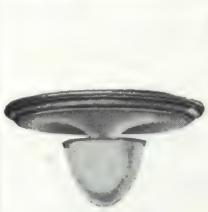
The new Renaissance Planetlite is made in antique iron finish, with or without wrought iron treatment on the bowl.

Da-Hue Daylight Glass—Planetlite fixtures may be had with the Da-Hue glass.

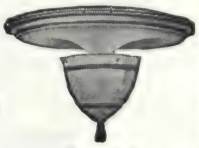
Da-Hue Glass is a two-layer glass that enables electricity to give a daylight hue.

Type 1532 PC

Spread 32-in. disc, bowl 15x20 in., of cast bronze with carved panels



Plain
4 sizes



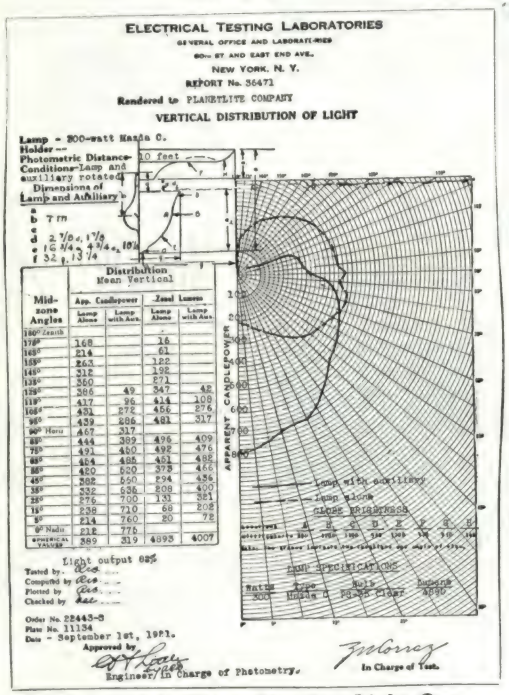
Special
3 sizes

Decorative
3 sizes

Regulation
4 sizes

Suspended Octagon
3 sizes

Adam
3 sizes



ELECTRICAL TESTING LABORATORIES
GENERAL OFFICE AND LABORATORIES
80th ST. AND EAST END AVE.
NEW YORK, N. Y.
REPORT No. 36472
Rendered to PLANETLITE COMPANY
VERTICAL DISTRIBUTION OF LIGHT

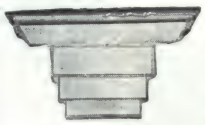
Lamp - 300-watt Nitrite C.
Holder ---
Photometric Distance-Conditions-Lamp and auxiliary rotated
Dimensions of Lamp and Auxiliary

	Distribution Mean Vertical			
Mid-zone Angles	App. Candlepower Lamp Alone	App. Candlepower Lamp with Acc.	Zonal Lumens Lamp Alone	Zonal Lumens Lamp with Acc.
180° Zenith				
175°	168		16	
165°	214		61	
155°	263		122	
145°	318		198	
135°	360		271	
125°	386	49	341	42
115°	417	96	414	108
105°	431	272	456	276
95°	439	286	481	317
90° Horiz	447	317		
85°	444	389	496	409
75°	491	400	492	476
65°	484	488	451	498
55°	460	500	375	466
45°	382	550	294	436
35°	332	636	208	400
25°	276	700	133	361
15°	238	710	68	208
5°	214	760	20	78
0° Nadir	212	775		
ZONAL TOTALS		319	4895	4007

Light output 82%
Tested by
Computed by
Plotted by
Checked by
Order No. 22443-S
Plate No. 11134
Date - September 1st, 1921.
Approved by
Engineer in Charge of Photometry.
In Charge of Test.

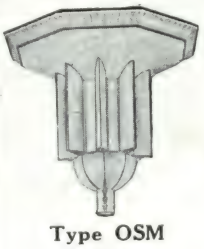
Photometric Chart Showing Light Output and Distribution of Planetlite in Laboratory Tests

The total light output is 82%.



Type O
1 size

Type CG
3 sizes



Type OSM
3 sizes

Type RM
1 size

Type AM
3 sizes

Type TM
1 size

QUADRANGLE MFG. CO.

Manufacturers of Lighting Units

26 South Peoria Street, CHICAGO, ILL.

Products

QUAD LIGHTING UNITS for industrial and commercial buildings, schools, hospitals, hotels, clubs, Y. M. C. A., etc.; QUAD "GLASSTEEL" DIFFUSERS; QUAD REFLECTORS, Dome, Shallow Bowl, and Cone; QUAD SOCKET REFLECTORS; QUAD SWIVEL HANGERS and SWIVEL STEM PENDANTS; CEILING and KITCHEN Units.

Also Outlet Box Receptacles, Fittings, etc.

QUAD LIGHTING UNITS

TRADE-MARK

A Service to Architects

Complete handbook (Catalog No. 4, just issued) covering industrial and commercial lighting requirements with illuminating data, charts, tables, etc., sent on request. Whatever your lighting problems Quad Engineers will gladly help you without obligation.

Adjustable Socket Feature Gives Lighting Flexibility

One of the features of quality and efficiency found in Quad Socket Reflectors. The sliding adjustable socket permits change in light intensities or variation in light distribution.

In this way is afforded the flexibility for seasons or conditions so essential for industrial lighting.

Quad Swivel Hangers

Designed to align fixtures perfectly when hung from the steepest roof or on any ceiling—flat, sloping, sawtooth, etc. Eliminates stud, hickey and knockout covers; provides more space in outlet box and gives unobstructed wire ways. Made of 14-gauge steel, cadmium plated, with cast iron ball threaded for ½-in. conduit stem; or if specified for ⅜ or ¾-in.

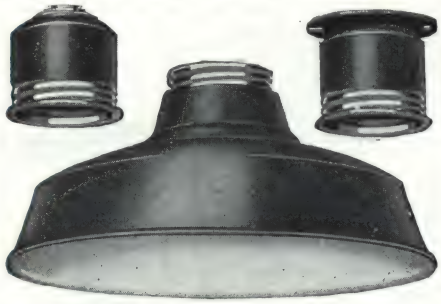
Catalogue No.	Size outlet box
145G	3 and 4-in. round
1945G	4-in. square No. 1900

Listed as standard by Underwriters' Laboratories, Inc.

RLM Standard Dome Reflectors

QUADRANGLE DOME 200

"COMPLIANCE WITH REFLECTOR AND LAMP MANUFACTURERS STANDARD SPECIFICATIONS" CERTIFIED ELECTRICAL TESTING LABORATORIES



We make a full line bearing the label reproduced above showing that Quad Reflectors are built to Reflector and Lamp Manufacturers' standard specifications, tested and certified by Electrical Testing Laboratories to be of correct design, high light output and first quality workmanship.

Made of armco iron, porcelain enameled green outside, white inside. Sizes from 12 to 20-in. diameter for lamps from 60 to 1000 watts.

Two types: (1) heavy threaded dome reflector with socket hood for ½-in. conduit stem or 4-in. outlet box. (2) Dome socket reflector with neck or socket housing electric welded to reflector before enameling providing 1-piece construction.

RLM Standard Dome Reflectors regularly furnished with keyless socket hood.

Medium Base Porcelain Pull Socket

(Non-adjustable furnished if specified)

Size of lamp, watts	Catalogue No. 2 Pc.	Catalogue No. 1 Pc.	Depth, in.	Socket	Diam., in.
60	.....	111	7⅜	Med.	12
100	1126	112	8	Med.	12
150	1146	114	9¼	Med.	14
200	1166	116	10½	Med.	16
300–500	1186M	118M	11½	Mog.	18
750–1000	1206M	120M	14¼	Mog.	20

Simple and Sturdy in Construction

Quad Units and Fixtures are distinguished for simplicity, durability and efficient utilization of lumen output; consequently, economical in operation as well as first cost.

Quick Detachable Reflectors and Fittings

The Q-D (quick-detachable) feature of this line permits the interchange of all types of reflectors on the socket-fittings without disturbing electrical connections. Types include round and rectangular angle reflectors, shallow bowl and special dome. Construction is strong, durable and weatherproof. Keyless socket regularly furnished. Pull socket if specified.

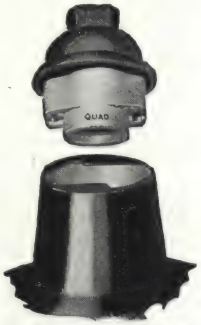
"H" Socket Fitting

"B" Socket Fitting

Keyless or Pull-chain Sockets

QUICK DETACHABLE

Note: Specify socket fitting H, B or V

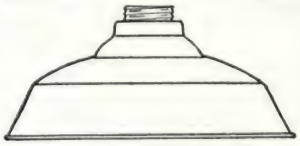


Reflector Neck with "V" Socket Fitting

Lamp size, watts	Cat. No.	Diam., in.	Depth, in.
100	8125	12	7½
150	8145	14	9
200	8165	16	10
300–500	8185M	18	12

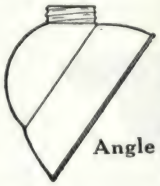
Jumbo Heavy Threaded Reflectors

Serviceable line of interchangeable reflector with sliding adjustable socket. Principal feature—heavy rolled thread connecting reflector to socket-hood. Construction—armco iron, porcelain enameled green outside, two coats of white inside.

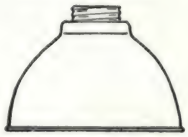


R.L.M. Standard Dome

Jumbo HEAVY THREADED REFLECTORS

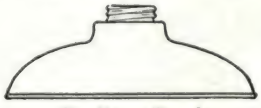


Angle



Deep Bowl

Outlet Box



Shallow Bowl

½-in. Conduit

New Car Storage Room, Buick Assembly Plant, Clearing, Ill., Lighted with Quad R.L.M. Reflectors

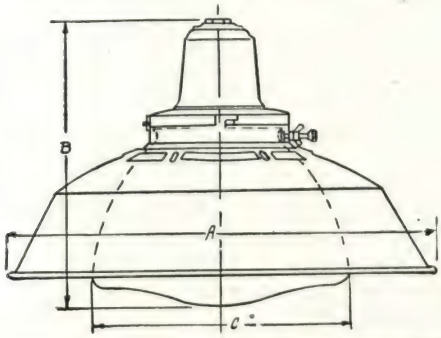
Lamp size, watts	Dome Reflector Cat. No.	Dome Reflector Diam., in.	Shallow Bowl Cat. No.	Shallow Bowl Diam., in.	Deep Bowl Cat. No.	Deep Bowl Diam., in.	Angle Reflector Cat. No.	Angle Reflector Diam., in.
100	1124	12	3124	12	2084	8	5104	10
150	1144	14	3144	14	2104	10	5124	12
200	1164	16	3164	16				
300–500	1184M	18	3184M	18	2124M	12	5144M	14

Continued on next page

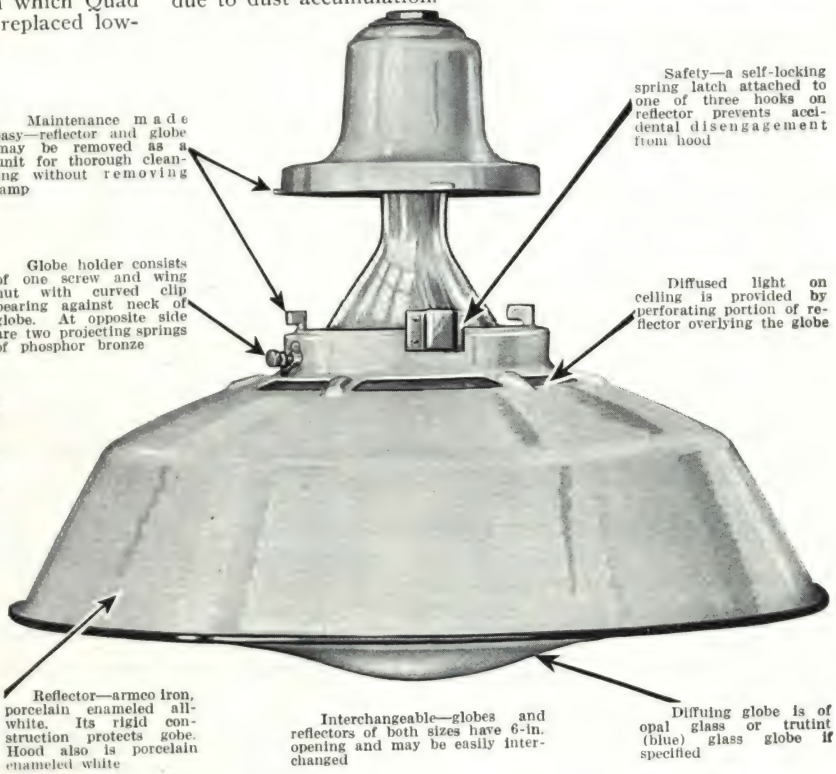
GLASSTEEL DIFFUSER

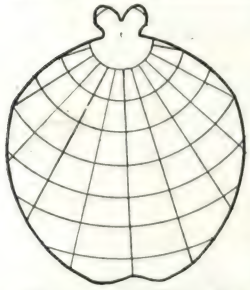
Made of Armco Iron Porcelain Enameled White with Opal Globe

Embodies unique features of safety, convenience and simplicity in maintenance. The ease and speed with which Quad Glassteel Diffusers can be removed, cleaned and replaced lowers maintenance cost and avoids depreciation in lighting output due to dust accumulation.



Lamp size, watts	Catalogue No.	Diam. in. "A"	Depth, in. "B"	Globe, in. "C"	Net Weight lb., each
150-200	5187	18	12	10	6½
300-500	5207M	20	13½	12	8¼





Distribution Curve

The same distribution of light is attained with both sizes of Quad Glassteel Diffuser even though the two lamps listed for the smaller size are of different filament lengths. The socket used for the 150 and 200-watt lamps may be adjusted to bring the filament of either lamp to the correct focal point as the Glassteel Diffuser is fitted with sliding adjustable socket.

Where higher lighting intensities are used almost invariably production is speeded up and spoilage is decreased. The cost of such lighting is negligible when compared to payroll and increased output.

Quad Glassteel Diffusers: Meadows Mfg. Co., Bloomington, Ill. *(Left)*

Field Museum of Natural History, Chicago *(Right)*

Q-D Angle Reflector—Round or Rectangular

Round

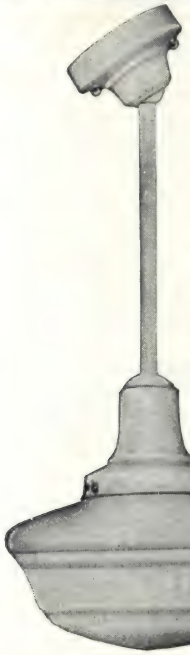
Quick, detachable and interchangeable reflectors—45° angle. Initials "H," "V" or "B" indicate socket fitting type: horizontal, vertical or outlet box; keyless or pull socket.

Preferred reflectors for outdoor or indoor display, store windows, industrial plants, floodlighting, etc.

Rectangular

Size of lamp, watts	Catalogue No.		Socket
	Round	Rectangular	
50–60	606	5005	Med.
100	608	5015	Med.
200	612	5025	Med.
300–500	614M	5035M	Mog.

Add initials to Catalogue No. "H," "V" or "B" to indicate type of socket fitting: horizontal, vertical or outlet box.



Quad Swivel Stem Pendants

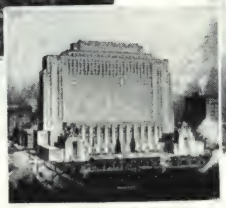
Made of armco iron, porcelain enameled white or brass electro-plated statuary bronze. Sliding adjustable socket. Swivel stem aligns perfectly regardless of rough angle and completely encloses dust-catching wires. The preferred fixture for schools, hospitals, stores, offices, etc.

Lamp size, watts	Catalogue No.		Diam., in.	Length, in.	Bowl, in.
	Porcelain white	Statuary bronze			
60–100	1057	1051	4	18	4x10
100–150	1157	1151	4	18	4x12
150–200	1457	1451	6	18	6x14
300–500	1657M	1651M	6	18	6x16

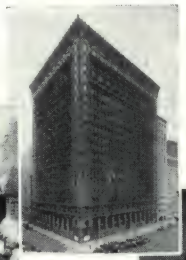
Quad Ceiling Units

A full line of pastel tints and standard white or ivory. Colors porcelain enameled on armco iron. Also brass electro-plated statuary bronze.

The Field Museum



Chicago Daily News Building



Peoples Gas Building

Chicago Civic Opera

In Buildings of Distinction

Quad Lighting Units selected for many recent achievements of the architectural profession, as well as leading industrial plants, schools, hospitals and public buildings. Quad Lighting Units have won the recognition of architects by quality, convenience, safety and service.

WESTINGHOUSE ELECTRIC & MFG. CO.

EAST PITTSBURGH, PA.

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YOUNGSTOWN, OHIO

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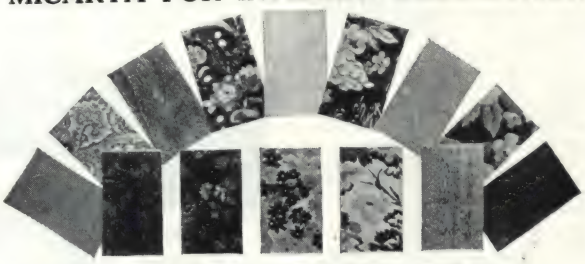
For Reference to Other Products see Index to Manufacturers.

MICARTA FOR INTERIOR DECORATION

Description

This modern material consists of laminations of fabric-base material impregnated with phenolic resin, baked under intense heat and high pressure into a homogeneous product that is insoluble and permanent.

It is not affected by heat or cold, nor will it stain from liquids and alcohol, nor spot from lighted cigars and cigarettes that may be deposited on it.



A Few of the Designs Available in Micarta

Uses

Micarta is particularly well adapted for tops of dressers, tables, desks, counters and similar flat surfaces. Also of particular value for window sash and sills, door and wall panels, name and number plates, push and kick plates and other types of plates, panels, etc., as it does not warp, split or swell.

Simulations of Woods

Micarta is produced in natural simulations of choice woods, such as mahogany and walnut, in verde antique, black and gold marble figurations, in decorative tapestry and modernistic designs of four or five colors, and in exclusive patterns to meet special requirements. It is strong and wear-resistant, and requires no polishing or refinishing.

Beautiful Designs

The beautiful designs of Micarta are part of the material so that wear and use will not affect the beauty of the finish.

Sizes

Micarta is made in almost any thickness from $\frac{1}{32}$ in. upward in sheets as large as 48x96 in., having one side highly polished, the other side in dull finish.

Information

Samples of Micarta and complete information will be furnished on request to our nearest office.

Continued on next page

LIGHTING EQUIPMENT

The Installation of Efficient Lighting

Four qualifications of a good lighting system:

(1) Sufficient illumination on all planes is governed by the amount of light required for quick and easy vision. Illumination is measured in foot-candles by an instrument which ascertains the "thickness" of illumination much in the same way that the fall of snow or rain is measured by a yard stick. To illustrate an easily understood conception of a foot-candle, it may be said that the illumination produced by an ordinary tallow candle 1 ft. from a surface is approximately one foot-candle; two such candles, two-foot candles, and if ten or twelve or even more were considered, the amount of illumination produced would be such as we are accustomed to use with artificial lighting systems.

Within recent years, various States have issued mandatory lighting codes whose purpose is humanitarian only. Tables show the standards of illumination required by present day practice.

(2) Uniform distribution of light requires the proper reflecting equipment, and the proper positioning of lighting fixtures or luminaires. Illumination is said to be uniform when the minimum intensity, usually midway between luminaires, is three-fourths of the maximum immediately beneath the luminaires.

(3) A well diffused light with a minimum amount of direct and reflected glare commonly caused by bare lamps, or poor lighting equipment which does not adequately shield the eyes from the lamp filament. The fact that an interior may seem to be brightly lighted is no criterion of the amount of effective light.

The correct way to tell whether an interior is adequately illuminated is to take illumination measurements at locations where light is needed and compare them with that required by modern lighting practice.

(4) Light of a quality and spectral character suited to the work. Often conditions require some form of color discrimination in order that colors be matched or imperfections be detected. Inasmuch as the color quality of daylight is a distinct asset for both, it is obvious that artificial illumination should simulate daylight in color.

Definition of Terms—The term "luminaire" is used to designate a light source together with its direct appurtenances, such as globe, reflector and support or lighting fixture.

The "mounting height" is the distance from the floor to the bottom of the luminaire.

The term "electric outlet" is a location on any wiring system at which access to the conductors is intentionally provided for the purpose of connecting a luminaire or other energy consuming device.

COMMERCIAL LIGHTING

Sollux Luminaires

The Sollux is the leader in Westinghouse Commercial Fixtures, the aristocrat of lighting units with exclusive features that, once understood, assure its acceptance where the best is sought. Hangers of differing designs, all including the exclusive Sollux features, make this fixture available in a range of prices that will appeal to a wide class of buyers.

Ceiling Type Sollux with Ornamental Hanger

Wall Bracket Sollux with Ornamental Hanger

For installations in hotel lobbies, restaurants, banks and other places where it is desirable to have lighting fixtures somewhat more ornate than the usual plain commercial fixture, the Ornamental Sollux can be supplied. These fixtures are richly finished in an antique gold that harmonizes with the more pretentious architectural surroundings in which they will be used.

The keeper ring method of supporting the globe, a distinctive Westinghouse feature, makes a totally enclosed dustproof and bugproof globe, and eliminates unsightly setscrews. The tilt-out cap, another feature, permits easy replacement of the lamp without removing globe from its holder.

Hangers may be procured in several styles, viz., ornamental with antique gold finish; paneled with statuary bronze finish; semi-rigid in statuary bronze finish; plain hangers in American bronze finish; as well as chromium plated.

The ornamental hanger is available in suspension, ceiling and bracket types; the latter either with or without crown.

The Sollux with plain hanger is lower in price than with the paneled hanger. It was designed to retain the many practical advantages of the Sollux globe, including the keeper ring safety holder and tilt-out cap, at a lower cost than that of the paneled hanger.

The canopy is made of heavy gauge brass. A ⅜-in. malleable iron hickey of standard design fits on the end of the canopy stem. The husk is similar to that used in the paneled hanger except that the embossing has been omitted.

Suspension Type Sollux with Plain Hanger and Decorated Globe

Specifications for Westinghouse Sollux—

The luminaire shall be of non-ventilated design and shall consist essentially of a glass enclosing globe of the highest efficiency supported by hanger designed to harmonize with the contour of the globe and hold it securely in place. The luminaire shall be dustproof and bugproof and shall be adaptable for high or low ceilings.

The hanger shall consist of a canopy, chain, husk, and socket. The canopy shall be held by a knurled nut which, when unscrewed, allows the canopy

Continued on next page

to slip over the chain to the husk giving ample room for installing the unit without danger of soiling the ceiling. The chain shall be of detachable type to permit lengthening or shortening the hanger without tools. The socket shall be contained in the husk and shall be supported directly by the chain. The socket shall be of one-piece porcelain easy to wire and the shell shall be of gilding metal or other untarnishing metal to insure good electrical contact. All suspension type hangers shall be furnished with approved wire. The ceiling type hanger shall combine the canopy and husk within a single unit to reduce the over-all length of the luminaire.

Ceiling Type Sollux with Paneled and Plain Globe

The globe shall be of Monax glass designed to utilize the highest percentage of light generated, giving an efficiency of at least 85% and perfect diffusion, completely concealing the lamp filament. The globe shall be supported by means of a keeper ring and flange which, when screwed into the husk, shall exert a uniform pressure inside the neck of the globe to hold it securely, thus eliminating globe breakage due to unequal pressure. The globe shall have a tilt-out cap permitting replacement of the lamp without removing the globe from the hanger.

SOLLUX COMPLETE UNITS*

Lamp size, watts	Globe size, in.	Length, in.	Style No.	List price	Length, in.	Style No.	List price
Suspension Type Ornamental hanger					**Ceiling Type** Ornamental hanger		
75-100	10x4	53⅞	343876	$38.00	15¾	343274	$33.50
150	12x4	55⅞	343877	41.95	17¼	343275	37.45
200	14x5	56⅝	343810	47.20	18½	343218	43.20
300	16x6	59⅛	343811	56.00	19⅞	343219	51.00
500	18x6	60⅜	343812	71.10	21½	343220	66.10
Paneled hanger (Plain globe)					Paneled hanger (Plain globe)		
75-100	10x4	34½	343800	11.75	11½	343006	8.45
150	12x4	36	343801	13.50	13	343007	10 20
200	14x5	37¼	343802	16.00	14¼	343008	12 70
300	16x6	40	343803	20.00	16	343584	16 50
500	18x6	41¼	343804	23.75	17¼	343585	20.25
(Decorated globe)					(Decorated globe)		
75-100	10x4	34½	343805	14.50	11½	343009	11.20
150	12x4	36	343806	17.20	13	343010	13.90
200	14x5	37¼	343807	20.70	14¼	343011	17.40
300	16x6	40	343808	26.25	16	343590	22.75
500	18x6	41¼	343809	36.35	17¼	343591	32.85
Plain hanger (Plain globe)					Plain hanger (Plain globe)		
75-100	10x4	32⅝	343823	8.75	11⅜	343012	7.15
150	12x4	34⅜	343824	10.50	12⅞	343013	8.90
200	14x5	35⅝	343825	13 00	14⅛	343014	11.40
300	16x6	38	343826	16.85	15⅞	343586	15.05
500	18x6	39¼	343827	20.60	17⅛	343587	18.80
(Decorated globe)					(Decorated globe)		
75-100	10x4	32⅝	343828	11.50	11⅜	343015	9.90
150	12x4	34⅜	343829	14.20	12⅞	343016	12.60
200	14x5	35⅝	343830	17.70	14⅛	343017	16.10
300	16x6	38	343831	23.10	15⅞	343588	21.30
500	18x6	39¼	343832	33.20	17⅛	343589	31.40
Chromium-plated hanger† (Semi-rigid with plain globe)					Chromium-plated hanger (Plain globe)		
75-100	10x4	32½	343044	15 50	11⅜	343049	8.90
150	12x4	34	343045	17 25	12⅞	343050	10.65
200	14x5	35¼	343046	19 75	14⅛	343051	13.15
300	16x6	37¾	343047	23.75	15⅞	343052	18.35
500	18x6	39	343048	27.50	17⅛	343053	22.10
Semi-rigid hanger† (Plain globe)					**Bracket Type‡** Ornamental hanger**		
75-100	10x4	33½	343813	12.65	Lamp size, watts††	Style No.	List price
150	12x4	35	343814	14.40			
200	14x5	36¼	343815	16.90			
300	16x6	38¾	343816	20.75			
500	18x6	40	343817	24.50			
(Decorated globe)					75-100	343280§	$47.25
75-100	10x4	33½	343818	14.50	75-100	343225¶	39.00
150	12x4	35	343819	18.10	150	343281§	51.70
200	14x5	36¼	343820	21.60	150	343226¶	41 70
300	16x6	38¾	343821	27.00	200	349760§	56 95
500	18x6	40	343822	37.10	200	349761¶	45.20

*Hangers and globes may be purchased separately. For Style Numbers and list prices refer to Catalogue 219-B.

†Style numbers and list prices cover hangers 24 in. over-all fitted with two-section stems. Hangers may be lengthened by means of standard 9-in. section.

‡Tassel extends respectively 11¼, 12¾ and 14 in. below center line of outlets.

§With crown.

¶Without crown.

**Length, inches: 75-100 watt size, 19¼ in.; 150-watt, 20¾ in.; 200-watt, 22 in.

††Size of globe, inches, 75-100 watt, 10x4; 150-watt, 12x4; 200-watt, 14x5.

Sollux Corridor Unit

For installations where a fixture somewhat more ornamental than the plain commercial fixture is required, but where the Ornamental Sollux is felt to be too decorative this Sollux Corridor Unit should be furnished. The need for it will often be encountered in the corridors of buildings and in banks, hotel rooms, lobbies and other such places.

The hanger is made of cast bronze, with a special antique gold finish having burnished high lights. The hanger is a regular Sollux Hanger, employing the keeper ring method for supporting the Sollux Globe, with tilt-out cap. The unit is furnished in ceiling type only, for use with plain or decorated globe.

Sollux Corridor Unit with Decorated Globe

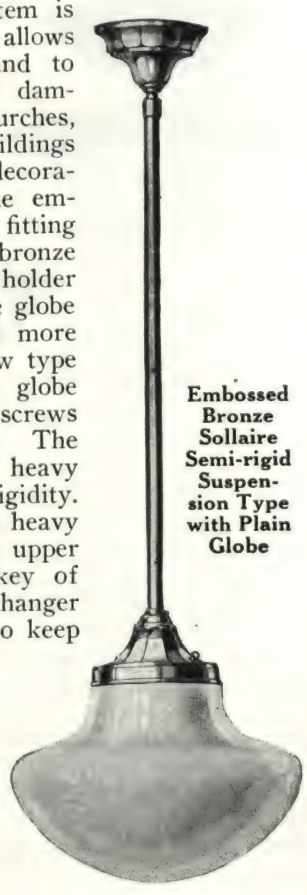
COMPLETE UNIT—CEILING TYPE

For lamp size, watts	Globe diam., in.	Length, in.	Plain globe Style No.	Plain globe List price	Decorated globe Style No.	Decorated globe List price
75-100	10	11⅛	343879	$40.25	343882	$43.00
150	12	13	343880	42.00	343883	45.70
200	14	14¼	343881	44.50	343884	49.20

The Sollaire

The Sollaire, as effective a lighting unit as the Sollux with practically the same efficiency of light distribution, fills a big demand at a still lower price. The same quality of workmanship and of material is used in the two units. Certain Sollux features have been eliminated.

The new bronze Sollaires combine the popular semi-rigid construction with the Sollaire globe in a fixture that presents the pleasing appearance of the semi-rigid Sollux and at the same time brings it into the price class with the Sollaire Luminaires. The semi-rigid stem in the suspension type covers the wire, protecting it against unsightly accumulation of dust. The ball-and-socket joint by which the stem is suspended from the canopy allows the fixture to hang true and to withstand slight jars without damage to the globe. In churches, banks, theaters and other buildings where bronze is used for its decorative and useful qualities, the embossed bronze Sollaire will be fitting and popular. In the embossed bronze Sollaire a new type of globe holder is used. With this holder the globe can be removed or replaced more quickly than with the setscrew type of holder. The danger of globe breakage through setting the screws too tight is also eliminated. The canopy and holder are of heavy gauge brass, beaded to add rigidity. The suspension hanger has a heavy brass tube stem, fitted at the upper end with a ⅜-in. iron hickey of standard design. The ceiling hanger has a steel bridge designed to keep the ceiling band flush with the ceiling at all times.



Embossed Bronze Sollaire Semi-rigid Suspension Type with Plain Globe

Ornamental hangers in antique gold finish; plain and safety hangers in American bronze finish, and embossed semi-rigid hangers in satin bronze finish are available.

Continued on next page

SOLLAIRE COMPLETE UNITS*

Lamp size, watts	Globe size, in.	Length, in.	Style No.	List price	Length, in.	Style No.	List price
Suspension Type					**Ceiling Type**		
Ornamental hanger							
50-60-75	8x4	51¾	343940	$35.40	13⅝	343947	$30.90
75-100	10x4	53¼	343941	37.45	15⅛	343948	32.95
150	12x4	54⅝	343942	39.85	16½	343949	35.85
150-200	14x5	56⅛	343943	43.30	18	343950	39.30
300-500	16x6	57½	343944	50.95	19⅜	343951	45.95
300-500	18x6	58⅛	343945	61.15	20	343952	56.15
750-1000	20x8	59⅝	343946	86.65	21½	343953	81.15
Plain safety hanger (Plain globe)							
50-60-75	8x4	30¼	340481	$ 6.65	8⅝	342173	5.95
75-100	10x4	31¾	340482	7.30	10⅛	342174	6.60
150	12x4	33⅛	340483	8.05	11½	342175	7.35
150-200	14x5	34⅝	340484	10.50	13	342176	9.70
300-500	16x6	36½	340485	12.75	15⅛	342177	11.75
300-500	18x6	37⅛	340466	17.60	15¾	342178	16.60
750-1000	20x8	39¼	340467	29.25	12½	342179	28.00
(Decorated globe—undrilled)							
50-60-75	8x4	30¼	340468	8.50	8⅝	342180	7.80
75-100	10x4	31¾	340469	9.45	10⅛	342181	8.75
150	12x4	33⅛	340470	10.60	11½	342182	9.90
150-200	14x5	34⅝	340471	13.00	13	342183	12.20
300-500	16x6	36½	340472	16.30	15⅛	342184	15.30
300-500	18x6	37⅛	340474	21.30	15¾	342185	20.30
750-1000	20x8	39¼	340475	33.75	20½	342186	35.05
(Decorated globe—drilled and tassel)							
50-60-75	8x4	34¼	341210	9.90	12⅝	342187	9.20
75-100	10x4	35¾	341211	10.95	14⅛	342188	10.25
150	12x4	37⅛	341212	12.10	15½	342189	11.40
150-200	14x5	38⅝	341213	14.50	17	342190	13.70
300-500	16x6	40½	341214	17.95	19⅛	342191	16.95
300-500	18x6	41⅛	341216	23.15	19¾	342195	22.15
750-1000	20x8	43¼	341218	40.70	24½	342196	37.45
Embossed bronze semi-rigid hanger (Plain globe)							
60-75	8x4	29¼	343112	9.25	10⅛	343131	5.75
75-100	10x4	30¾	343113	9.90	11⅝	343132	6.40
150	12x4	32⅛	343114	10.65	13	343133	7.15
150-200	14x5	33⅝	343115	12.65	14½	343134	9.25
300-500	16x6	35½	343116	15.35	16	343135	12.35
300-500	18x6	36⅛	343117	20.20	16⅝	343136	17.20
750-1000	20x8	38¼	343118	31.70	20	343137	28.90
(Decorated globe—undrilled)							
60-75	8x4	29¼	343119	11.10	10⅛	343138	7.60
75-100	10x4	30¾	343120	12.05	11⅝	343139	8.55
150	12x4	32⅛	343121	13.20	13	343140	9.70
150-200	14x5	33⅝	343122	15.15	14½	343141	11.75
300-500	16x6	35½	343123	18.90	16	343142	15.90
300-500	18x6	36⅛	343124	23.90	16⅝	343143	20.90
750-1000	20x8	38¼	343125	38.75	20	343144	35.95
(Decorated globe—drilled and tassel)							
60-75	8x4	33¼	337614	12.50	14⅛	337616	9.00
75-100	10x4	34¾	337615	13.55	15⅝	337617	10.05
150	12x4	36⅛	343126	14.70	17	343145	11.20
150-200	14x5	37⅝	343127	16.65	18⅛	343146	13.25
300-500	16x6	39½	343128	20.55	20	343147	17.55
300-500	18x6	40⅛	343129	25.75	20⅝	343148	22.75
750-1000	20x8	42¼	343130	43.15	24	343149	40.35
Plain hanger (Plain globe)							
50-60-75	8x4	30¼	343833	6.00	8⅝	349219	4.45
75-100	10x4	31¾	343834	6.65	10⅛	349220	5.10
150	12x4	33⅛	343835	7.40	11½	349221	5.85
150-200	14x5	34⅝	343836	9.30	13	349222	8.50
300-500	16x6	36½	343837	11.35	15⅛	343592	11.05
300-500	18x6	37⅛	343838	16.20	15¾	343593	15.90
750-1000	20x8	39¼	343090	30.10	20½	343093	29.20
(Decorated globe—undrilled)							
50-60-75	8x4	30¼	343839	7.85	8⅝	349225	6.30
75-100	10x4	31¾	343840	8.80	10⅛	349226	7.25
150	12x4	33⅛	343841	9.95	11½	349227	8.40
150-200	14x5	34⅝	343842	11.80	13	349228	11.00
300-500	16x6	36½	343843	14.90	15⅛	343594	14.60
300-500	18x6	37⅛	343844	19.90	15¾	343595	19.60
750-1000	20x8	39¼	343091	37.15	20½	343094	36.25
(Decorated globe—drilled and tassel)							
50-60-75	8x4	34¼	337618	9.25	12⅝	337620	7.70
75-100	10x4	35¾	337619	10.30	14⅛	337621	8.75
150	12x4	37⅛	343845	11.45	15½	349231	9.90
150-200	14x5	38⅝	343846	13.30	17	349232	12.50
300-500	16x6	40½	343847	16.55	19⅛	343596	16.25
300-500	18x6	41⅛	343848	21.75	19¾	343597	21.45
750-1000	20x8	43¼	343092	41.55	24½	343095	40.65

Bracket Type
Ornamental hanger

Lamp size, watts	Globe size, in.	Length, in.	Style No.	List price	Length in.	Style No.	List price
(With crown)					(Without crown)		
50-60-75	8x4	18	343954	$44.65	18	343955	$36.40
75-100	10x4	19¼	343956	46.70	19¼	343957	37.45
150	12x4	20¾	343958	49.60	20¾	343959	38.60
150-200	14x5	22	343960	53.05	22	343961	41.30

*Hangers and globes may be purchased separately. For style numbers and list prices, refer to Catalog 219-B.

Globes are available in both plain and decorated finishes, the latter style either drilled (and with tassel) or undrilled.

Specifications for Westinghouse Sollaire

The luminaire shall be of non-ventilated design and shall consist essentially of an enclosing glass globe of high efficiency supported by hanger designed to harmonize with the contour of the globe. The globe shall be dustproof and bug-proof and shall be adaptable to high or low ceilings.

The hanger shall consist of canopy, chain holder and socket and shall be sturdy and substantial. The hanger shall have a heavy brass tube at the upper end over which the canopy may be lowered. The holder at the lower end of the chain contains the socket. The socket shall be of one-piece porcelain, easy to wire, and the shell shall be of gilding metal to insure good electrical contact. All suspension type hangers shall be furnished with approved wire. The ceiling type hanger shall combine the canopy and holder into a single unit.

Ceiling Type Sollaire with Plain Globe

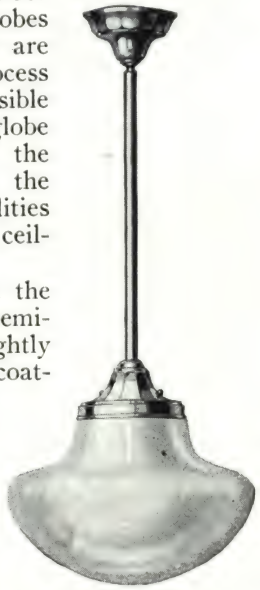
The globe shall be of Monax glass designed to utilize efficiently the light generated and give perfect diffusion of the light, completely concealing the lamp filament. The globe shall be supported by means of three setscrews designed so they will not loosen under vibration.

Semi-indirect Lunaire with Embossed Bronze Semi-rigid Hangers Satin Bronze Finish

In the Lunaire Westinghouse offers for the first time, a new and practical method for semi-indirect lighting. The globes used in this new Lunaire unit are made by a newly developed process in which it has been found possible to make the lower part of the globe of white reflecting glass while the same glass, in the upper part of the globe, has high transmission qualities and diffuses the light against the ceiling.

The Lunaire makes possible the pleasing, restful illumination of semi-indirect lighting without unsightly shields and without resorting to coating or enamel on the glass which might deteriorate with age or use.

The Lunaire unit as listed here, consists of a combination of the semi-indirect Lunaire globe with the embossed bronze Sollaire hangers. The unit is available in both suspension and ceiling types and globes can be had in the plain and decorated styles and also in the decorated style, drilled and with tassel.



Suspension Type Lunaire with Plain Globe

All suspension hangers, except when ordered with special finishes, are wired with No. 16 stranded copper, rubber covered wire, approved by the Underwriters. Unwired hangers will be supplied on special order without additional charge, but must be equipped with code wire to secure the Underwriters' approval.

Specifications for Westinghouse Lunaire—

The luminaire shall consist essentially of a glass enclosing globe of the highest efficiency supported by a hanger designed to harmonize with the contour of the globe and hold it se-

Continued on next page

Ceiling Type Lunaire with Decorated Globe—Drilled

curely in place. The luminaire shall be dustproof and bugproof and shall be adaptable for high or low ceilings.

The globe shall be of a special glass designed to utilize the highest percentage of light generated, giving an efficiency of at least 79% and perfect diffusion, completely concealing the lamp filament. The lower part of the one piece globe shall be made of white reflecting glass while the same glass in the upper part of the globe has high transmission qualities and diffuses the light against the ceiling.

The hanger shall be made of bronze with a natural satin bronze finish. A ball and socket joint should be installed between the canopy and stem so that the unit will hang vertically and will withstand slight jars without damage to the globe.

SEMI-INDIRECT LUNAIRE COMPLETE UNITS*

Lamp size, watts	Globe size, in.	Length, in.	Style No.	List price	Length, in.	Style No.	List price
	Suspension Type				**Ceiling Type**		
			Semi-rigid hanger (Plain globe)				
50-60	8x4	29¼	340361	$10.80	10⅛	340382	$ 7.30
75-100	10x4	30¾	340362	12.55	11⅝	340383	9.05
150	12x4	32⅛	340363	14.20	13	340384	10.70
200	14x5	33⅝	340364	17.95	14½	340385	14.55
300	16x6	35½	340365	22.10	16	340386	19.10
500	18x6	36⅛	340366	29.20	16⅝	340387	26.20
			(Decorated globe—undrilled)				
50-60	8x4	29¼	340368	13.00	10⅛	340389	9.50
75-100	10x4	30¾	340369	15.10	11⅝	340390	11.60
150	12x4	32⅛	340370	17.50	13	340391	14.00
200	14x5	33⅝	340371	20.65	14½	340392	17.25
300	16x6	35½	340372	26.10	16	340393	23.10
500	18x6	36⅛	340373	34.60	16⅝	340394	31.60
			(Decorated globe—drilled and tassel)				
50-60	8x4	33¼	340375	15.85	14⅛	340396	12.35
75-100	10x4	34¾	340376	18.20	15⅝	340397	14.70
150	12x4	36⅛	340377	21.40	17	340398	17.90
200	14x5	37⅝	340378	24.50	18½	340399	21.10
300	16x6	39½	340379	31.10	20	340400	28.10
500	18x6	40¼	340380	40.80	20⅝	340401	37.80

*Hangers and globes may be purchased separately. For style numbers and list prices, refer to Catalog 219-B.

Note: Suspension type style numbers and list prices cover hangers 24 in. over-all fitted with two-section stems. Hangers may be lengthened by means of standard 9-in. sections.

The Sollite

A modernistic trend in design adds distinction to the Sollite. It is similar to the Sollux and Sollaire in the quality of illumination and is just as efficient. The simplified hanger with new safety globe holder gives it its low cost.

The Sollite Luminaire offers a more angular globe in the plain, banded and art moderne styles, made of same glass as Sollux and Sollaire globes.

Ceiling Type Sollite with Banded Globe

The simplified mechanical construction of the Sollite hanger enables it to be offered at a lower price, and the improved globe holder furnishes a quicker means of attaching and removing globe with assurance that the globe will not be loosely attached or jarred loose by vibration. It also protects against breaking the globe through setting the screws too tight.

The canopy and holder are of heavy brass, beaded to add rigidity. The suspension type has a short stem of such design that chain passes through it, fastening to a ⅜-in. hickey. The canopy is held in place by a setscrew which, when loosened, allows it to drop the full length of chain. This adds one of the features of the Sollux hanger, and allows ample room to make the electrical connections without soiling the ceiling or the luminaire. American bronze is the standard finish, but other finishes furnished on special order.

The standard decoration on the banded and art moderne globes is a light tan, but other colors furnished at no extra charge on special order. Special decorative designs furnished at additional cost.

Specifications for Westinghouse Sollite—

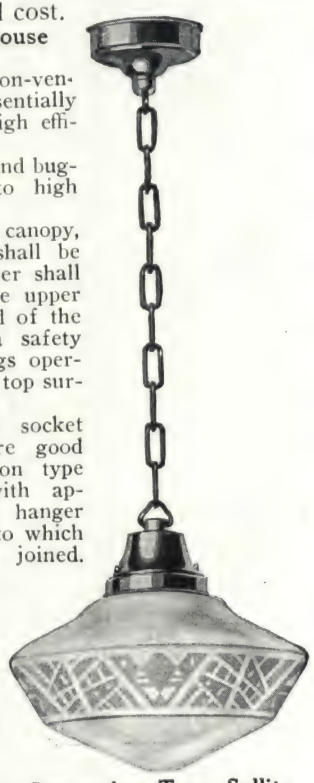
The luminaire shall be of a non-ventilated design and shall consist essentially of an enclosing glass globe of high efficiency.

The globe shall be dustproof and bugproof and shall be adaptable to high or low ceilings.

The hanger shall consist of a canopy, chain, holder and socket and shall be sturdy and substantial. The holder shall have a heavy brass sleeve at the upper end. The holder at the lower end of the chain shall be equipped with a safety hanger consisting of globe springs operated by knobs emerging from the top surface of the holder.

The shell of the porcelain socket shall be so made as to insure good electrical contact. All suspension type hangers shall be furnished with approved wire. The ceiling type hanger shall consist of a heavy canopy to which the standard holder is tightly joined.

The globe shall be of Monax glass designed to utilize efficiently the light generated and give perfect diffusion of the light, completely concealing the lamp filament. It shall be so designed that the shoulder will rest snugly against the lower part of the metal holder, thereby excluding dust, dirt and moisture.



Suspension Type Sollite with Art Moderne Globe

SOLLITE COMPLETE UNITS*

Lamp size, watts	Globe size, in.	Length, in.	Style No.	List price	Length, in.	Style No.	List price
	Suspension Type				**Ceiling Type**		
			Screwless hanger (Plain globe)				
50-60-75	8x4	28½	343167	$ 4.50	10⅜	343188	$ 3.20
75-100	10x4	29⅝	343168	5.65	11⅜	343189	4.35
150	12x4	30⅝	343169	6.70	12⅜	343190	5.40
150-200	14x5	32⅛	343170	8.90	14	343191	7.55
300-500	16x6	33½	343171	11.25	15¼	343192	9.90
300-500	18x6	35⅛	343172	15.20	16⅞	343193	13.85
750-1000	20x8	37⅜	343173	29.00	19⅞	343194	28.10
			(Banded globe)				
50-60-75	8x4	28½	343174	5.05	10⅜	343195	3.75
75-100	10x4	29⅝	343175	6.35	11⅜	343196	5.05
150	12x4	30⅝	343176	7.60	12⅜	343197	6.30
150-200	14x5	32⅛	343177	9.55	14	343198	8.20
300-500	16x6	33½	343178	12.05	15¼	343199	10.70
300-500	18x6	35⅛	343179	16.80	16⅞	343201	15.45
750-1000	20x8	37⅜	343180	32.20	19⅞	343202	31.30
			(Art moderne globe)				
50-60-75	8x4	28½	343181	6.30	10⅜	343203	5.00
75-100	10x4	29⅝	343182	7.80	11⅜	343204	6.50
150	12x4	30⅝	343183	9.20	12⅜	343205	7.90
150-200	14x5	32⅛	343184	11.70	14	343206	10.35
300-500	16x6	33½	343185	14.45	15¼	343207	13.10
300-500	18x6	35⅛	343186	18.95	16⅞	343208	17.60
750-1000	20x8	37⅜	343187	33.65	19⅞	343209	32.75

*Hangers and globes may be purchased separately. For style numbers and list prices, refer to Catalog 219-B.

6-in. hangers with medium sockets can be supplied at a reduction in list price of $0.50 each; Suspension Type Style No. 340230; Ceiling Type Style No. 340231.

14-in. globes with 6-in. fitters can be supplied at the same price; Plain Globe Style No. 340232; Banded Globe Style No. 340233; Art Moderne Globe Style No. 340234. Chain link for above, Style No. 349951, list price $0.02 per link, 7 links per foot, 9 links per hanger.

Continued on next page

DESIGNING A LIGHTING SYSTEM USING WESTINGHOUSE SOLLUX, SOLLAIRE OR SOLLITE

(1) Determine the mounting height as that distance above the floor at which luminaires can be suspended without interference with ceiling beams, etc., and also to present a pleasing appearance.

(2) Refer to Table No. 1 with the mounting height, and ascertain the proper spacing distance. If spacing obtained with the mounting height does not coincide with the building bays, a smaller spacing with a lower mounting height should be used.

(3) Select from Table No. 2 the foot-candle illumination required by the class of installation and find the nearest corresponding value under the selected spacing distance.

(4) Having arrived at the correct foot-candle intensity, read toward the left side of Table No. 1 and find the lamp size and luminaire style number which should be used.

TABLE NO. 1

Note: The distances between the wall and the first row of fixtures should be one-half the fixture spacing except when desks are close to the wall, in which case this distance should be one-third, varying according to the conditions.

Use ceiling type fixtures where ceilings are 10½ ft. or less. The foot-candle values given in Table No. 2 at the bottom of this page are based on conditions involving the average size of room (width about twice ceiling height), medium color walls and ceiling, ordinary maintenance. When unfavorable conditions exist involving narrow room (width equal to ceiling height), dark walls and ceilings, poor maintenance, the next size larger lamp is recommended or a closer spacing should be used.

Approximate outlet spacing.....ft.	8½x8½	10x10	11½x11½	13x13
Area per outlet lighted.....sq. ft.	75	100	135	170
Mounting height from floor to bottom of globe.....ft.	8½	9½	10½	11½

	Suspension type style No.	Ceiling type style No.	Lamp, size watts	Average foot-candle illumination on plane of work			
Sollux Luminaire	343800	343006	100	4.5- 5.0	3.0- 3.5	2.0- 2.5	1.5- 2.0
	343801	343007	150	6.0- 9.0	4 0- 6.0	3.5- 4.5	3.0- 3.5
	343802	343008	200	9.0-13.0	6.0- 8.0	5.0- 6.0	4.5- 5.0
	343803	343584	300	.....	9.0-15.0	7.0-11.0	6.0- 9.0
	343804	343585	500	.....	.....	.....	11.0-17.0

TABLE NO. 2

Recommended Standards of Desirable Illumination for Commercial and Public Interiors

Buildings	Foot-candles		Buildings	Foot-candles	
	Good practice	Min. recom.		Good practice	Min. recom.
Armories, Public Halls	10	6	Libraries		
Auditoriums (exclusive of stage)	5	3	Reading room	12	8
Automobile Showroom	15	10	Lunch Rooms	12	8
Banks			Office Buildings, Offices		
Lobby	10	6	Close work	15	10
Cages and offices	15	10	No close work	10	8
Barber Shops	15	10	File room	6	4
Churches			Restaurants	8	5
Auditorium	3	2	Schools		
Sunday School	8	5	Assembly room, auditorium	8	5
Dance Halls	6	4	Classrooms, study rooms, office	12	8
Dental Offices	12	8	Drawing	25	15
Department stores and large specialty stores			Laboratory	12	8
Main floors	15	10	Manual training	12	8
Other floors (except furniture)	12	8	Sewing rooms	25	15
Drafting Rooms	25	15	Specialty and Small Stores		
Halls, Passageways	3	2	Automobile supply	12	8
Hospitals			Book	12	8
Lobby and reception room	6	4	Cigar	15	10
Corridors	3	2	Drug	15	10
Wards and private rooms with local illumination	5	3	Florist	12	8
With no local illumination	8	5	Haberdashery	15	10
Night illumination	2	1	Jewelry	15	10
Operating room	15	10	Shoe	15	10
Hotels			Sporting goods	12	8
Lobby	8	5	Tailor	15	10
Dining room	6	4	Tobacco	15	10
Kitchen	10	6	Telephone Buildings		
Bedrooms	8	5	Manual exchanges	8	5
			Automatic exchanges	12	8

INDUSTRIAL LIGHTING

Bayonet Heel Reflector-Socket Fixtures—"Easy to Wire"—Guaranteed Weatherproof

Fixtures consist of porcelain enamel steel reflectors which fasten securely to the porcelain body of the reflector-socket by means of screws that seat themselves in bayonet slots in the reflector heel. A fiber gasket between the reflector heel and the porcelain seat, and a copper washer within the reflector neck, make the fixture waterproof and protect the enamel.

This design allows a compact, rigid assembly and at the same time gives the easy-to-wire features so well known to users of Westinghouse Reflector-Sockets. So few operations are necessary that one man can install a complete fixture in three minutes.

Reflector-Socket for Conduit Mounting

For attachment either to outlet box or conduit the wires are pulled through the vertical openings in the porcelain socket and connected to the terminals. The reflector is then fastened in place by means of the three screws which engage in the bayonet slots in the reflector heel. There are no loose wires to stuff back or washers and lock nuts to adjust.

These fixtures are waterproof. The cast iron cover of the conduit type and the punched steel cover on the outlet type are both heavily galvanized and painted and will not corrode. The screws used to attach the porcelain to the iron cap and the bayonet screws are iron, cadmium plated. The reflectors are insulated from the conduit and the terminals are protected from accidental short circuit.

With the bayonet heel reflector-socket fixture the reflector must seat in its correct position with respect to the lamp filament. In this way the most efficient distribution of light from each of the different types of reflectors is assured.

Bayonet heel reflector-socket fixtures are interchangeable. Reflectors of different shapes may be substituted at any time, providing that medium reflectors are used on medium sockets and mogul reflectors on mogul sockets.

A double lamp grip assures perfect electrical contact and prevents loosening of lamp under vibration. Socket shells are made of gilding metal to give them permanence.

For either interior or exterior lighting purposes these reflector-socket fixtures may be suspended by any of the following methods:

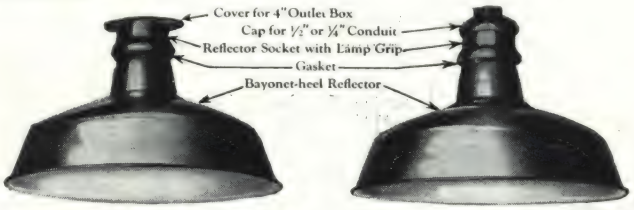
(1) On ½ or ¾-in. conduit.
(2) Directly from outlet box.
(3) On reinforced drop cord by using porcelain bushings.

Reflector-Socket for Outlet-box Mounting

RLM Dome Reflectors

For general lighting effectiveness, the RLM Dome Reflector cannot be surpassed. Upward light, which would be wasted without reflectors, is directed down toward the working plane and thus becomes of value. When mounted properly and equipped with the correct size lamps, no glare is apparent unless one looks directly at the lamp. Westinghouse RLM Dome Reflectors are coated inside and out with porcelain enamel.

Each reflector bears the RLM label, assuring the customer of highest quality. The RLM fixtures listed are combinations of bayonet heel reflectors and reflector-sockets.



RLM Dome Type

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Specifications for Westinghouse RLM Reflectors—

The reflector-socket fixture shall be a heavy gauge drawn steel reflector with the reflecting surfaces finished with white porcelain of highest reflecting efficiency, and suitable socket with a cast iron cap. The enamel shall not discolor, chip or craze.

The assembly of the complete unit shall be such as to make it easy to install and maintain and shall be of rugged compact design to withstand the rough service required in industrial lighting installations.

All reflectors shall bear the RLM label which is assurance that the product meets the exacting requirements of the code's standards under inspection and tests conducted by the Electrical Testing Laboratories of New York City. The reflectors shall be fired with a ground coat inside and out with two additional coats of white inside and one green outside, each coat fired separately. The reflectors shall be attached to the porcelain reflector socket by means of screws that seat in bayonet slots in the reflector heel. A fiber gasket between the reflector heel and the porcelain socket and a copper washer within the reflector neck shall be provided to make the fixture weatherproof.

The angle of light cut-off shall be 17½° below a horizontal plane level with the edge of the reflector in order to shield from view the filament of the lamp.

The socket shall consist of one-piece porcelain to facilitate wiring, with gilding metal shell and cadmium-plated screws to resist oxidation, and lamp grips to prevent the lamp from loosening under vibration. The socket shall be covered with a heavily galvanized green japanned cast iron cap tapped for ½-in. conduit or fitted with a heavily galvanized green japanned punched steel cap, for mounting on 4-in. outlet boxes.

RLM DOME REFLECTORS*

In ordering complete fixtures specify style number of complete unit from the following table.

Bayonet Heel

Lamp size, watts	Standard pkg.		For ½-in. conduit mounting			For 4-in. outlet-box mounting		
	Quan.	Wt.,lb.	Depth, in.	Style No.	List price	Depth, in.	Style No.	List price
50– 60	10	25	7½	343700	$3.20	6½	343706	$3.20
75–100	10	25	8	343701	3.30	7	343707	3.30
150	10	30	9¼	343702	3.50	8¼	343708	3.50
200	10	35	10⅜	343703	4.30	9⅜	343709	4.30
300–500	5	30	12	343704	5.30	10⅝	343710	5.30
750–1000	5	35	15¼	343705	7.20	13⅞	343711	7.20

*May also be had with standard heel reflector—Sockets ½-in. conduit or 4-in. outlet box mounting; or with aluminum for copper shell sockets for ½-in. mounting. For style numbers and list prices, refer to Catalogue 219-A.

Wemco Reflectors and Hoods with Sockets

Wemco hoods and reflectors have been designed for installation wherever industrial reflectors and sockets are used or where the lighting equipment is subjected to extraordinary service.

Wemco Reflector

The socket is attached to the hood by two screws. By loosening these screws the socket can readily be removed by turning it slightly since the porcelain is furnished with bayonet slots. RLM bowl, symmetrical angle and shallow dome reflectors are furnished with the heavy copper screw heel for all Wemco holders.

WEMCO REFLECTORS*

Lamp, size watts	Depth in.	Style No.	List price, ea.	Depth in.	Style No.	List price, ea.
RLM Reflectors with Steel Hoods for ½-in. Conduit Mounting				**RLM Reflectors with Steel Hoods for 4-in. Outlet Box Mounting**		
50— 60	7½	341237	$3.10	7	341243	$3.10
75— 100	8½	341238	3.20	8	341244	3.20
150	9½	341239	3.50	9	341245	3.50
200	10½	341240	3.90	10	341246	3.90
300— 500	12¼	341241	5.40	11¾	341247	5.40
750—1000	15¼	341242	7.40	14¾	341248	7.40

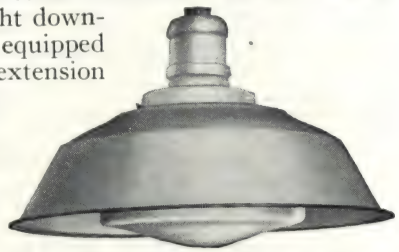
*Also come with cast hoods for ½-in. conduit or 4-in. outlet box mounting. For style numbers and list prices, refer to Catalogue 219-A.
Note: Hoods can be furnished with medium pull chain sockets at 80¢ additional list for ½-in. conduit, Style No. 341291, for 4-in. outlet box, Style No. 341647.

All Wemco reflectors are coated inside and out with porcelain enamel. The first coat is a binder coat after which one coat of green is applied outside and two coats of white inside. Each coat is fired separately.

The "Easy to Wire" sockets are housed in cast aluminum hoods with a green baked enamel finish or in sheet metal hoods electro-galvanized and with a green baked enamel finish. Hoods are either tapped for ½-in. conduit or are fitted with 4-in. outlet box covers.

Glassteel Diffusers—For the best illumination obtainable for industrial purposes the Glassteel Diffuser should be used. It furnishes soft diffused light and eliminates glare.

The Glassteel Diffuser consists of a diffusing glass globe and a white porcelain enameled reflector which directs most of the light downward. The reflector equipped with a bayonet heel extension for attaching to the well-known "Easy-to-Wire" Westinghouse Bayonet Heel Reflector-Socket, or with a threaded copper extension for attachment to the porcelain enameled steel hood shown above. Two sizes of glassware are used; the 10-in. size with smaller reflector, which is 18 in. in diameter, and the 12-in. size for the larger reflector, which is 21 in. in diameter.



Glassteel Diffuser with Bayonet Heel Reflector-Socket

Specifications for Glassteel Diffusers—

The lighting shall consist essentially of a heavy gauge drawn steel reflector porcelain enameled and a white, homogeneous diffusing glass globe and suitable white bayonet heel reflector-socket. The porcelain enamel shall be of the highest reflecting efficiency and shall not discolor, chip or craze. The complete unit shall be arranged so that it is easy to wire, install and maintain.

The reflector shall be provided with openings at the top to allow some of the light filtering through the diffusing globe to illuminate the ceiling. The reflector shall be fired with a ground coat inside and out with two additional coats inside and outside. Each coat shall be fired separately. The reflector shall be attached to the porcelain reflector-socket by means of screws that seat in bayonet slots in the reflector heel.

The diffusing globe shall be of maximum efficiency providing perfect diffusion and completely concealing the lamp filament. The white diffusing globe shall be interchangeable with a daylight blue glass globe for use when color discrimination is desirable. The globe shall be held in position by two studs and a setscrew bearing on a metal collar encircling the neck of the globe, to provide uniform pressure eliminating globe breakage due to unequal pressure.

The socket shall consist of one-piece porcelain to facilitate wiring, with a gilding metal shell and cadmium-plated screws to resist oxidation, and lamp grips to prevent the lamp from loosening under vibration. The socket shall be covered with a porcelain enameled cast iron cap tapped for ½-in. conduit or fitted in the heavily galvanized punched steel cap for mounting on 4-in. outlet boxes.

GLASSTEEL DIFFUSERS

Lamp size, watts	Standard pkg.		For ½-in. conduit mounting			For 4-in. outlet-box mounting		
	Quan.	Wt.,lb.	Depth, in.	Style No.	List price	Depth, in.	Style No.	List price
Complete Unit with Bayonet Heel Reflector-Socket								
150– 200	4	45	11¼	343018	$ 9.00	10¼	343020	$ 9.00
300– 500	4	70	12¾	343019	12.50	11⅜	343021	12.50
750–1000	2	40	15	343061	18.50	13⅝	343062	18.50
Complete Unit with Porcelain Enameled Steel Hood								
150– 200	4	45	11½	343022	9.00	10⅝	343024	9.00
300– 500	4	75	13	343023	12.50	12¼	343025	12.50
750–1000	2	40	15¼	343063	18.50	14½	343064	18.50

Note: Can be supplied for ¾-in. conduit at the same price on special order; 100-200 watt complete unit Style No. 343861, 300-500 watt complete unit Style No. 343862.

Continued on next page

DESIGNING LIGHTING SYSTEM USING WESTINGHOUSE RLM DOME REFLECTOR OR GLASSTEEL DIFFUSER

(1) Determine the mounting height as the highest point above the floor at which reflectors can be suspended without interference with belting, shafting, etc.

(2) Refer to Table No. 1 below and with the mounting height ascertain the proper spacing distance. If spacing distance obtained with the mounting height does not coincide with the building bays, a smaller spacing with a lower mounting height should be used.

(3) Select the type of fixture most suitable to the application.

(4) Select from Table No. 2 at the right the foot-candle illumination required by the class of work and find the nearest corresponding value under the selected spacing distance in Table No. 1.

TABLE NO. 1

	Outlet spacing.....ft.			8½x8½	10x10	11½x11½	13x13	15x15
	Area per outlet lighted sq. ft.			75	100	135	170	225
	Mounting height.....ft.			8½	9½	10½	11½	12½
	Style No.		Lamp size, watts	Average foot-candles illumination on plane of work				
	Suspension type	Outlet box type						
RLM Standard Dome Reflector-socket Fixture	343701	343707	100	6–7	3.5–4	3.0–3.5	2.5–3	2.0–2.5
	343702	343708	150	10–13	6–8	5–6	4–5	3.0–3.5
	343703	343709	200	13–18	10–12	7–9	6–7	4.5–5.5
	343704	343710	300	.....	.....	12–15	10–13	7–10
	343704	343710	500	.....	.....	.....	.....	13–17
	343705	343711	750	.....	.....	.....	.....	.....
	343705	343711	1000	.....	.....	.....	.....	.....
Glassteel Diffuser	343018	343020	100	5–6	3–4	2.5–3.0	2.0–2.5	.....
	343018	343020	150	8–11	5–7	4–5	3–4	2.8–2.5
	343018	343020	200	11–15	8–11	6–8	5–6	3.5–4.0
	343019	343021	300	.....	.....	10–13	9–12	5.6–8.0
	343019	343021	500	.....	.....	.....	16–21	11–15

(5) Having arrived at the correct foot-candle intensity, read toward the left side of Table No. 1 and find the lamp size and fixture style number which should be used.

TABLE NO. 2

Recommended Standards of Desirable Illumination for Industrial Interiors

Buildings	Foot-candles		Buildings	Foot-candles	
	Good practice	Min. recom.		Good practice	Min. recom.
Industrial Aisles, stairways, passageways and corridors	3	2	Fine bench and machine work, fine automatic machines	20	12
Assembling—Medium	12	8	Sheet Metal Works Fine bench and machine work	15	10
Boilers, engine rooms and power houses	6	3	Tin plate inspection	20	10
Forge Shops and Welding Fine forging and welding	14	8	Store and Stock Rooms Medium	8	5
Foundries Rough moulding and core making	10	6	Textile Mills, Cotton—Spooling, spinning, warping, weaving, inspecting	12	8
Fine moulding and core making	15	10	Silk—Warping, weaving, finishing, winding and dyeing	20	8
Garage Storage, live	8	5	Woolen—Carding, picking, washing and dyeing	10	4
Inspecting Medium	15	10	Drawing in, warping and weaving	16	6
Machine Shops Rough bench and machine work	10	6	Warehouses	3	2
Medium bench and machine work, rough grinding	15	10	Woodworking Medium machine and bench work	12	8
			Fine bench and machine	15	10

Chromilite High Mounting Reflectors

Designed for use in industrial interiors where mounting height is necessarily high and particularly where there are present more than ordinary corrosive influences, the Chromilite high mounting reflector-socket is of an extremely rugged design.

Chromilite High Mounting Reflector

The reflector is fitted with a copper screw heel the same as used in heavy duty reflectors, and must be supported by heavy duty cast-iron or porcelain enameled steel hoods. Because of its hardness and the chromium-plated reflecting surface, ordinary cleaning compound will not destroy its efficiency.

Specifications for Westinghouse Chromilite High Mounting Reflectors—

The high mounting reflector-socket fixture shall consist essentially of a spun copper reflector, a cast iron or porcelain enameled steel hood housing a mogul multiple socket. The fixture shall be rugged and of sufficient strength to withstand the hard usage encountered in industrial plants.

The hood shall be of galvanized cast iron, painted green, or of porcelain enameled steel tapped for ½-in. conduit and shall be provided with a mogul multiple socket.

The socket shall consist of one-piece porcelain to facilitate wiring, with a gilding metal shell and cadmium-plated screws to resist oxidation, and lamp grips to prevent the lamp from loosening under vibration. The hood shall be threaded to receive the copper screw heel of the reflector.

The reflector shall consist of No. 18 B&S gauge copper spun with circular grooves of concentric rings paralleling the edge of the reflector. The top of the reflector, heel and hood shall be closed to prevent the air from circulating through the fixture due to heat generated by the light source. The outside finish shall be green baked japan and the inside reflecting surface shall be chromium-plated to resist corrosive influences caused by smoke fumes, soot, moisture, etc. It shall be hard and durable and resist the heat of large lamps without discoloration. The reflector shall be fitted with a copper screw heel which engages the threads of the cast iron hood or porcelain enameled steel hood.

DESIGNING AN INDUSTRIAL LIGHTING SYSTEM

(1) Select mounting height from either Table No. 2A or Table No. 2B depending on the approximate width of the room to be lighted.

(2) Determine the highest permissible mounting height depending on ceiling conditions.

(3) Determine the desirable foot-candle intensity from Table No. 2 above.

(4) Select from the left hand column of Table No. 2A or No. 2B the mounting height arrived at, follow over to the average foot-candle column and select the desired intensity.

(5) Reference to the spacing column at the left will show the location of units.

(6) The style number of the Chromilite High Mounting fixture for 500-watt P.S. 40-bulb lamp is 343598, for 750-1000-1500-watt P.S. 52-bulb lamps 343599.

Mounting height, ft.	Spacing approximate	Area per outlet, lighted, sq. ft.	Lamp size, watts	Foot-candles average
Table 2A—Areas Having Width of Approximately 50 Feet				
35	30-1 row	1500	1000	4.5
35	30-1 row	1500	1500	9.0
35	25x30-2 rows	750	1000	12.0
35	25x30-2 rows	750	500	8.5
45	40-1 row	2250	1000	3.5
45	30-1 row	1500	1500	6.0
45	25x30-2 rows	750	1000	10.5
55	50-1 row	2500	1500	3.5
55	25-1 row	1250	1500	7.5
55	25x30-2 rows	750	1500	12.0
Table 2B—Areas Having Width of Approximately 100 Feet				
35	30-2 rows	1500	500	3.0
35	30-2 rows	1500	750	5.0
35	33x33-3 rows	1100	1000	10.0
35	33x33-3 rows	1100	1500	15.0
45	40x50-2 rows	2000	1000	4.5
45	33x40-3 rows	1333	1000	8.0
45	33x40-3 rows	1333	1500	11.5
55	50x50-2 rows	2500	1000	3.5
55	50x33-2 rows	1666	1500	8.0
55	33x40-3 rows	1333	1500	10.5

Aluminum and Copper Reflectors and Sockets

These sockets and reflectors have been developed to meet the demand for a well built, lower priced reflector that can be quickly detached from the socket.

Screw Heel Reflector

The porcelain-lined shell keyless sockets are extremely rugged in construction and are suitable for both outdoor and indoor use where atmospheric conditions are such that brass shell sockets are unsuitable or where unusual insulation is desired.

The two parts of the socket are held together by two screws, accessible in the lamp receiving end of the socket.

ALUMINUM SCREW HEEL REFLECTORS AND SOCKETS

Lamp size, watts	Dia. in.	Standard pkg.		Complete units			List price
		Q'n.	Wt., lb.	Dep., in.	Aluminum Style No.	Copper	
25–60	7	10	15	7⅞	343786	337449	$2.33
75–100	8	10	18	8⅞	343787	337450	2.43
150	8	10	20	10⅛	343788	337451	2.63
200	10	10	25	11⅜	343789	337452	3.03

Continued on next page

Symmetrical Angle Reflectors

Symmetrical Angle Fixture with Standard Heel

This type of reflector is an ideal one for all installations where lighting must be done from the side, as the greater part of the light generated by the lamp is reflected into the vertical plane. The symmetrical angle fixtures listed below are combinations of bayonet heel reflectors and reflector-sockets, an exclusive Westinghouse design.

HOOD WITH SOCKET (COMPLETE UNIT)

Lamp size, watts	Depth, in.	Style No.	List price	Depth, in.	Style No.	List price
	Without reflector			With deep bowl reflector		
50–150	10¾	343571	$3.75	10¾	343578	$6.40
200	12	343572	4.20	12	343579	7.00
300–500	14¼	343573	5.60	15½	343580	9.15
	With RLM dome reflector			With concentric reflector		
75–100	10¾	343574	$6.00	10¾	343581	$6.00
150	10¾	343575	6.75	10¾	343582	6.75
200	12	343576	8.25	12	343583	8.25
300–500	14¼	343577	10.75	14¼	343111	9.65
	With angle reflector					
100–200	12¼	343424	$7.25			
300–500	17	337853	10.00			

Disassembled View of Vapor-proof Unit

Pulley Sockets

Save time and effort in cleaning lamps and reflectors and make it possible to clean them more thoroughly. They eliminate the delay that results from the use of ladders, and provide safety from short circuits. Within this pulley socket, wiping contacts are provided of sufficient capacity to make and break the current of a 1000-watt lamp. A pull on the line disengages the reflector and socket.

Description	Standard pkg. Quan.	Standard pkg. Wt., lb.	Style No.	List price
Pulley socket, medium base, to fit bayonet heel reflectors for 200-watt and smaller lamps	10	85	338029	$7.80
Pulley socket, mogul base, to fit bayonet heel reflectors for 300-watt and larger lamps	10	95	338030	8.45

Reflector Sockets for Conduit or Outlet-box Mounting with Broken Views of Reflector

COMPLETE UNIT WITH BAYONET HEELS

Lamp size, watts	For ½-in. conduit mounting: Standard pkg. Quan.	Wt., lb.	Dep. in.	Style No.	List price	For 4-in. outlet-box mounting: Dep. in.	Style No.	List price
25–60	10	10	7½	343790	$2.60	6½	343795	$2.60
60–75	10	15	7½	343791	2.95	6½	343796	2.95
100-150-200	10	25	11⅝	343792	3.45	10⅝	343797	3.45
200–500	5	20	16	343793	4.95	14⅝	343798	4.95
750–1000	5	30	20	343794	7.60	18⅝	343799	7.60

COMPLETE UNIT WITH STANDARD HEELS

Lamp size, watts	For ½-in. conduit mounting: Standard pkg. Quan.	Wt., lb.	Dep. in.	Style No.	List price	For 4-in. outlet-box mounting: Dep. in.	Style No.	List price
25-60	10	10	8¼	343500	$2.75	7¼	343505	$2.75
60-75	10	15	9½	343501	3.05	8½	343506	3.05
100-150-200	10	25	11¾	343502	3.55	10¾	343507	3.55
300-500	5	20	15½	343503	5.75	14⅛	343508	5.75
750-1000	5	30	19½	343504	7.75	18⅛	343509	7.75

One of the principal advantages of standard heel reflectors is in equipping lamps where the sockets and wiring are already installed. The most lasting installation of standard heel reflectors is obtained by supporting them from reflector-sockets. Reflector-sockets should be used with large reflectors having 3¼-in. heel.

Improved Vapor-proof Units

The improved line of vapor-proof units consists essentially of cast iron hoods, housing front-connected sockets, vapor-proof glass globes and suitable reflectors. The "easy-to-wire" features have been retained. The vapor-proof globes are threaded to fit the cast-iron hoods and seat on a special gasket which is unaffected by moisture. Hood style numbers include hood, socket and gasket. The hood is threaded for ½-in. conduit.

Automatic Cut-out Hangers

For use with reflector-socket fixtures on multiple circuits.

The loss of light, when reflectors are not regularly cleaned, amounts to nearly 50% of the light available when systematic cleaning is followed out. The rope for lowering an automatic cutout is carried to the nearest column or wall. A pull on the rope disconnects the fixture from the circuit. It is then lowered to the floor for cleaning or renewing lamps. The next pull on the rope raises the fixture to its original position.

Automatic Cut-out Hanger

Description	Std. pkg.	Ship. wt., lb.	Style No.	List price
With ½-in. male thread fitting	10	20	345338	$6.80

Note: Above style number does not include socket, reflector or rope.

FLOODLIGHTING

Type SA-12 Chromilite Floodlight for 250 and 400-Watt G-Bulb Lamps

This projector is intended for use where light weight and small size are essential.

A single screw focusing mechanism is provided which is extremely easy to operate and gives all the lamp adjustment necessary.

Although very light in weight, the projector is of rugged construction and will withstand the most severe weather conditions. The projector is furnished with a 2½-ft. lead of flexible rubber cable which passes through a weather-proof bushing in the bottom of the housing.

The reflector is a chromium plated parabolic mirror which is not subject to any form of corrosion or breakage, and retains its initial efficiency throughout the life of the projector. A narrow beam reflector is regularly furnished, giving about 10° beam divergence with the clear lens and about 20° divergence with the stippled lens.

Specifications for Westinghouse Chromilite SA-12 Floodlight—

The floodlight shall consist essentially of a metal reflector supported inside a heavy sheet aluminum housing or body with a door and lens, and mounted on a cast aluminum base. The assembled unit shall be of non-ventilated type and shall be weather-proof.

Type SA-12 Chromilite Floodlight

Continued on next page

The reflector shall be of No. 20 B&S gauge, brass, parabolical in shape and shall be chromium-plated to give a hard, permanent, highly efficient reflecting surface that is impervious to ordinary corrosive influences.

The housing shall be of No. 18 B&S gauge sheet aluminum mounted on a small triangular-shaped cast aluminum base. The floodlight shall be adjusted on the base through a universal joint and shall be locked in any position by tightening one bolt and wing nut.

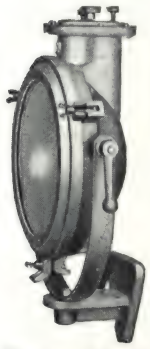
The door shall be hinged to the housing at the bottom and held firmly against the body, by three bronze spring latches which can be opened without tools. The joint between the lens and the outside flange of the door frame and between the door frame and the housing shall be provided with a treated composition packing.

Lenses for the door shall be of heat-resisting glass and available in clear diffusing, rectilinear spread, and circular spread. The lens shall be held in the door frame by small clips which can be removed with a screwdriver or knife blade. Provision shall be made so that a lens holder and inner color lens can be inserted in the projector when desired.

A medium multiple socket shall be so mounted in the housing that the projector may be adjusted to any position without causing the lamp to burn within 45° of base-up position. Because of this special mounting only a single in-and-out focusing device shall be provided at the back of the housing.

The projector shall be designed for the 250-watt G-30 floodlight lamp or the 400-watt, G-30 spotlight lamp. All exposed parts of the floodlight shall be non-corrosive and the assembled unit shall be weather-proof.

Description	Weight, lb.		Style No.	List Price
	Net	Shipping		
Clear lens	8	13	349550	$33.00
Stippled diffusing lens	8	13	349551	33.00
30° rectilinear spread lens	8	13	349536	33.00
5° circular spread lens	8	13	349591	33.00



Type CA-10 Chromilite Floodlight with Wall Bracket

Type CA Chromilite Floodlights

The line of Westinghouse cast aluminum floodlight projectors consists of the CA-10, CA-14, CA-16 and CA-20.

Type CA projectors are built to withstand hard usage. They are mounted on cast-iron bases by means of a steel bow, both being hot galvanized. The swivel base affords universal adjustment. A pole mounting bracket or pipe standard can be furnished for all sizes at a slight increase in cost.

These projectors are so designed that the heat generated is dissipated by radiation, and ventilation is unnecessary and undesirable. Ventilation in a projector ordinarily results in a concentration of heat around the lamp base and socket, which is the most vulnerable part of the unit, and repeated tests have demonstrated that the temperatures at this point are higher with ventilation than without.

Lamps may be focused to a high degree of accuracy by adjusting the three thumbscrews which are placed in an accessible position on the top of the projector.

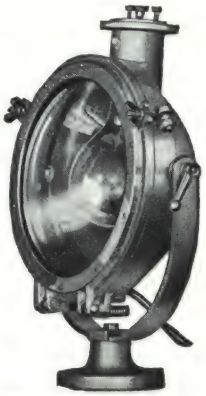
TYPE CA FLOODLIGHTS

Description	For lamp size, watts	Weight, lb.		Style, No.	List price
		Net	Shipping		
Type CA-10, with Narrow Beam Reflector 10-in. Diam.					
Clear lens	150–200	28	60	348209	$39.50
Clear lens and G-bulb adaptor	250	28	60	348302	39.50
Rectilinear spread lens	150–200	28	60	348300	39.50
Stippled diffused lens	150–200	28	60	348301	39.50
Type CA-16, with Narrow Beam Reflector 16-in. Diam.					
Clear lens	750–1000	46	100	347502	$78.00
Rectilinear spread lens	750–1000	46	100	347508	78.00
Stippled diffusing	750–1000	46	100	347503	78.00
Type CA-16, with Wide Beam Reflector 16-in. Diam.					
Clear lens	750–1000	46	100	347517	$78.00
Rectilinear spread lens	750–1000	46	100	341016	78.00
Stippled diffusing lens	750–1000	46	100	347509	78.00
Stippled lens and G-bulb adaptor	1000	46	100	342890	78.00

The center screw adjusts the vertical position of the filament. All three screws work independently of each other and their adjustment is simple and rapid.

Specifications for Westinghouse Chromilite Cast-aluminum Flood Lights—

The floodlight shall be of the non-ventilated type and shall consist essentially of a metal reflector mounted in a cast aluminum alloy housing and the whole suspended in a bow mounted on a hot galvanized cast-iron base.



Type CA-16 Chromilite Floodlight

The reflector shall be of heavy gauge brass, chromium-plated to give a permanent, hard, highly efficient reflecting surface that is impervious to ordinary corrosive influences. The reflector shall be designed to give a narrow (wide) beam spread.

The housing shall be adjustable to any position on its support and shall be balanced so as to have no appreciable tendency to turn out of its set position.

The door shall consist of a cast-aluminum alloy frame and lens and shall be hinged to the housing at the bottom. The door shall be held securely against the housing by means of a spring hinge at the bottom and two T-bolts and wing nuts that are hinged to the body near the top and fit into slotted lugs on the door frame. The joint between the lens and the door frame and between the door and the housing shall be provided with a treated composition packing making the whole weather-proof.

Lenses for the door shall be of heat resisting glass and shall be available in clear, diffusing, and rectilinear spread. Provision shall be made so that an inner color lens can be installed on the door of the floodlight when desired.

The socket shall be a one-piece porcelain mogul multiple with a gilding metal shell and lamp grips. It shall be mounted normally at the top of the housing. When a G. bulb floodlighting lamp is to be used, the housing must be capable of being equipped with a socket stilt and rotated to place the socket at the bottom. It shall also be possible to rotate the socket in the 1000-watt floodlight in order to turn the narrowest dimension of the lamp filament toward the reflector.

The floodlight shall be equipped with three thumb screws at the top housing which permits movement in any direction so that the lamp may be brought to focus without opening the floodlight. The floodlight shall be designed for the 750 or 1000-watt lamps (300-500 watt lamps).

PERFORMANCE CHARACTERISTICS OF WESTINGHOUSE FLOODLIGHT PROJECTORS

Equipment			Lamp, size, type	Beam spread, degrees	Maximum range, ft.	Catalog style No.
Floodlight	Reflector	Lens				
CA-10	N. B.	Clear	250-Flood.	12	155	348302
SA-12	N. B.	Clear	250-Flood.	10	190	349550
CA-14	N. B.	Clear	500-Flood.	12	225	341899
CA-16	N. B.	Clear	1000-Flood.	10	320	347505
CSA-24	N. B.	Clear	1000-Flood.	9	400	349138
			1000-Std.	13	350	349126
			1500-Std.	15	370	349126
CA-10	N. B.	Diff.	250-Flood.	24	70	348304
CA-10	N. B.	Clear	200-Std.	20	110	348299
SA-12	N. B.	Diff.	250-Flood.	20	100	349551
CA-14	N. B.	Clear	500-Std.	20	175	348365
CA-16	N. B.	Clear	1000-Std.	16	260	347502
CSA-24	M. B.	Clear	1000-Std.	22	200	349128
CA-14	N. B.	Diff.	500-Flood.	27	100	342885
CA-14	W. B.	Clear	500-Std.	30	115	341013
CA-16	W. B.	Clear	1000-Std.	29	200	347517
CSA-24	N. B.	N. Spr.	1000-Std.	29x15	175	349127
CSA-24	M. B.	N. Spr.	1000-Std.	38x25	155	349136
CA-10	N. B.	Diff.	200-Std.	50	60	348301
CA-14	W. B.	Diff.	500-Std.	50	80	341014
CA-14	N. B.	Diff.	500-Std.	40	65	348366
CA-14	N. B.	Spread	500-Std.	57x20	90	341893
CA-16	N. B.	Diff.	1000-Std.	50	95	347503
CA-16	N. B	Spread	1000-Std.	55x15	135	347508
CSA-24	N. B.	M. Spr.	1000-Std.	54x15	140	349135
CSA-24	M. B.	M. Spr.	1000-Std.	63x25	125	349137
CSA-24	N. B.	W. Spr.	1000-Std.	109x15	100	349893
CSA-24	M. B.	W. Spr.	1000-Std.	118x25	100	349894

N. B.—Narrow Beam W. B.—Wide Beam
M. B.—Medium Beam N. Spr.—Narrow Spread
M. Spr.—Medium Spread Diff.—Diffusing Std.—Standard Lamp
W. Spr.—Wide Spread Flood.—Floodlight Lamp

Continued on next page

DESIGNING A FLOODLIGHT SYSTEM

The data given herein is primarily intended to provide a rapid means of making an approximate estimate of the number and characteristics of floodlighting projectors required for a given application. For the purpose of checking the results obtained and securing complete information on more intricate designs, such as the lighting of statuary, monuments, railroad classification yards, airports, etc., and color floodlighting, the drawings of the subject together with all details relating to its illumination, should be referred to the Illuminating Engineering Bureau through the nearest Westinghouse Sales Office or Agent-Jobber

Applications

In general, floodlighting applications can be divided into two main classes:

Class A—Including buildings, monuments, bulletin and poster panels and other more or less localized applications, in which the main problem is the selection of location and equipment without excessive "spill" or wasted light. (Table 1A.)

Applications—Figure 1 shows a structure which can be lighted from an adjacent building (usually across a street).

Procedure—(1) From a consideration of the surface and the brightness of the surroundings determine from Table 1A the watts required per square foot of surface.

(2) Multiply the above selected figure by the area in square feet of the surface to be illuminated. This gives the total floodlight wattage required.

(3) The succeeding steps consist of a number of successive trials to determine what sizes and types of floodlights are to be used. Since large units are more desirable than a greater number of smaller units, the first trial should be on the basis of 1000-watt or 1500-watt floodlights.

Class B—Including large areas such as railroad yards in which the problem is largely one of light volume and where a wider choice of equipment is possible. (Table 1B.)

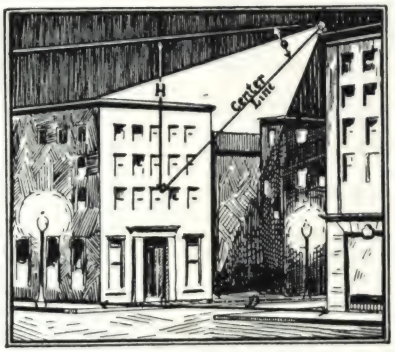


Figure 1

Note: The distance D is from the floodlight to the object being lighted.
The distance H determines the location of the center of the beam above or below a horizontal plane passed through the center of the floodlight and is controlled by the angle of Projection.

Applications—It will usually be found that in the applications listed in Table 1B and other similar applications, where a relatively large area is to be illuminated by broadcast lighting, that the 1000-watt floodlights (Types CA-16 and CSA-24) or 1500-watt floodlight (Type CSA-24) can be used to best advantage. For purposes of rough calculation it can be assumed that a 1000-watt unit will be used, and the steps in determining the number of projectors required will be as follows:

Procedure—(1) Calculate area of the surface to be illuminated.

(2) From Table 1B determine the watts recommended per 1000 square feet of area and multiply this value by the area found in (1) in thousands of square feet.

(3) Divide the value so obtained by 1000, which gives the number of 1000-watt units required.

TABLE NO. 1A

Recommended Watts per Square Foot of Surface and Resultant Illumination for the Subjects Listed in Class A

	Type of exterior surface	Surroundings					
		Bright		Medium		Dark	
		W't.	F.C.	W't.	F.C.	W't.	F.C.
Buildings and monuments	White	1.75	9.5	1.25	7.0	1.0	5.0
	Cream or light gray	2.25	12.5	1.75	9.5	1.25	7.0
	Buff or medium gray	2.75	15.0	2.25	12.5	1.75	9.5
	Tan or dark gray	4.0	22.0	3.25	18.0	2.5	14.0
Bulletins and poster panels	Light colored	5.5	30.0	3.25	18.0	1.75	10.0
	Dark colored	8.0	45.0	4.5	25.0	3.25	18.0

TABLE NO. 1B

Recommended Watts per 1000 Sq. Ft. of Area and Resultant Illumination for the Subjects Listed in Class B

Application	Watts per 1000 sq. ft.	Resulting illumination, foot-candles
Playgrounds	360— 715	2.0— 4.0
Auto Parking Spaces	90— 180	.5— 1.0
Bathing Beaches	90— 180	.5— 1.0
Building Construction	715—1075	4.0— 6.0
Building Excavation	180— 360	1.0— 2.0
Football Fields		
Practice	715—1075	4.0— 6.0
Games	1430—2150	8.0—12.0
Industrial Yards	90— 180	.5— 1.0
Railroad Yards		
General	9	.05
Approach to hump	45	.25
Yard thoroughfares and classification yards	27	.15
Receiving and departure yards	18	.10
Ladder tracks and turntables	45	.25
Skating Rinks	180— 360	1.0— 2.0
Storage Yards	90— 180	.5— 1.0
Swimming Pools	540— 890	3.0— 5.0

Note: An allowance of 25% provided for in the above wattages offsets the loss of light by accumulation of dirt, etc., on floodlights.

TABLE NO. 3

Showing dimensions in feet of beam intercepted by surface at various distances from the light source

See Fig. 1			Beam spread Θ 10° Intercepted beam			Beam spread—15° Intercepted beam			Beam spread—20° Intercepted beam			Beam spread—25° Intercepted beam			Beam spread—30° Intercepted beam			Beam spread—50° Intercepted beam		
D Feet	H Feet	Θ Deg.	Lgth., ft.	Width, ft.	Area, sq. ft.	Lgth., ft.	Width, ft.	Area, sq. ft.	Lgth., ft.	Width, ft.	Area, sq. ft.	Lgth., ft.	Width, ft.	Area, sq. ft.	Lgth., ft.	Width, ft.	Area, sq. ft.	Lgth., ft.	Width, ft.	Area, sq. ft.
	0	0	4	4	15	7	7	34	9	9	61	11	11	97	13	13	141	23	23	431
	6.7	15	5	5	17	7	7	37	9	9	68	12	12	108	14	14	158	25	24	486
	14.4	30	6	5	23	9	8	53	12	10	95	15	13	152	18	16	226	34	28	826
25	25.0	45	9	6	43	13	9	99	18	11	181	23	16	295	30	20	456	60	37	1747
	43.3	60	18	9	124	28	14	297	39	19	566	52	24	984	68	30	1623	268	79	.....
	93.3	75	73	18	1028	130	29	2950	232	45	8251	525	74	.....	.....	.....	.....	.....	.....	.....
	0	0	9	9	59	13	13	135	18	18	244	22	22	387	27	27	564	47	47	1722
	13.4	14	9	9	66	14	14	151	19	18	271	24	23	429	29	28	631	51	49	1944
	28.9	30	12	10	93	18	15	210	24	20	382	30	26	608	37	31	902	67	56	3302
50	50.0	45	18	12	172	27	19	398	36	23	724	47	32	1179	59	40	1825	119	75	6990
	86.6	60	36	18	494	56	27	1184	78	37	2263	104	48	3930	137	60	6490	537	158	.....
	186.6	75	146	36	4120	259	58	.....	464	91	.....	111	148	.....	.....	.....	.....	.....	.....	.....
	0	0	13	13	135	20	20	308	26	26	549	33	33	866	40	40	1269	70	70	3850
	20.1	15	14	14	149	21	20	336	28	27	609	36	35	973	43	42	1419	76	73	4360
	43.3	30	18	15	207	26	23	473	36	31	859	45	39	1370	55	47	2030	100	84	6600
75	75.0	45	26	19	385	40	28	893	55	34	1629	70	48	2650	89	61	4107	179	112	.....
	129.9	60	54	26	1112	83	41	2660	117	56	5091	156	72	8860	205	91	.....	.....	237	.....
	279.9	75	220	54	9280	389	87	.....	696	136	.....	.....	222	.....	.....	.....	.....	.....	.....	.....
	0	0	18	18	240	26	26	543	35	35	977	44	44	1540	54	54	2256	94	94	6890
	26.8	15	19	18	264	28	27	607	38	36	1082	48	46	1723	58	56	2522	102	98	7854
	57.7	30	23	20	371	35	31	845	48	41	1528	60	52	2440	73	63	3609	134	112	.....
100	100.0	45	35	25	685	54	38	1590	73	46	2896	93	64	4720	119	81	7301	238	149	.....
	173.2	60	72	35	1987	111	54	4725	156	74	9050	208	96	.....	273	121	.....	.....	316	.....
	373.2	75	292	72	.....	518	116	.....	929	181	.....	.....	296	.....	.....	.....	.....	.....	.....	.....

Note: When accustomed to the use of table No. 3 its application is considerably simplified by first referring to the beam spread and then to the factors under columns D and H. Table No. 3 shows the area covered by the beam of one floodlight; to provide uniform illumination for areas requiring more than one floodlight, the beams should be so arranged on the area that each one has a minimum overlap of 25%, by the adjacent beam on each side.

Continued on next page

Problem 1—To Illuminate Facade of a Building

The building is 80 ft. wide and 80 ft. high, of dark colored surface, and is located amid dark surroundings. A building suitable for mounting floodlights is located directly across the street 100 ft. distant.

Solution—The building, having a dark gray colored surface and located amid dark surroundings, requires 2.5 watts per sq. ft. of area or a total of 16,000 watts for satisfactory illumination. This is equivalent to 16-1000-watt floodlights. The total area can be divided conveniently into sixteen equal squares each 20x20 ft. With the floodlights being mounted on the building across the street, the distances D and H will be 100 and 40 ft., respectively. Reference to Table No. 3 shows that when the floodlights are located 100 ft. from the object being illuminated a 15° spread is necessary. With this determined we refer to Table No. 2 under the column headed Fig. 1 and find 100 ft. under column D with 40 ft. in column H lying about half-way between 26.8 and 57.7. With this as a guide, we refer to the 15° beam spread and find a circular beam of approximately 30 ft. is obtained. Inasmuch as the building facade has been divided into 16 equal squares of 20x20 ft. each, there will be a 10-ft. beam overlap from each floodlight to insure ample coverage resulting in a uniformly lighted surface. In the equipment listed in the table showing "Performance Characteristics of Westinghouse Floodlight Projectors" on a preceding page we find that the Type CA-16, Style No. 347502 floodlight with narrow beam, 16° reflector, clear lens and 1000-watt lamp fulfills all requirements.

Problem 2—To Light a Sports Field

The field, 160x300 ft., is bounded on three sides by a stadium the back of which is 50 ft. above the ground and 100 ft. from the gridiron.

Solution—The requirement for this type of lighting is a uniform distribution of light with a minimum amount of glare. To accomplish these results involves the selection of floodlights according to the correct beam spread and the choosing of floodlight locations so that the fewest possible number of people face the floodlights. Mounting heights of 60 ft. or more are necessary to avoid glare. It is essential also that the light be projected from more than one point so that severe shadows do not exist. Reference to Table No. 1B shows that between 1430 and 2150 watts per 1000 sq. ft. are necessary. Suppose conditions warrant that the lesser of these values be used. Therefore:

Total watts required—$48 \times 1430 = 68{,}640$ watts.

$\frac{68{,}640}{1000} = 68.6$ number of 1000-watt floodlights.

The next step is to arrange the floodlights in groups, determine the location and mounting height of each group and select the floodlights according to beam spread. To obtain light from opposite directions so as to avoid shadows which are confusing to both the player and spectator and also to avoid glare in the eyes of the players, it is necessary to locate the floodlights along both sides of the field. The most desirable arrangement is on top of the back of the seating stands or about 100 ft. from the gridiron. By using this system the beams have an opportunity to spread before striking the edge of the gridiron. Inasmuch as the floodlights are to be directed across the field, three symmetrically located positions on each side of the field with 11 floodlights at each position are necessary. With 75 ft. as a mounting height, we refer to Table No. 4 and select a combination from TP and L which best fits the width of the field. For this particular installation floodlights of approximately 14° seems to best fit the conditions, because TP or the center of the beam strikes at about the center of the field and L is confined within the width of the field. The beam of the floodlights at a similar position on the opposite side of the field strike the ground in like manner and cover approximately the same area. This assures uniform illumination across the field. The illumination longitudinally of the field is obtained by locating the floodlight beams adjacent to each other so that the beam width of 50 ft. as obtained from Table No. 4 is overlapped on each side by the adjacent beam until all the 66 floodlights required are properly trained. Reference to the table on "Performance Characteristics" on a preceding page shows that the Type CA-16, Style No. 347502 floodlight with 16° narrow beam reflector clear lens and 1000-watt standard lamp meets the requirement called for by the design.

TABLE NO. 3
Floodlighting Equipment Usage

APPLICATION	Distance from light source to object, ft.	Beam spread Type	Beam spread Degrees
Low or Moderate Height Buildings:			
Lighted by floodlights mounted on marquises or located within the specified distance; by combination flood and street lighting units	10– 49	Broad	50
Building Facades:			
Illuminated from floodlights located 50 ft. or more away:			
Distance from floodlights to facades	50– 99	Wide	30
Distance from floodlights to facades	100–199	Narrow	15
Distance from floodlights to facades	200–300	Narrow	10
Tall Buildings—Setbacks only Lighted:			
Setbacks of one or two stories	15– 30	Broad	50
Setbacks of one or two stories	2– 8	Rectangular beam	15x50
Setbacks of three or more stories	15– 30	Wide	30
Setbacks of three or more stories	2– 8	Rectangular beams	15x50
Columns			
Pilasters, etc.	2– 8	Narrow	10

TABLE NO. 4
Floodlight Calculation Data Applying to Subjects Listed as Class "B" Applications
Area Lighted by One Floodlight

14° Projector					20° Projector					30° Projector				
H	C	TP	L	W	H	C	TP	L	W	H	C	TP	L	W
75	200	180	140	50	75	200	165	180	50	75	200	140	240	100
	400	300	410	90		400	250	500	110		400	195	600	160
	600	370	750	120		600	295	860	150		600	220	980	200
	800	415	1110	140		800	325	1240	180		800	230	1370	230
	1000	450	1480	160		1000	340	1600	210		1000	240	1760	260
	1200	470	1910	180		1200	355	1980	230		1200	245	2160	290
90	200	185	120	50	90	200	170	160	70	90	200	150	230	110
	400	320	370	90		400	275	470	120		400	215	560	170
	600	405	690	120		600	335	810	160		600	250	940	210
	800	465	1040	150		800	370	1190	190		800	270	1330	250
	1000	510	1430	180		1000	395	1570	220		1000	280	1720	290
	1200	540	1770	200		1200	410	1910	250		1200	290	2110	320
110	200	190	110	50	110	200	180	150	80	110	200	160	220	110
	400	340	330	90		400	300	430	130		400	240	530	180
	600	445	620	130		600	375	770	170		600	290	910	230
	800	520	960	160		800	420	1110	210		800	315	1270	270
	1000	575	1310	190		1000	455	1500	240		1000	330	1670	310
	1200	615	1680	210		1200	480	1880	270		1200	340	2060	350

H—Height of floodlight above ground level. C—Distance from base of tower to the center of the lighted ellipse. TP—Distance from base of tower to the point at which the center of the beam strikes the ground. The location of this point controls the length and width of the elliptical area lighted. L—Length of ellipse lighted. W—Width of ellipse lighted. All distances are in feet.

AIRPORT LIGHTING

The realization of night flying facilities, from an economic standpoint, if not an urgent necessity, follows the initial development of a site for use of an airport. The results of the experience so far obtained in this comparatively recent addition to the field of illumination, indicate for the guidance of planes to ports and for their safe landing after arrival, that the lighting system of an airport should consist of the following:

(1) a rotating beacon to guide pilots en route; (2) boundary marker lights to indicate the limits of the landing area; (3) approach marker lights to indicate the most favorable avenues of approach to the landing area; (4) obstruction marker lights to indicate the location of obstruction on or near the airport; (5) floodlights to illuminate the landing area; (6) floodlights or standard industrial lighting fixtures to illuminate the roof and walls of the hangars to enable the pilot to judge his elevation above the ground; (7) an illuminated wind direction indicator; (8) a narrow beam projector to determine the height of the "ceiling" or overhanging clouds; (9) interior building lighting.

Chromilite Landing Field Floodlight

The increased demand for facilities to make airports safe for night use resulted in the development of Westinghouse Chromilite Landing Field Floodlights that now make landing fields as safe by night as by day.

Chromilite Landing Field Floodlight

Safe night landings require lighting systems which differ considerably from standard practice. To adequately floodlight the landing surface of an airport it is necessary to project a sheet of light having a uniform intensity and a limited vertical height over the usable area of the field. The method of projecting the light should be such that irregular, wavy surfaces are sufficiently lighted to eliminate confusing shadows.

Continued on next page

SWIMMING POOL LIGHTING

Designing a Swimming Pool Lighting Installation Using the Westinghouse Aqualux Underwater Light

Aside from the overhead illumination whose primary purpose is to light the pool surroundings and objects above the surface of the pool, underwater lighting has found considerable application since an increase in overhead illumination does not materially increase the visibility of objects beneath the surface when viewed from above.

Good pool lighting practice requires two lamp watts per square foot of water surface. To provide uniform illumination on sides of the pool and on objects in the water, a spacing distance of 10 ft. is considered as maximum. Two rows of units are recommended for use in water 10 ft. or more deep.

Type W Aqualux Underwater Light

The example illustrates the method of determining the equipment necessary for the usual indoor swimming pool.

Problem—To illuminate an indoor swimming pool 40x70 ft. in which the depth of water varies from 3 to 10 ft.

Solution—To ascertain the quantity of underwater lights required to illuminate the above pool the following formula should be used:

$$\frac{\text{area x watts per sq. ft. (2)}}{\text{lamp size (250 watts)}} = \text{Number of underwater lights required}$$

or

$$\frac{40\text{x}70\text{x}2}{250} = \frac{5600}{250} = 22.4 \text{ or } 22\text{-underwater lights required}$$

Having ascertained the number of units necessary, the next step is the arrangement of the units. Since a spacing of 10 ft. may be used the units should be arranged seven on each side spaced 10 ft. apart and 5 ft. from each end. They should be mounted so that the center of the lens is approximately 12 to 18 in. below the surface of the water.

At the deep end of the pool, 3 units should be spaced 10 ft. apart and 10 ft. from each side.

Another row of 5 lights spaced 8 ft. apart and 4 ft. from each end should be mounted 18 in. above the bottom of the pool.

The underwater light should be mounted in a recess so that the door of the unit is flush with the side of the pool.

Sufficient waterproof cable should be provided to permit the unit to be lifted to the surface, making it unnecessary to drain the pool to relamp or service the units.

Specifications for Westinghouse Type W Aqualux Underwater Light

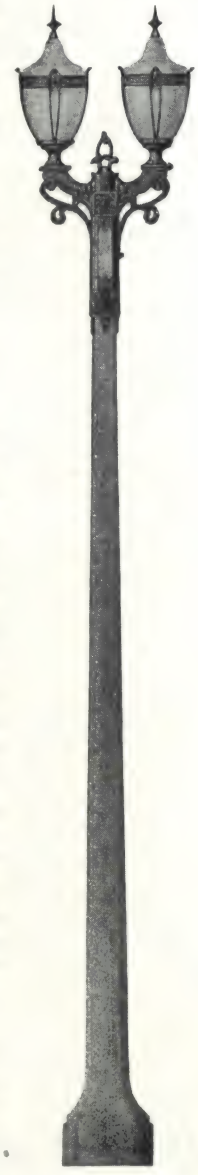
The underwater lighting unit shall consist essentially of a cubical cast box with over-all dimensions 8⅞ in. sq. by 9⅜ in. deep, or non-ferrous metal fitted with a watertight door and heat-resisting lens, housing a metal reflector and medium multiple socket.

The reflector shall be of No. 22 B&S gauge brass, heavily chromium plated to insure a permanent, hard, and highly efficient reflecting surface impervious to ordinary corrosive influences.

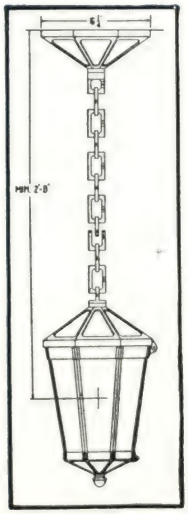
The housing shall be of cast aluminum alloy and be provided with a recess, opening on two sides, in which the electrical connections are made so that the unit may be placed on any side or in any position without interfering with the cable; 15 ft. of waterproof rubber covered cable shall be furnished with each unit. One side of the housing shall be provided with three holes so that the unit may be tilted when placed on a horizontal or flat surface by means of one or more setscrews. The housing shall be fitted with a door and lens assembly which, when fastened in place, forms a watertight seal between the door and the housing.

The lens shall be held in the door assembly securely between two rubber gaskets independent of the bolts holding the door assembly to the housing, so that the door may be removed without disturbing the watertight sealing about the lens. The lens shall be 8⅜ in. in diameter and made of heat-resisting glass. Lenses shall be available in clear and colored glass, also providing circular and rectilinear spreads. Two holes shall be provided in the door front, tapped to receive a ⅜-in. 16-threaded rod or screw eye so that the unit can be easily removed from an inaccessible position.

The underwater light shall have all corners rounded and screws countersunk. It shall be provided with a medium multiple socket and shall be designed for the 250-watt G-30 floodlight lamp or the 400-watt G-30 spotlight lamp.



OUTDOOR LIGHTING EQUIPMENT



Octagonal Lighting Unit

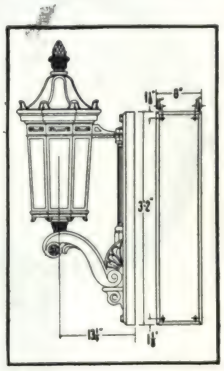
Westinghouse manufactures a complete line of ornamental and utilitarian equipment for outdoor lighting, including airports.

Street Lighting Standards and Newels—Street lighting standards and newels are made in a wide variety of designs in either cast iron or hollow-spun granite. The latter type, because of its attractive appearance and superior durability, is particularly suitable where harmony with fine structures is essential. Standards are designed to support single, two or three-light luminaires in heights from 10 to 32 ft., and newels of similar design suitable for bridges, gate posts or balustrades are from 3 to 8 ft. high.

Hollowspun granite newels and standards are of reinforced concrete. They are "spun" by the centrifugal process which closely compacts the aggregate around the steel reinforcements, thus assuring a product of high tensile strength.

All cast metal standards can be furnished in iron bronze or aluminum as desired.

Brackets—Brackets for supporting pendent or upright luminaires are made in a variety of designs for either wall or pole mounting.



Ornamental Wall Bracket

Pendent Lanterns—Pendent lanterns are available where brackets are impractical.

Lanterns—Lanterns and lighting units for the above are available in cast iron, bronze or aluminum with glassware of different forms and densities. Refractive glassware for increasing the effectiveness of the light generated or for directing it where desired may be added to any lighting unit.

Duolux Floodlighting Units—These units are octagonal paneled lanterns containing a concealed parabolic reflector. When mounted reasonably near buildings or monuments they provide both effective floodlighting and an attractive appearance.

All Westinghouse Lighting Equipment is designed to distribute light in the most effective and economical manner. All are dustproof and insectproof when properly assembled.

Catalog covering all phases of lighting, except residential, are obtainable from the nearest sales office.

A 2-light Hollowspun granite standard is illustrated at the right.

Service

For properly planned lighting installations submit the plans to the Illuminating Engineering Bureau of the Westinghouse Companies. This free service may be secured through the nearest Westinghouse office or agent jobber.

ESTABLISHED 1908

THE HERWIG COMPANY, INC.

Manufacturers of Exterior Lighting Fixtures in Cast Iron and Bronze

OFFICE AND FACTORY

TELEPHONE
LINCOLN 5935

Department A, 1753-1759 Sedgwick Street
CHICAGO, ILL.

Products and Service

Over 300 different designs of OUTDOOR LIGHTING FIXTURES.

We have been engaged in the manufacture of outdoor lighting fixtures for over 22 years. Our modern factory, combined with the large number of patterns we have, enable us to produce work quickly either in Cast Iron or Solid Bronze.

Construction and Design

HERWIG fixtures are of good sound construction, pleasing design and moderate cost. Suitable for apartment buildings, residences, country clubs, public buildings, schools and garages, and wherever outdoor lighting is required. A good many of the leading oil companies use Herwig Fixtures as standard lighting for their service stations and garages.

No. 157 and 109-A shown below are typical of the fixtures now in use.

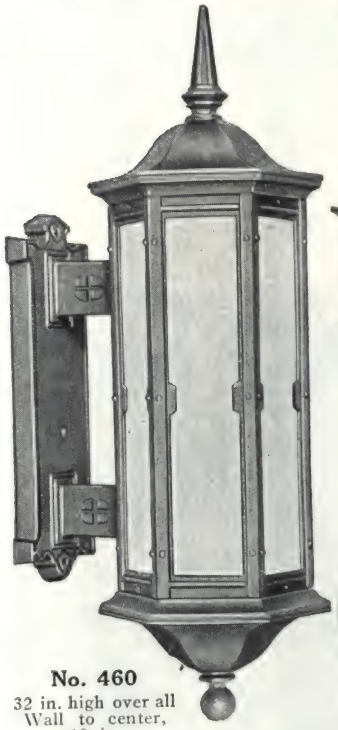
See complete line in our Catalogue No. 30.

Demand

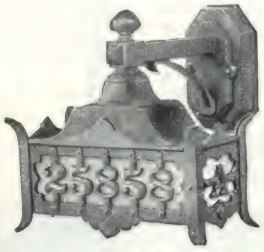
HERWIG fixtures are now specified by the United States Government and leading architects, and are sold in many foreign countries.

Catalogue

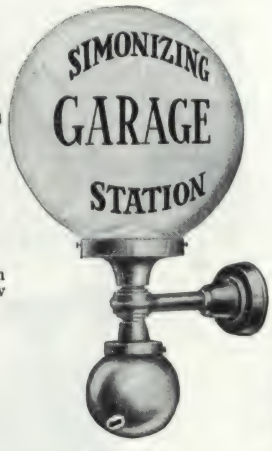
On account of the great number of attractive designs shown in our new Catalogue No. 30 (a copy of which will be sent on request) many architects have found these stock fixtures suitable for their various buildings, thus saving the cost of making up special patterns.



No. 460
32 in. high over all
Wall to center, 10 in.
Back panel, 5½x18 in.
Also made in the gothic panel design
Note: Lugs on panel are now omitted.



No. 463
11 in. high over all
Wall to center, 7 in.
Can be supplied for numbers of 1-5 digits

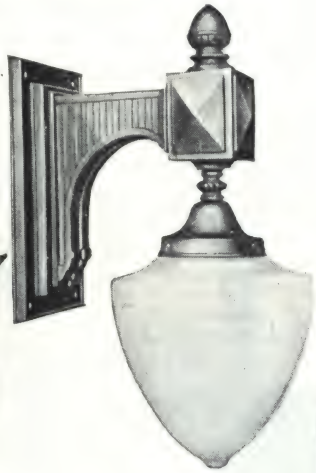


No. 157
Duplex Garage Bracket
6-in. holder on top x 3¼-in. holder below
Length to holder, 7 in.
Wall to center, 10 in.
Standard equipment for service stations

No. 501-A
Height over all, 6 ft. 6 in.
Column, 3¼x4¼ in.
Lantern, 12x15½ in.
Hex. base, 14 in.

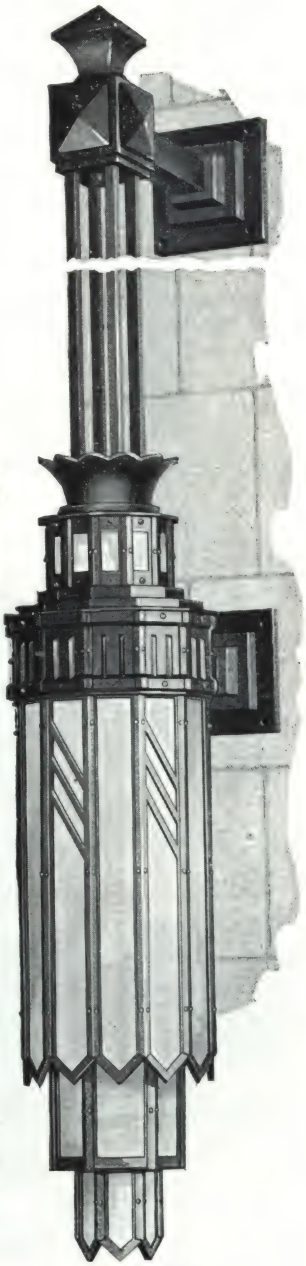
No. 501-B
Height over all, 8 ft.

No. 501-C
9 ft. 8 in.



No. 131
Length to globe, 15 in.
Wall to center, 9¼ in.
6-in. holder

No. 109-A
Height to holder, 7½ in.
Scroll, 5x10 in.
Base, 10½ in. square
Also made with larger scroll
Standard equipment for service stations



No. 515
Length over all, 8 ft.
Lantern, 10x41 in.
Back panel, 6½ in.
Wall to center, 12½ in.
Provision for 4 lights
12 sided

No. 454
Length over all, 14½ in.
Lantern, 4¾x9x9 in.
Wall to center, 7½ in.
Back panel 4½x6¾ in.

SMYSER-ROYER COMPANY

Exterior Lighting Fixtures of Cast Iron and Bronze

MAIN OFFICE AND WORKS
YORK, PA.

PHILADELPHIA, PA., Sales Office, 1700 Walnut Street
BALTIMORE, MD., Jas. P. Lynch, Representative, 811 Park Avenue

Products

Lamp Standards, Lamp Brackets and Lanterns of cast iron and bronze for all exterior lighting purposes.

For our pages on Ornamental Metal Work, see Manufacturers' Index.

TRADE-MARK

Workmanship

Since 1840 the works at York, Pennsylvania, have specialized in artistry in iron, and since that time the high character of workmanship has been steadily maintained. The brief list of typical installations given on this page indicates the type of structure and wide range of projects for which our fixtures have been specified.

Facilities

Complete drafting and designing departments, large pattern and model studio, cast iron and bronze foundry and extensive fitting and assembling shops provide the utmost in facilities to our clients.

Purpose of This Catalogue

While we gladly co-operate with architects in the development of original designs we believe that the array of fixtures shown herein will enable the architect to find one or more suitable to almost every building.

These patterns have been acquired over a period of many years and represent the selection from more than 350 different designs.

In studying the illustrations of standards, brackets and lanterns herein it should be noted that two scales have been used. A height of 6 ft. 6 in. was selected as the dividing point between the scales—fixtures less than 6 ft. 6 in. in height shown to scale ⅜ in. equals 1 ft. and fixtures measuring 6 ft. 6 in. or over shown to scale ¼ in. equals 1 ft. A brief description is given below each design.

If larger illustrations of any particular designs are desired by the architect they may be obtained by addressing the company at any of its offices.

Some Typical Installations.

A few of the projects for which we have furnished the exterior lighting fixtures are:

Delaware River Bridge, Philadelphia, Pa.
Roosevelt Dam, Phoenix, Ariz.
Grand Central Station Approach, New York, N. Y.
Fairmount Park, Philadelphia, Pa.
Estate of John Wanamaker, Elkins Park, Pa.
Estate of Charles M. Schwab, Bethlehem, Pa.
Estate of Mrs. R. T. Reynolds, Winston Salem, N. C.
Roland Park, Baltimore, Md.
Forest Hills and Garden City, L. I., N. Y.
Federal Reserve Bank, Houston, Tex.
D Street Bridge, Washington, D. C.
Tacony-Palmyra Bridge
Albany Courthouse, Albany, N. Y.
City Hall, Omaha, Neb.
Strand Hotel, Atlantic City, N. J.
City Hall, Philadelphia, Pa.

Philadelphia, Pa. Subway
Department of City Transit, Architects

Delaware River Bridge, Philadelphia, Pa.
Ralph Modjeski, Chief Engineer

Continued on next page

No. 423
Height, 7′ 1½″ to bottom of globe
Base 2′ 5″ square

No. 322
7′ 9″ high to bottom of upper globe
Base, 2′ 8″ square

No. 396
6′ 11½″ high to bottom of central globe
Base, 2′ 3″ square

No. 176
9′ high to bottom of upper globe
5 globes
Base, 1′ 6″ square

No. 127
9′ 4″ high to bottom of upper globe
Base, 2′ 8½″ square

No. 222
9′ high to bottom of upper globe
Width across arms, 2′ 3″
Base, 2′ 9″ on square

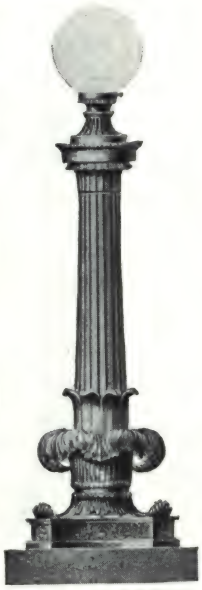
No. 325
9′ 5⅜″ high to bottom of upper globe
Base, 2′ 0″ square

No. 298
8′ 5″ high to bottom of globe
Base, 2′ 3½″ long, 12″ wide

No. 185
7′ high up to 10′ high to bottom of upper globe
5 globes
Base, octagonal 2′ 2″ diameter

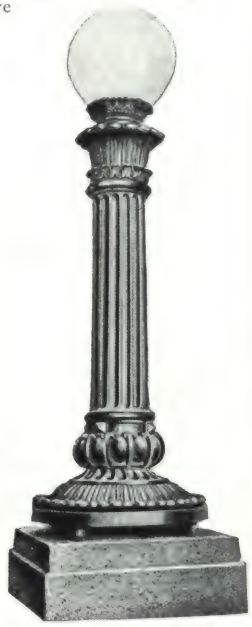
No. 381
7′ 5″ high to bottom of globe
Body triangular
Base, 18″ square

No. 313
7′ 9⅝″ high to bottom of globe
Base, 2′ 5″ x 2′ 5″



No. 149
6′ 5″ high to bottom of globe
Base, 2′ 1″ square

No. 353
5′ 7⅜″ high to bottom of globe
Base, 1′x2′ 3½″ long



No. 32
6′ high to bottom of globe
Base, round, 2′ 6″ diameter

No. 107
2′ high to bottom of globe
May also be made 1′ 3½″ high to bottom of globe
Extreme projection, 1′ 5″
Wall plates, 7½″x9⅜″; 9″x11″

No. 311
3′ ¼″ high to bottom of globe
Extreme projection, 1′ 7⅛″
Wall plate, 10⅛″ square

No. 114
3′ 6″ high to bottom of globe
Extreme projection, 1′ 4″
Top wall plate, 6⅜″x1′ 3″
Lower wall plate, 8¼″x4¾″

No. 384
Extreme projection, 25½″
Wall plate, 21¼″x8″

No. 166
Extreme projection, 1′ 3″
Wall plate same as for No. 109
May be used with globe upright or pendent, as desired

No. 300-A
Extreme projection, 1′ 7″
Wall plate, 1′ 11″x7⅝″

No. 300—Similar
Extreme projection, 2′9½″
Wall plate, 3′ 5″x1′ 1½″

No. 254
1′ 6¼″ high to bottom of globe
Extreme projection, 9¼″
Wall plate, 8″x15″

No. 111
Extreme projection, 1′ 11″
Wall plate, 11½″x1′5″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

Continued on next page

No. 239
8′ 1″ high to bottom of globe
Base, round, 1′ 6″ diameter

No. 30
8′ 3″ high to bottom of upper globe
Spread of arms, 2′ 0″ c.-c. of globes
Can be made with either 3 or 4 cross-arms
Base, round, 2′ 0″ diameter

No. 189
7′ 1″ high up to 10′ 0″ high to bottom of globe
Base, octagonal, 1′ 6½″ diameter

No. 205
7′ 1″ high up to 10′ 0″ high to bottom of globe
Number of arms, 2 or 4, to suit requirements
Base, octagonal, 1′6⅜″ diameter

No. 309
7′ 5″ high, over all
Body of lantern octagonal, 1′ 3″ diameter
Base plate square, 1′ 8″x 1′ 8″

No. 433
Standard with octagonal lantern
Overall height, 7′ 6″ (can be made any height up to 9′ 7″)
Round base 11″ diameter

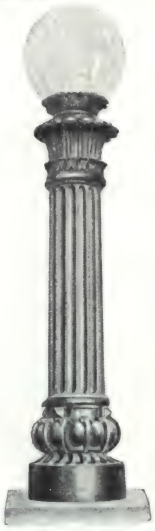
No. 355
7′ 9″ high to bottom of globe
Base, round, 18″ diameter

No. 249
5′ 6″ high to bottom of globe
Base, 1′ 8″ diameter

No. 401
5′ 6½″ high to bottom of globe
Figure on top of globe 6″ high
Base, 5 sided, 17¼″ greatest width

No. 121
8′ 11″ high to bottom of globe
Base, 1′ 6″ square

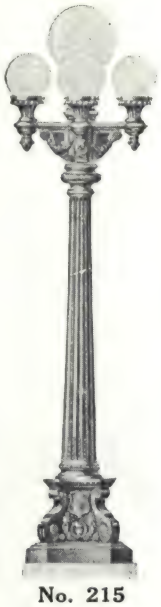
No. 152
7′ 6″ high to bottom of upper globe
Base, 2′ 0″ square



No. 352
5′ 10″ high to bottom of globe
Base, round, 1′ 4½″ diameter

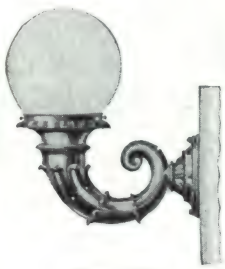
No. 118
5′ 2″ high to bottom of globe
Base can also be made 1′ 3″ diameter
Base, 1′ 3″ square

No. 105
8′ 9″ high to bottom of globe
Base, triangular, 2′ 9″ diameter
Base may also be made 2′ 0″ diameter



No. 215
6′ 6″ high to bottom of lower globes
Base, 1′ 6″ square with cut corners and curved sides

No. 54
2′ 7½″ high to bottom of globe
Extreme projection, 1′ 5″
Wall plate, 1′ 4″x1′ 11″
Wall plate same as No. 199



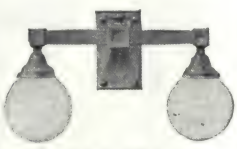
No. 180
1′ 6½″ high to bottom of globe
Extreme projection, 2′ 7″
Wall plate, round, 1′ 2″ diameter

No. 143
3′ 9″ high to bottom of globe
Extreme projection, 1′ 4″
Top wall plate, 1′1″x9¼″
Lower wall plate, 10½″x7½″

No. 408
2′ 1½″ high to bottom of globe
Extreme projection, 9⅝″
Wall plate, octagonal 10″ extreme diameter
Bracket octagonal

No. 113
Extreme projection, 1′ 1″
Wall plate, 1′ 0″x1′ 1½″

No. 280
1′ 4¾″ high over all
Extreme projection, 1′ 2″
Wall plate, 1′ 4″x9″; 1′ 3″x8″



No. 361
Extreme spread of arms, 2′ 9½″
Extreme projection from wall, 10½″
Wall plate, 8″x14″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

Continued on next page

No. 211
7′ 1½″ high to bottom of globe
Base, round, 1′ 4″ diameter

No. 24
7′ 0″ high to bottom of globe
Base, 2′ 0″ square

No. 273
7′ 0″ high to bottom of upper globe
4 arms, 22″ center to center of opposite lights
Base, 1′ 4″ square

No. 265
7′ 1½″ high to bottom of upper globe
2, 3 or 4 arms
Base, triangular, 1′ 8″ diameter

No. 160
6′ 7″ high to bottom of upper globe
3 or 4 pendent globes
Base, 1′ 4″ square

No. 270
8′ 6¼″ high to bottom of upper globe
Five globes
Base measures, 2′ 0″ across

No. 29
6′ 8″ high to bottom of globe
Base, 1′ 4½″ diameter

No. 170
7′ 7″ high to bottom of globe
Base, 2′ 2½″ square

No. 307
5′ 4¼″ high to bottom of globe
Base, 18½″ square

No. 354
6′ 0″ high over all
Base, octagonal, 13″ longest diameter

No. 328
5′ 2½″ high to bottom of globe
Base, round, 1′ 8″ diameter

No. 50
5′ 6″ high to bottom of globe
Base, 1′ 9″ square

No. 400
5′ 3½″ high to bottom of globe
Base, 21¼″ square

No. 326
5′ 8½″ high to bottom of globe
Base, 1′ 10″ square

No. 206
3′ 6″ high to bottom of upper globe
Design, size and projection of wall plates and brackets same as per design No. 114

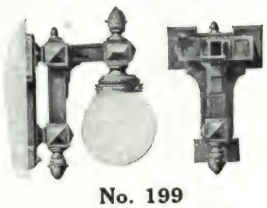
No. 198
3′ 8½″ high to bottom of globe
Wall plate, 11″ diameter

No. 198-A
2′ 8″ high to bottom of globe
Wall plate, 8″ diameter with projecting lugs for bolts with 9″ over all diameter

No. 52
3′ 7″ high to bottom of globe
Wall plate, octagonal
1′ 2″ diameter
Extreme projection, 1′ 7½″

No. 183
1′ 11″ high to bottom of globe
Extreme projection 1′ 1½″
Wall plate, rectangular, 10″x11″

No. 213
1′ 4½″ high to bottom of globe
Extreme projection, 11¾″
Wall plate, 9⅜″x7½″
(same as per design No. 214)



No. 199
2′ 4½″ high over all
Extreme projection, 1′7½″
Wall plate, rectangular, 1′ 4″x1′ 10″

No. 109
1′ 7¾″ high to bottom of globe
Extreme projection, 1′ 7″
Wall plate, 1′ 5″x11¼″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

Continued on next page

No. 120
6′ 0″ high to bottom of globe
No. 120-A
7′ 0″ high to bottom of globe
No. 120-B
4′ 0″ high to bottom of globe
Base, 1′ 4″ square

No. 27
5′ 4½″ high to bottom of globe
Base, octagonal, 1′ 3″ diameter

No. 259
5′ 6″ high up to 6′ 0″ high to bottom of globe
Base can be made 10″ or 11½″ square

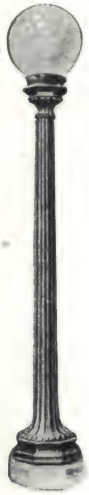
No. 53
5′ 6″ high to bottom of globe
Base, 1′ 8″ square

No. 369
6′ 0″ high to bottom of globe
Base, round, 1′ 3″ diameter

No. 318
6′ 0″ high to bottom of globe
Base, round, 1′ 8″ diameter

No. 334
5′ 0″ high to bottom of globe
Base, octagonal, 1′ 10″ diameter

No. 334-A
Scale, 1″ = 1′ 0″
3′ 8″ high to bottom of globe
Base, octagonal, 1′ 4″ diameter



No. 397
5′ 6″ high to bottom of globe
Base, octagonal, 12¼″ across square, 13½″ across corners

No. 191
5′ 0″ high up to 8′ 1″ high to bottom of globe
Base, 1′ 0″ square

No. 316
7′ 6″ high to bottom of globe
Base, triangular, 2′ 4¾″

No. 110
7′ 7″ high to bottom of globe
Base, 2′ 0″ square

No. 262
8′ 11″ high to bottom of globe
Base, 1′ 5″ square

No. 252
8′ 0″ high to bottom of globe
Base, 11″, round or square

No. 182
6′ 7½″ high to bottom of globe
Base, 1′ 8″ square

No. 124
8′ 9″ high to bottom of center globe
Base, rectangular, 3′ 3″x1′ 4″

No. 357
1′ 6⅝″ high to bottom of globe
Extreme projection, 12¼″

No. 358
2′ 6¾″ high to bottom of globe
Extreme projection, 15″
Wall plate, round, 11½″ diameter

No. 231
2′ 8″ high to bottom of globe
Extreme projection, 1′ 1⅛″
Wall plate, 9″x16″

No. 234
Extreme projection, 1′ 3¾″
Wall plate, round, 11″ diameter

No. 405
Extreme projection, 7″
Wall plate, 5″x9½″

No. 246
3′ 3″ high to bottom of upper globe
Distance from center of shaft to wall, 12″
Size of wall plate, 9″x16″

No. 212
Extreme projection, 1′ 3½″
Wall plate, round, 6″ diameter

No. 181
Extreme projection, 1′ 1½″
Wall plate, rectangular, 10½″x1′ 7″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

Continued on next page

No. 312
Scale, 1″ = 1′ 0″
5′ 10″ high to bottom of globe
Steel pipe shaft
Base and cap of cast iron
Can be made any height
Base, round, 11″ diameter

No. 337
Scale, 1″ = 1′ 0″
4′ 11⅛″ high over all
Base, octagonal, 10″ diameter

No. 23
Scale, 1″ = 1′ 0″
4′ 2¾″ high to bottom of globe
Base, 1′ 3½″ square

No. 413
Scale, 1″ = 1′ 0″
4′ 2″ high to bottom of globe
Base, 4½″ square
This standard is especially adapted for stair newel lighting and can be made from 3′ 0″ to 5′ 0″ high to bottom of globe

No. 260
Scale, 1″ = 1′ 0″
4′ 9½″ high to bottom of globe
Base, 1′ 3″ square

No. 190
Scale, 1″ = 1′ 0″
4′ 5″ high to bottom of globe
Base, 1′ 2″ square

No. 244
Scale, 1″ = 1′ 0″
4′ 1½″ high to bottom of globe
Base, round, 9″ diameter

No. 244-A
4′ 1½″ high to bottom of globe
Base, 7″ square

No. 200
Scale, ¾″ = 1′ 0″
6′ 7½″ high over all
Lantern, octagonal
Base, square, 1′ 9½″ diameter (cut corners, concave sides)

No. 173
Scale, 1″ = 1′ 0″
3′ 8″ high to bottom of globe
Base, 12″ square

No. 237
Scale, 1½″ = 1′ 10″
4′ 10″ high up to 6′ 3″ high to bottom of globe
Base, 11″ square

No. 319
Scale, 1″ = 1′ 0″
4′ 1″ high to bottom of globe
Base, 1′ 3″ square

No. 421
4′ 10″ high over all
Base, 11″ square

No. 232
Scale, 1″ = 1′ 0″
3′ 4″ high to bottom of globe
Base, octagonal, 10″ diameter

No. 305
Scale, 1″ = 1′ 0″
5′ 8⅞″ high over all
Body, round, 1′ 3″ diameter
Base, 1′ 5″ square

No. 410
5′ 2½″ high over all
Body, round; outside diameter of glass, 1′ 6″
Base, round, 1′ 7½″ over all diameter

No. 441
5′ 10¼″ high over all
Base 2′ 1″ square

No. 375
Scale, 1″ = 1′ 0″
3′ 7⅝″ high over all
Lantern, octagonal
Base, 2′ 10¾″ on diagonal

No. 364
Scale, 1½″ = 1′ 0″
2′ 11¼″ high over all
Over-all spread of base, 1′ 9½″

No. 350
Scale, 1′ = 1′ 0″
4′ 8½″ high over all
Body, octagonal, 2′ 9¾″ longest diameter
Base, round, 1′ 8″ diameter

No. 360
Scale, 1″ = 1′
Octagonal pier lantern
Over-all height, 4′ 0″
Base, 12″ square

No. 432
2′ 4½″ high over all
Base, 8½″ square

No. 391
Scale, 1½″ = 1′ 0″
2′ 11″ high over all
Lantern, hexagonal, widest diameter 17″
Base, round, 12″ diameter

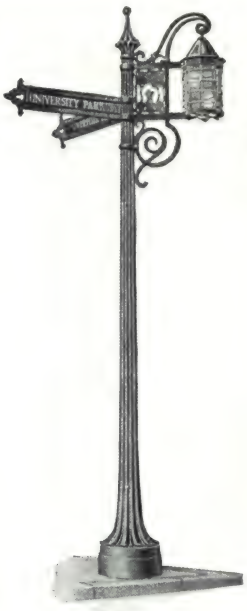
No. 333
Scale, 1½″ = 1′ 0″
3′ 3¾″ high over all
Body, octagonal
Longest diameter 1′ 6¼″
Bottom member of base, 1′ 2½″ diameter

No. 362
Scale, 1½″ = 1′ 0″
2′ 7⅝″ high over all
Body, octagonal
Base, 12″ square

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

Continued on next page

No. 278
12′ 6″ high over all
9′ 8″ high to bottom of lantern
Can be made with 1 to 3 sign arms
Can be made with 1 to 4 lamp arms
Base, 13″ diameter, octagonal



No. 230
11′ 11⅝″ high over all
Base, round, 16¼″ diameter

No. 323
11′ 7½″ high over all
Lantern, round, 10½″ diameter
Base, round, 10″ diameter

No. 399
12′ 6″ high over all
Base, 12″ square

No. 419
12′ 0″ high over all
Base, 1′ 5″ diameter

No. 255
14′ 1″ high over all
Lantern, octagonal, 18″ diameter
Base, 1′ 4¼″ square

No. 202
1′ 0″ high to bottom of globe
Base, round, 1′ 4″ diameter

No. 187
4′ 3½″ high over all
Base, octagonal, 1′ 5″ diameter

No. 418
Over-all height, 5′ 0″
Base round, 15½″ diameter
Lantern is irregular octagon

No. 393
2′ 6″ high over all
Base, octagonal, 14″ over octagon
Base, octagonal, 13″ over square

No. 393-A
Same design as 393 but 2′ 11½″ high over all
Base, octagonal, 17″ over octagon
Base, octagonal, 16″ over square

No. 383
3′ 4½″ high over all
Base, 14″ square

No. 275
"The New Path-finder"
2′ 6½″ high over all
Specially designed for walks and driveways of country estates
Base, round, 7⅞″ diameter

No. 335
2′ 2¼″ high over all
Base, round, 7¾″ diameter

No. 233
2′ 0¾″ high to bottom of globe
Shaft, 2″ square
Base, 8″ square

No. 203
Over all height of body, 1′ 5½″
Extreme diameter of base, 1′ 4″

No. 203-A
Similar
Height, 1′ 1″
Base, 1′ 0″

No. 134
2′ 4″ high to bottom of globe
May also be made 3′ 10½″ high to bottom of globe with 1′ 0½″ square base
Base, 11″ square

No. 340
3′ 6″ high over all
Base, 16″ round

No. 177
1′ 7″ high to bottom of globe
Base, 2′ 0″ square

No. 409
2′ 10¼″ high over all
Base, 7¼″ square

No. 377
5′ 8″ high over all
Extreme projection, 2′ 0⅝″
Lantern, octagonal
Wall plate, 8¾″ wide x 9¼″ high

No. 412
4′ 6″ high over all
Extreme projection, 2′ 0″
Upper wall plate, 6″ square
Lower wall plate, 12″ square

No. 379
10⅞″ high
Base, 16″ octagonal

No. 108
12″ high to bottom of globe
Base, 9¾″ square

No. 374
10¼″ over-all height of body
Base, round, 10″ diameter

SMYSER-ROYER COMPANY

EXTERIOR LIGHTING FIXTURES

SCALE
⅜″ and ¼″ = 1′ 0″

Continued on next page

No. 386
9′ 0″ high over all
Lantern, octagonal, mean diameter, 10⅛″
Base, round, 1′ 6″ diameter

No. 321
9′ 8½″ high over all
Lantern, hexagonal, 13½″ diameter
Base, round 1′ 8″ diameter

No. 430
Over-all height 9′ 6″
Hexagonal base, 7½″ across corners

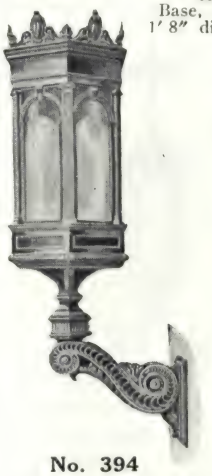
No. 435
9′ 8½″ high over all
Base, octagonal, 1′ 6½″ diameter

No. 303
9′ 7″ high up to 12′ 8″ high over all
Lantern, octagonal, 10″ diameter
Base, octagonal, 1′ 6⅜″ diameter

No. 363
10′ 8¼″ high over all
Base, round, 12″ diameter

No. 294
8′ 6″ high over all
Base, 10″ square

No. 446
11′ 2¾″ high to bottom of globe.
Base, octagonal, 1′ 6⅜″ short diameter



No. 394
6′ 1½″ high over all
Lantern, hexagonal
Diameter across corners at top, 31¾″
Wall plate, 12½″x20¾″

No. 137
4′ 6½″ high over all
Extreme projection, 1′ 10″
Wall plate, 1′ 10″ diameter

No. 306
5′ 3″ high over all
Lantern, octagonal, 12½″ diameter
Extreme projection, 1′ 8½″
Wall plate, 11″ square

No. 276
4′ 4″ high over all
Extreme projection, 2′ 4¾″
Body, octagonal, mean diameter, 14″
Wall plate, 9⅞″x14⅝″

No. 258
6′ 9¾″ high over all
Extreme projection, 2′ 10½″
Top wall plate, 7¾″ wide x 17¾″ high
Bottom wall plate, 7¾″ wide x 13″ high

No. 437
Octagonal lantern, Over-all height, 3′ 10″
Extreme projection, 1′ 11″
Octagonal wall plate, 10⅜″ across the square

No. 402
4′ 3¼″ high over all
Extreme projection, 21⅛″
Lantern, octagonal
Wall plate, 17¼″ long, 9″ wide at top, 6¾″ wide below

No. 320
5′ 9″ high over all
Body, hexagonal, 1′ 2¼″ diameter
Projection from wall to center line, 12¼″
Wall plate, 9¼″x15¾″

No. 395
3′ 10½″ high over all
Extreme projection, 23″
Wall plate, 6½″ diameter

No. 136
3′ 8″ high over all
Extreme projection, 1′ 11½″
Wall plate, 10½″ diameter

No. 346
Extreme projection, 3′ 0″

No. 277
4′ 0½″ high over all
Extreme projection, 2′ 1″
Body octagonal, 10″ diameter
Wall plate, 2″0¼″x7½″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

Continued on next page

No. 192
10′ 0″ high to bottom of globe
Base, round, 1′ 7″ diameter

No. 373
8′ 0″ high to bottom of sign
Sign box, 2′ 4″ long, 1′ 6″ high, 5″ deep
Base, 1′ 4″ square

No. 290
7′ 0″ high to bottom of lower sign
Pipe shaft, base and signs of cast iron

No. 291
6′ 6″ high to bottom of globe
Base, round, 11½″ diameter

No. 240
11′ 6″ high to bottom of globe
Base, 1′ 6″ square

No. 317
9′ 0″ high to bottom of upper globe
Base, round, 1′ 8″ diameter

No. 248
10′ 0″ high to bottom of globe
Base, round, 1′ 4″ diameter

No. 445
2′ 6″ high over all
Lantern, 11″ square

No. 444
2′ 10⅜″ high over all

No. 417
Over-all height, 3′ 3½″
Extreme projection, 2′ 3⅜″
Body of lantern octagonal and is 1′ 5½″ across the square
Wall plate, 1′ 10¼″x 6¼″

No. 425
Octagonal lantern
Over-all height, 3′ 6⅝″
Extreme projection, 1′ 7½″
Back plate, 10¾″x5″
Top bracket plate, 4½″ diameter

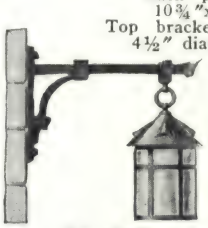
No. 327
5′ 0¾″ high over all
Body, octagonal, 1′ 4″ mean diameter
Extreme projection, 2′ 2″
Wall plate, round, 15″ diameter

No. 429
Over-all height, 4′ 0″
Extreme projection, 2′ 6″
Back plate, 7″ diameter

No. 286
1′ 7¾″ high over all
Projection to center of lantern, 1′ 1¾″

No. 282
2′ 1½″ high over all
Projection to center of lantern, 11¾″
Wall plate, 2″x14″

No. 284
1′ 9¾″ high over all
Projection to center of lantern, 1′ 0″



No. 302
2′ 4¾″ high over all
Projection to center of lantern, 1′ 10½″
Wall plate, 3½″x19″

No. 287
1′ 1¼″ high over all
Projection to center of lantern, 1′ 1″

No. 285
1′ 4¾″ high over all
Projection to center of lantern, 1′ 0″

No. 288
1′ 8½″ high over all
Projection to center of lantern, 1′ 0″

No. 299
3′ 7½″ high over all
Projection to center line of lantern, 1′ 4″
Body, octagonal, 12¼″ diameter
Wall plate, 7⅝″ square

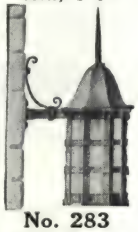
No. 407
2′ 1⅜″ high over all
Lantern, octagonal
Wall plate, round, 5″ diameter

No. 376
2′ 1½″ high over all
Extreme projection, 19½″
Lantern, hexagonal
Wall plate, 5¼″ square

No. 367
Lantern, 1′ 6″ high over all
Body at largest point, 12″ square

No. 281
2′ 4½″ high over all
Projection to center of lantern, 1′ 10½″
Wall plate, 2½″x17½″

No. 63
1′ 6″ high.
Body, 7″ square
Extreme projection, 1′ 9″



No. 283
2′ 9½″ high over all
Projection to center of lantern, 1′ 0″
Wall plate, 3″x5″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

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No. 296
2′ 8″ high over all
Body, octagonal, mean diameter, 10⅛″
Wall plate, round, 10½″ diameter

No. 438
Octagonal lantern, over-all height, 2′ 11″
Extreme projection, 1′ 7″
Wall plate, 4′x1′ 9″

No. 343
Projection to center of lantern, 12″

No. 439
Square lantern of wrought iron, Over-all height, 3′ 4″
Extreme projection, 2′ 4½″
Body of lamp, 12″

No. 426
Body of lantern octagonal 10″ across the flats
Over-all height, 3′ 4″
Extreme projection 1′ 7″
Wall plate, 1′ 9¾″x3⅝″

No. 301
3′ 10¼″ high over all
Projection to center of lantern, 1′ 6½″
Wall plate, 4½″ wide x 3′ 3″ long

No. 371
Lantern, 2′ 0¼″ high over all
Extreme projection, 3′ 1″
Wall plate, 24″ high, 4″ wide

No. 424
Octagonal lantern
Over-all height, 3′ 0″
Extreme projection, 1′ 1″
Wall plate, 3½″ diameter

No. 438-A
Same design as No. 438, but of the following dimensions:
Over-all height, 2′ 1½″
Extreme projection, 1′ 1¾″
Body of lantern, 10″
Wall plate, 3′x15⅜″

No. 440
Octagonal lantern
Over-all height, 1′ 1″
Extreme projection, 8″
Octagonal wall plate, 4″

No. 324
11¼″ high over all
Extreme projection, 7″
Body octagonal, 6″ maximum diameter
Wall plate octagonal, 4⅛″ diameter

No. 324-A
1′ 10¾″ high over all
Extreme projection, 1′ 2½″
Body, octagonal, 11¾″ maximum diameter
Wall plate, octagonal, 9″ maximum diameter

No. 345
2′ 10″ high over all
Projection to center of lantern 1′ 1¾″

No. 380
2′ 8″ high over all
Extreme projection, 17″
Lantern, octagonal
Wall plate, round, 10½″ diameter

No. 168
2′ 4″ high over all
Extreme projection, 1′ 4½″
Wall plate, 4½″ diameter
Body, 1′ 0″ square

No. 336
2′ 10⅜″ high over all
Extreme projection, 13″
Wall plate, same as design No. 214

No. 329
Octagonal lantern
Diameter of body, 10″
Wall plate, round, 8″ diameter

No. 447
6′ 2¼″ high over all

No. 55
5′ 8½″ high over all
Body, octagonal
Extreme projection, 2′ 0″
Upper wall plate, 8¼″x4¾″
Lower wall plate, 1′ 3″x6⅜″

No. 365
3′ 7⅞″ high over all
Body, round, 1′ 3″ diameter

No. 329-A
Ceiling plate, round, 8″ diameter
Octagonal lantern
Diameter of body, 10″

Lantern No. 146
Height of body over all, 4′ 0″
Ceiling plate, 8″ diameter
Body, square, over all 2′ 0″

No. 194
Height of body over all, 3′ 6″
Body, octagonal, 1′ 6″ diameter
Ceiling plate, round, 10″ diameter

No. 151
4′ 3½″ high over all
Body, round, 2′ 1″ diameter
Rosette at ceiling, 1′ 2″ diameter
Suspension pipe, 1⅛″ outside diameter
Length to suit specifications

No. 161
2′ 4″ high over all
Extreme projection, 1′ 5″
Wall plate same as for No. 54

No. 226
Extreme projection, 1′ 6″
Wall plate, octagonal, 14″ short diameter

No. 169
Extreme projection, 1′ 4″
Wall plate, 9″ diameter

No. 197
Over-all height of body, 2′ 1½″
Body, octagonal
Extreme diameter, 1′ 1¾″
Canopy at ceiling included

No. 112
Extreme projection, 1′ 4½″
Wall plate, 1′ 0″x1′ 1½″
(Same as per design No. 113)

No. 372
Extreme projection, 10⅝″
Wall plate, round, 8″ diameter

No. 135
Extreme projection, 1′ 2″
Wall plate, 11¾″x5½″

No. 214
Extreme projection, 9¾″
Wall plate, 9⅜″x7½″

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

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No. 390
12′ 5½″ high over all
Base, 17″ square

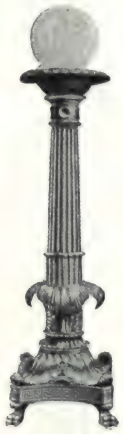
No. 261
10′ 0½″ high over all
Base, 14″ square

No. 385
9′ 10″ high over all
Lantern, octagonal, 12″ across corners
Base, octagonal, 22″ across corners
Base, without feet, 21½″ octagonal

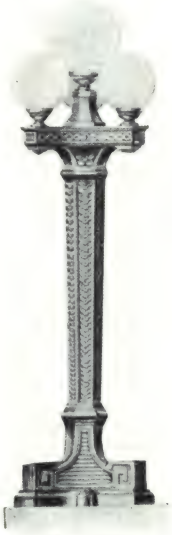
No. 216
7′ 5″ high to bottom of globe
Base, 3′ 7″ square

No. 165
8′ 9″ high to top of acorn
Base, 2′ 8″ square

No. 332
8′ 0⅛″ high over all
Lower portion, 12″ square
Outside diameter, at base, 13¼″



No. 308
6′ 6¼″ high to bottom of globe
Base, 2′ 4″x2′ 4″



No. 51
6′ 0″ high to bottom of upper globe
Base, triangular, 2′ 0″ diameter
Base also can be made 1′ 9″ diameter

No. 142
4′ 2″ high to bottom of globe
Base, 1′ 3½″ square

No. 150
5′ 2″ high to bottom of globe
Base, 11″ square

No. 179
4′ 7″ high over all
Base, 1′ 10″ square

No. 420
7′ 6¾″ high over all
Base, 1′ 11″ square

No. 129
5′ 10″ high to bottom of globe
Base, 1′ 4″ square

No. 292
6′ 6″ high to bottom of globe
Steel pipe shaft
Base and cap of cast iron
Can be made any height
Base, round, 11½″ diameter

No. 277-A
3′ 11½″ high over all
Extreme projection, 1′ 6⅜″
Body, octagonal, 10″ diameter
Wall plate, 1′ 6¾″x7½″

No. 338
5′ 1″ high over all
Base, 14½″ over all

No. 242
5′ 2″ high over all
Distance from wall to center of lantern, 1′ 6″

No. 389
Lantern, 18½″ high over all
Lantern, hexagonal
Extreme diameter, 12½″
Sides flattened out to attach to scroll braces

SMYSER-ROYER COMPANY	EXTERIOR LIGHTING FIXTURES	SCALE ⅜″ and ¼″ = 1′ 0″

DAVENPORT-TAYLOR MFG. CO.

Manufacturers of Illuminated Signs, Bronze Tablets and Plaques

TELEPHONE
SUPERIOR 9274
Private Exchange

GENERAL OFFICE
412 Orleans Street, CHICAGO, ILL.

BRANCH OFFICES
NEW YORK, N. Y., 132 West 43rd Street—Telephone, Bryant 7999
BOSTON, MASS., 318 Little Building—Telephone, Beach 2584
SEATTLE, WASH., 1007 2nd Avenue
DETROIT, MICH., 1346 Broadway—Telephone, Randolph 9334
SAN FRANCISCO, CAL., 693 Mission Street—Telephone, Kearney 5460
LOS ANGELES, CAL., 405 So. Hill Street—Telephone, Tucker 1312

AGENCIES IN ALL PRINCIPAL CITIES

For our page on Building Directories and Bulletin Boards, see Manufacturers' Index

Interior Electric Signs

The electric indicator signs illustrated are recognized as necessary equipment wherever interior electric signs are used. That they may be seen in daily use in practically all of the leading banks, hotels, theatres, department stores, office buildings and other institutions of a public nature places an endorsement upon them far greater than anything we might say.

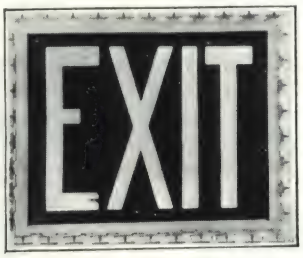
Opal and Bronze

The face of the sign is one piece of white opal glass.

The background is cut away, causing the letters to stand out. Duco bronze color is applied to the background, making it opaque so that the electric light shines only through the raised white opal letters.

One standard tubular electric lamp (25 watt) concealed in the heavy part of the frame is used for every eight inches in length.

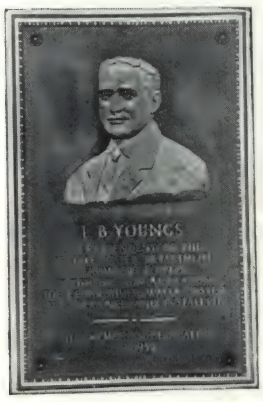
Style No. 176



Style No. 171

Opal and Edge-Lite Bronze Signs
Special designs made up to your own specification in bronze, nickel, silver, monel metal or steel

Genuine U. S. Standard Bronze Tablet
Size 33x15½ in.



No. 437. Cast Bronze Tablet with Modeled Bust

Cast Letters
Made in all sizes in bronze or nickel silver. Any finish desired

Edge-Lite

The face of the Edge-Lite is clear plate glass with the lettering or design deeply cut into the reverse side.

The light from standard tubular lamps concealed in the heavy part of the frame shines directly through the edge of the glass, lighting up the letters and making them appear embossed.

Any type letter or special design can be cut into either the Edge-Lite or the Opal and Bronze Sign.

No. 43E. Single Face Bronze Sign

Single Face only. Usually mounted on top of grille work or on a ledge of some kind. The frame is of drawn bronze with cast bronze ornament, hand chased and finely finished representing the highest development in directional signs of built up bronze. Furnished either in Opal and Bronze or Edge-Lite Type. Bronze frames only

No. 43B. Single or Double Face Sign with Wall Arm

Furnished in either Edge-Lite or Opal and Bronze Type. Frame may be either drawn bronze or steel finished dull black

No. 43K. Single Face Bronze Sign

Single Face only. Made with flat back and small lugs at each end to attach directly to the wall. The frame is drawn bronze with cast bronze ornaments attached. This style made in either Opal and Bronze or Edge-Lite Type

No. 17. Desk and Counter Name Sign

Solid cast bronze fitted with rubber tips to prevent marring of counter or desk

Cast Bronze Tablets, Plaques, Name Plates

Our workmanship is of the highest type using standard U. S. formulas in both bronze and nickel silver. Our portrait tablets are modeled by recognized artists. Prices and sketches furnished to our own or your specifications.

Write for complete Bronze Sign Folders.

FLEXLUME CORPORATION

Manufacturers of Electric Displays

1101 Military Road
BUFFALO, N. Y.

Products

EXTERIOR DISPLAYS: Neon Tube; Raised Glass Letter; Exposed Lamp; or Combination Designs; Interchangeable Glass Letter or Marquee; Roof Displays.

INTERIOR DISPLAYS: Etched Glass, panel type.

Experience

Originators and developers of quality electric displays since 1910. Million-dollar financial responsibility. Largest plant in the world exclusively devoted to the manufacture of electric displays.

Exterior Displays

Raised White Glass Letter—These patented electric displays are particularly desirable—alone or in combination with neon-tube or exposed-lamp borders because of dignity and beauty combined with day-and-night effectiveness. Raised glass letters are more legible than any other illuminated letter of equal size, day or night.

Neon Gas Tube Electrics—The newest and latest in colorful electric display with strong day and night attractiveness . . . . red, blue, green, white, gold and purple.

Spectacular Exposed Lamp Displays—For roof tops and large building fronts where spectacular display is desired.

Interchangeable Glass Letter or Marquee—These displays are for theatre attraction boards or for advertising timely features.

Combination Designs—Combining the rich and highly visible raised glass letter type with borders of colorful neon or flashing effects of exposed lamps; another combination is neon and exposed lamp. The ideal display combines the great legibility of raised glass letters with the brilliance of neon.

Construction

Framework—Consists of specially processed galvanized steel angle frame, securely bolted; entire lift and strain of the sign is thus borne by the framework.

Faces and Edges—Face metals are of Nos. 24 and 26 gauge, galvannealed sheet steel, rigidly bolted to framework; edges turned over to provide weatherproofness; the whole face crimped to give strength and to eliminate wave and glares.

Finishes—Copper plate; du Pont Duco; porcelain enamel over No. 18 gauge Armco iron; pure copper and bronze.

Electric Wiring—All Flexlumes bear the label of the National Board of Fire Underwriters and are on the approved list. All wiring is inside, thoroughly protected from the weather and human contact. Union label.

Openings for Maintenance—Weatherproof die-formed doors give easy access for cleaning and relamping. They are hinged and fit cap-shape over openings in the edges of the signs.

Hanging Rig—Furnished complete with either mast iron or wall iron. Except for small installations, wall irons are recommended.

Raised Glass Letters

Made with exclusive special formula producing much more luminous and far-reaching translucent glass letters moulded to give bold relief. They render uniform illumination; inside is a permanent reflecting surface producing the cross-reflection which is our patent, and giving increased illumination for the same amount of current consumption. The letters project through the stencil cuts in the display face, and are held in place by phosphor bronze clips.

Neon Electric Tubes

The same high quality construction; revolutionary electrodes give more brilliant illumination and much longer tube life; easily plugged into waterproof and dustproof terminals; electric connection automatic; high voltage wires not touched; transformer and all wiring within the sign.

Interior Directional or Advertising Displays

Made of glass onto which is processed the desired wording. Lighted from within, these displays give beautiful illumination for low cost; standard lamps used. Several sizes and types with frames in brushed bronze or mahogany. Special sizes and finishes can be furnished within certain limits.

Sketches and Quotations on Request

We will gladly show art sketches in color and furnish quotation for one display or one hundred displays, without obligation.

"Signs and Inscriptions in Architecture"

An authoritative book prepared specially for architects and engineers, illustrating quality construction and period designs.

Have your secretary write for copy.

PRICE BROTHERS, INC.

AND SUBSIDIARY: ATLAS BRONZE M'F'G COMPANY

Manufacturers of Illuminated Directional Signs and Reflectors, Ornamental Bronze and White Metal Work

GENERAL OFFICES AND FACTORY

TELEPHONE
ARMITAGE 4757

2640-2648 North Maplewood Avenue, CHICAGO, ILL.

EASTERN SALES OFFICE: 2 Park Avenue, NEW YORK, N. Y.

REPRESENTATIVES IN PRINCIPAL CITIES

Products

ILLUMINATED DIRECTIONAL SIGNS.
ELEVATOR SIGNS and SIGNALS.
ILLUMINATED BRONZE EXTERIOR SIGNS.
EXIT SIGNS.
BANK WICKET SIGNS.
REFLECTORS for BANK SCREENS.
INDIVIDUAL REFLECTORETTES.
COVE LIGHTING REFLECTORS.
TROUGH REFLECTORS.

Facilities

Pattern and modeling department. Foundry for making finest French sand castings. Fabricating and assembly department for cast, extruded, drawn and sheet, bronze and white metal work. Plating department for all metal finishes. Electro copper plating on glass. Sandblasting and etching on glass. Designing and engineering service without cost or obligation.

Sign Panels

Dayanite—Opal glass, raised sandblasted letters, electro copper plated background, plated to match frame.

Edgebrite—Plate glass sunken letter, illuminated through edge of glass.

Diffusalite—Metal stencil containing lettering applied on opal glass and covered with special diffusing glass front.

Disappearing Letter—Metal stencil containing lettering applied on diffusing glass and covered with gold irridescent glass front. Lettering legible only when illuminated.

Metalfase—Raised crystal letters protruding through sheet bronze face.

Catalog—Write for Catalog No. 30 on signs and reflectors.

Northwestern EC-1000

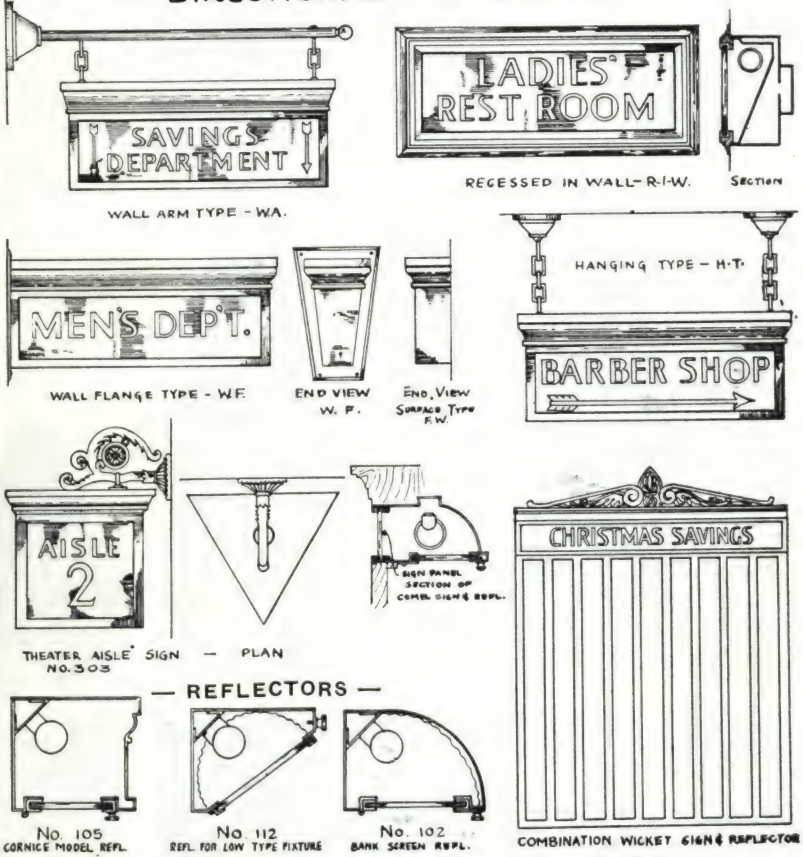
Cleveland C-1010

La Salle EC-1020

St. Louis C-1030

Shedd C-1040

— DIRECTIONAL — SIGNS —



— REFLECTORS —

A Few of Price Brothers' 1929-30 Installations

JOB	CITY	ARCHITECT
Foreman State National Bank	Chicago, Ill.	Graham, Anderson, Probst & White
First National Bank	Chicago, Ill.	Leonard Construction Co.
Continental Ill. Bank & Trust Co.	Chicago, Ill.	Graham, Anderson, Probst & White
LaSalle Wacker Building	Chicago, Ill.	Holabird & Root; Rebori & Wentworth
Cleveland Trust Company	Cleveland, Ohio	A. G. Hall
Banco Nacional de Mexico	Mexico City, Mex.	St. Louis Bank Bldg. & Equip. Co.
Northwestern National Bank	Minneapolis, Minn.	Graham, Anderson, Probst & White
Occidental Hotel	Muskegon, Mich.	Holabird & Root
Medical Arts Building	Cleveland, Ohio	Graham, Anderson, Probst & White
Northwestern National Co.	Milwaukee, Wis.	Holabird & Root
Mayo Clinic	Rochester, Minn.	Ellerbe & Company
Passavant Hospital	Chicago, Ill.	Holabird & Root
Swedish Covenant Hospital	Chicago, Ill.	Schmidt, Garden & Erickson
Shedd Aquarium	Chicago, Ill.	Graham, Anderson, Probst & White
Adler Planetarium	Chicago, Ill.	Ernest Grunsfeld, Jr.
St. Louis Courthouse	St. Louis, Mo.	Plaza Commission, Inc.
Merchandise Mart	Chicago, Ill.	Graham, Anderson, Probst & White
Loews' Kings Theatre	Brooklyn, N. Y.	Rapp & Rapp
Carew Tower	Cincinnati, Ohio	Walter B. Ahlschlager

RAWSON & EVANS CO.

Glass Signs, Ornamental Glass and Carved Glass

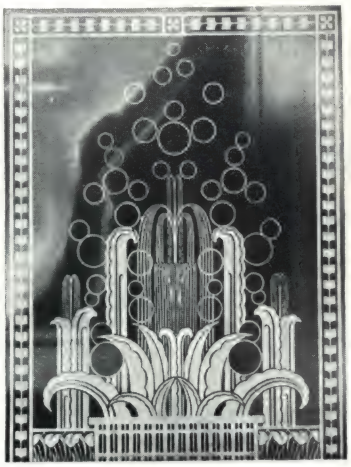
710 Washington Boulevard, CHICAGO, ILL.

Products

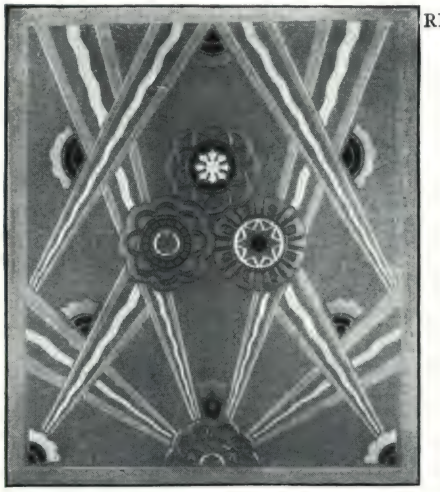
DECORATIVE GLASS, including carved, acid etched, acid stippled, chipped, sandblast, enameled, leaded art glass and ornamental mirrors in gold and silver.

Also glass signs, including raised letter marblelike glass, chipped and etched gold plate glass, Sani-Onyx, directional, edgeglow, art glass, church bulletins, both electric and non-illuminating.

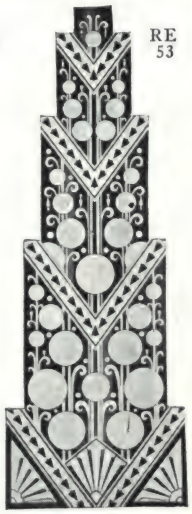
RE52



RE54



RE90



RE 53

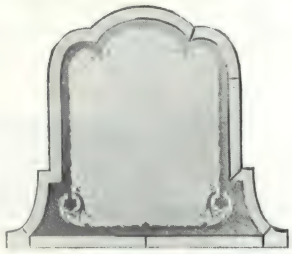
RE55 (below)

RE 62

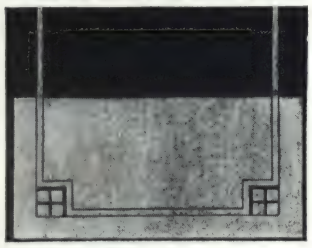
RE 63

Key to Illustrations

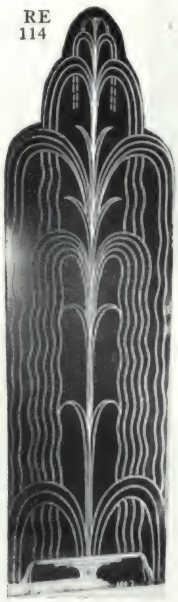
RE 52—Illuminated display panel.
RE 54—Window background.
RE 90—Office fixture panel.
RE 53—Modernistic mirror.
RE 55—Store front with carved glass in arcade, door, valances, etc.
RE 62—Show window, carved glass panel at side.
RE 63—Store entrance with carved glass transoms, panels.
RE 116—Gold and silver mirror.
RE 700—Bank fixture glass stippled part way up.
RE 114—Mirror, modernistic.



RE116 (above) RE700 (below)



RE 114



Carved Glass

This new decorative medium gives a beautiful finish to store fronts, show windows, transoms, entrances, display cases, cabinets, etc. Carved glass also adds a smart, new note of decoration to theaters, banks, public buildings, and home interiors.

Valances

Carved glass valances give a modern appearance to any store window. They are made with or without lettering and plain or colored.

Bank and Office Fixture Glass

We combine decorative effect and utility by acid etching, stippling, chipping, and sandblast treatments.

Gold and Silver Mirrors

Specially designed decorative mirrors in gold, silver, and colors, and combinations of each as architect may specify.

Sketches and Prices

For nearly fifty years we have been specializing in the fashioning of glass—creating designs or working from those supplied. We work in close co-operation with architects, designers and contractors. If desired, we shall be glad to offer suggestions and furnish sketches and prices.

TORK CLOCKS INC.

Manufacturers of Time Switches and Time Systems

GENERAL SALES OFFICE
12 East 41st Street, NEW YORK, N. Y.
FACTORY AND GENERAL SERVICE DEPARTMENT: LINDEN, N. J.

TORK CLOCKS

"Tork Clocks" are time switches used to automatically control lighting, heating, power and radio devices on regular daily schedules. Standardized in many types covering every variety of service. Stocked by principal wholesale electrical houses in more than 100 cities.

Simplicity

Tork Clocks are characterized by their simplicity. Any one can set a Tork Clock to perform the desired operations by reading the simple instructions on each clock. It is easy to turn them "on" and "off" by hand and this does not change the automatic operations in any way. Tork Clocks are regularly furnished to turn on and off once a day. Additional dial pins are easily added for extra operations up to the number indicated; no extra winding is required.

How to Specify Tork Clocks for Service Required

Simply specify the list number followed by the words "Tork Clock." This will constitute a complete specification in accordance with the functions and capacities indicated below.

TORK CLOCKS FOR SWITCHING ON AND OFF AT FROM 1 TO 16 TIMES PER DAY

Switch capacity		List No.		
Poles	Amperes	Indoor housing	Outdoor housing	Not enclosed
1	10	110	210	010
1	30	131	231	031
2	30	132	232	032
3	30	133	233	033
4	30	134	234	034
1	60	161	261	061
2	60	162	262	062

The above capacities are for any voltages up to 220 volts.

Weekly Calendar Attachment

Any of the above Tork Clocks may be obtained with a calendar attachment for automatically omitting the scheduled operations on any one or more days of the week. Specify as "No. 132-Calendar Tork Clock, etc." Unless otherwise specified, this is furnished with a pin for cutting out Sunday operations and 2 extra pins for plugging in when extra days "out" are desired.

Winding Alarm Attachment

Any of the above Tork Clocks may be obtained with a weekly alarm attachment consisting of a signal contact for sounding a buzzer one day before the clock would stop if not rewound, by adding the word "alarm." For example, "No. 132-Alarm Tork Clock."

Lock-Wind Attachment

Any of the above Tork Clocks may be obtained with a lock-wind attachment for preventing unauthorized persons from changing the schedule of operations, though permitting them to wind the clock. Specify as "No. 110-Lock-Wind Tork Clock, etc."

TORK CLOCKS FOR SWITCHING 2 DIFFERENT CIRCUITS ON AND OFF INDEPENDENTLY FROM 1 TO 16 TIMES PER DAY

Switch capacity			List No.		
1st circuit poles	2nd circuit poles	Amperes	Indoor housing	Outdoor housing	Not enclosed
1	1	30	1311	2311	0311
1	2	30	1312	2312	0312

The above capacities are for any voltages up to 220 volts.

Weekly Alarm Attachment

The weekly alarm attachment described above may be obtained on 2-circuit Tork Clocks. Specify as "No. 1311-Alarm Tork Clock," etc.

Momentary Contact Type

Any of the above 2-circuit Tork Clocks may be obtained for momentary contact service to control large remote controlled switches. Specify as "No. 1311-Momentary Contact Tork Clock, etc."

Guarantee

All of the above Tork Clocks are regulated and tested on complete runs before shipment and are packed in individual sealed cartons so that they may be delivered on the job as packed at the factory. Tork Clocks are unconditionally guaranteed against mechanical defects and any defective units are exchangeable for new at our factory without charge within one year of date of installation.

TORK-MASTER TIME SYSTEM EQUIPMENT

Tork-Master equipment includes Tork-Master Clocks, Tork Dials (secondary clocks) and Tork Program Instruments, which are manufactured for use with telephone, signaling, protective and recording apparatus made by other leading manufacturers.

Tork-Master Clocks

Of the greatest accuracy and simplicity and operated direct from 110-volt a-c. circuits with reserve for all current interruptions. A free swinging Invar pendulum which can be regulated within 10 seconds per month. Copy of Bureau of Standards test report on Tork-Master Clocks furnished on request. Mercury tube contact for operating all secondary apparatus.

Tork Dials and Program Instruments

We manufacture standard Tork Dials (secondary clocks) from 8 to 18 in., both single and double faced; and special Tork Dials in illuminated types and marble and bronze constructions up to 48-in. diameter. All mechanisms are individually housed and interchangeable. Our program instruments are made for 2, 4 or 6 circuits with 24 or 12-hour schedules as desired, and are complete with bell relays.

Combination Telephone Installations

Tork-Master Equipment is well adapted for use in combination with telephone systems. We manufacture control panels for such combinations as desired. Complete technical descriptions of all Tork-Master Equipment furnished upon request.

SIGNALING, TIME AND INTERCOMMUNICATING SYSTEMS

American District Telegraph Co.....D6180–6184
Auth Electrical Specialty Co., Inc.....D6052–6063
Autocall Co. D6064–6067
Automatic Electric Inc.....D6187–6189
Best Mfg. Co.....D6215
Bryant Electric Co.....D6068
Chicago Watchman's Clock Co.....D6209
Connecticut Telephone & Electric Corp.....D6069–6114
Couch, S. H., Co., Inc.....D6190–6191
Detex Watchclock Corp.....D6210
Edwards and Co., Inc.....D6116–6121
Graybar Electric Co.....D6195–6197
Hamilton-Sangamo Corp. D6201
Holtzer-Cabot Electric Co.....D6122–6165
International Fire Equipment Corp.....D6185
Landis & Gyr, Inc., Dept. of Magnetic Clock Co.....D6202
North Electric Mfg. Co.....D6192–6194
Ortho-Tone Co. D6211
Racon Electric Co.....D6216
Radio Receptor Co., Inc.....D6217
RCA-Victor Co., Inc.....D6212–6213
Samson Electric Co.....D6214
Schwarze Electric Co.....D6115
Select-O-Phone Co. D6200
Signal Engineering & Mfg. Co.....D6166–6173
Standard Electric Time Co.....D6203–6205
Stanley & Patterson.....D6174–6178
Stromberg-Carlson Telephone Mfg. Co.....D6198–6199
Thomas, Seth, Clock Co.....D6206–6207
Times Appliance Co.....D6218
Teletype Corp. D6186
Usem Co. D6179
Warren Telechron Co.....D6208
Western Electric Co.....D6219–6222
Yaxley Mfg. Co.....D6223

AUTH ELECTRICAL SPECIALTY CO., INC.

Manufacturers of Electrical Signaling Apparatus

422 East 53rd Street
NEW YORK, N. Y.

SALES REPRESENTATIVES

BALTIMORE, MD.	CHICAGO, ILL.	DETROIT, MICH.	LOS ANGELES, CAL.	NEW ORLEANS, LA.
BOSTON, MASS.	CLEVELAND, OHIO	KANSAS CITY, MO.	LOUISVILLE, KY.	SYRACUSE, N. Y.
CINCINNATI, OHIO	DENVER, COLO.	ST. LOUIS, MO.	MINNEAPOLIS, MINN.	PHILADELPHIA, PA.
PITTSBURGH, PA.		SAN FRANCISCO, CAL.		SEATTLE, WASH.

Products

ANNUNCIATORS, including all types of electrical and mechanical reset, lamp and drop types; PUSH BUTTONS, all types; BELLS and BUZZERS; BANK DAY RAID HOLD-UP ALARM and COUPON BOOTH SYSTEMS; RETURN CALL ANNUNCIATOR SYSTEMS; BREAK GLASS FIRE ALARM SYSTEM; SEPARABLE CONNECTORS; INTERCOMMUNICATING and APARTMENT HOUSE TELEPHONE SYSTEMS; IN and OUT REGISTER SYSTEMS for hospitals and offices; LAMP and ANNUNCIATOR DROP TYPES; DOCTORS' LOCATION SYSTEM; PAGING SYSTEMS for hospitals, offices and factories, silent and audible types; NURSES' CALL SIGNAL APPARATUS.

Catalogue

The following pages show a representative line of our products but in addition to these we make many standard devices for various signaling systems applicable to all classes of buildings. We will send on request our complete catalogue showing our full line, including wiring diagrams and information.

The Company and Its Facilities

In the manufacture of signaling equipment the AUTH ELECTRICAL SPECIALTY CO. is backed by an experience of 30 years during which the highest standards of quality have always been maintained.

The Company has a large plant equipped with the most modern facilities which enable it not only to make equipment of high quality, but to produce on a large scale and and in great variety.

A large quantity of the more common forms of appartus is carried in stock from which prompt shipment can be made.

In addition to standard products, we are also prepared to make special devices to meet any unusual problem.

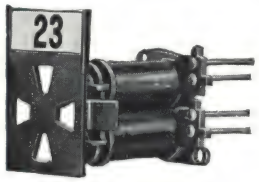
Service to Architects

Our engineering staff is always at the service of architects and engineers and we will advise as to the best methods, apparatus and specifications in any case, whether standard or to meet unusual requirements.

ANNUNCIATORS

Electrical Reset Drops

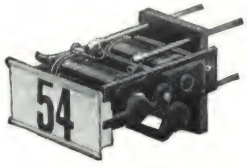
The drops herein shown and described are those which are installed as parts of the signaling devices and apparatus hereinafter illustrated, and as will be particularly mentioned in each case.



No. 500

No. 500 Rotating Target—Very sensitive and reliable. Operating current very low. Magnetically locked in set and reset positions. Especially recommended for installations having annunciators wired in multiple. Card indication is mounted directly on the drop. *For direct current only.*

No. 501—Marking is mounted directly on target. The only electrical reset drop with a completely disappearing indication in the reset position. Operates on the principle of the scale balance. Gravity assists the set and reset movements of the target. *For either direct or alternating current.*



No. 501

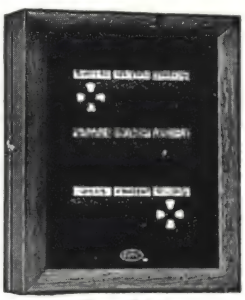
Note: Standard electrical reset annunciators are wired for group reset at the annunciator. Annunciators can be wired for individual reset, reset from a remote location or for automatic reset in which case the setting of any drop automatically resets the last indicating drop. Special finishes to order.

Annunciators, Electrical Reset

No. 510 Surface Wall—Office or residence type, all glass front metal case, standard finishes oak and mahogany, No. 500 drops, adjustable buzzer in case. *For direct current only.* For No. 500 drops, see above. For sizes, see table below.

No. 520—This is the same as No. 510 except that it is equipped with No. 501 drops as described above.

Note: Either the above types may be had with steel plate front instead of glass and with wood case instead of metal.



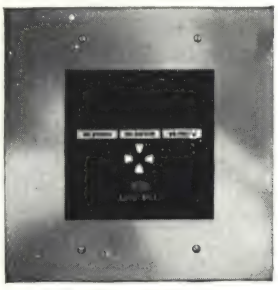
No. 510

SCHEDULE OF SIZES, NO. 510 AND NO. 520

No. of drops	Arrangement of drops		Size, in.	
	Across	Down	Width	Height
4	4	1	6	7½
12	4	3	7¾	9¾
20	5	4	9¼	11
30	6	5	10½	14¼
48	8	6	13¾	16¾
60	10	6	17	17
100	10	10	17	23¼

No. 530 Flush Wall—Office or residence type, glazed or metal trim, standard finishes oak and mahogany. Drop board is mounted on a cradle which has an adjustable mounting feature in a steel outlet box. Trim also fastens to outlet box independently of drop board. No. 500 drops and adjustable buzzer in case. *For direct current only.* For No. 500 drops see above.

No. 530-2—Same as No. 530 but with No. 501 drops. *For direct or alternating current.* For No. 501 drops, see above.



No. 530

If required, flush annunciators can be made with hinged doors in fronts so that name markings may be changed without removing trims from boxes.

Note: We recommend the use of Auth Separable Connectors in all flush annunciators. See description hereinafter.

SCHEDULE OF SIZES, NO. 530 AND NO. 530-2
(Depth of box in wall, 4 in.)

No. of drops	Arrangement of drops		Outlet box, in.		Overall, in.	
	Across	Down	Width	Height	Width	Height
6	3	2	8¾	10½	10¼	12
8	4	2	10½	10½	12	12
12	4	3	10½	12	12	13½
20	5	4	12	13¾	13½	15¼
25	5	5	12	16⅛	13½	17⅝
30	6	5	13¼	17¼	15¼	19¼

No. 535 Office Desk Annunciator—Wood case, finely finished, standard finishes oak and mahogany, bottom felt covered. Furnished complete with six feet of flexible cord. Furnished with No. 500 drops as shown above.

Continued on next page

No. 535 Desk Type

No. 535-3 Office Desk Annunciator—With vertical face, wood or metal case. Furnished with No. 501 electrical reset drops disappearing indication as shown above.

Note: We recommend that desk annunciators be connected by means of Auth Separable Connectors, floor or wall type.

No. 535-3 Desk Type

Elevator Annunciators

No. 543 Elevator Type Electric Reset—Heavy steel case black finish, standard round spot indication. The face of the annunciator is heavy sheet steel with individual glazed openings for each drop. Buzzer in case. For alternating or direct current.

No. 543

No. 544 Elevator Type Electric Reset for "Up" and "Down" Service—Distinctive colored opals are used to differentiate the "up" and "down" indications. The standard annunciator has a heavy sheet bronze case, standard finish is natural brushed bronze. The relays are located in a cabinet remote from the annunciator, usually at the top of the elevator shaft. Slide base lamps are furnished. The annunciator may be relamped without opening or removing the case. No. 544 annunciators are made with group reset and with individual reset for operation with automatic reset devices. They may be operated on either alternating or direct current.

No. 544

Floor Type Annunciator

No. 548 Metal Standard Floor Type Office Annunciator—For use in offices where the annunciator must be so located that wall or desk type annunciators cannot be used or in places where an additional annunciator is required on the wall but no conduit has been installed for it. The standard is mounted over an underfloor duct or conduit floor outlet and the wires brought up through the hollow base. Annunciator and standard are all metal and a pilot lamp signal may be used on top. May be single or double faced.

No. 548

Lamp Annunciators

Relays—Lamp annunciators shown herewith are designed to operate from momentary contact push buttons by the use of *locking relays.* They may, however, be operated without relays if locking buttons or switches are used for calling, and resetting is done at the calling station. It is standard design to have relays for all lamp annunciators located in separate relay cabinets. Nos. 1504, 1505 and 1506 may be constructed with the relays in the same case with the annunciator although doing so increases the size and detracts from general appearance.

Electric reset locking relays which are used with lamp annunciators are operated from momentary contact push buttons at the various calling stations. When a button is pressed, a relay sets and makes a contact which lights a lamp on the annunciator. This contact is maintained until the reset button is pressed.

The use of relays with lamp annunciators makes three important features possible:

(1) Calling stations can be made with small *momentary* contact buttons instead of large cumbersome switches.

(2) Resetting of lighted indications can be done at any place desired, at the annunciator or remote from it.

(3) Lighted indications can be reset in groups.

Resets—Resetting of lighted indications may be "group," in which case a single reset button controls a number of indications or "individual" in which case each indication has a reset button.

Lamps—Nos. 1503, 1504 and 1505 are equipped with slide base lamps and removable opals. Lamps may be changed without disturbing front plate. Nos. 1501 and 1506 have screw base lamps with provision for relamping.

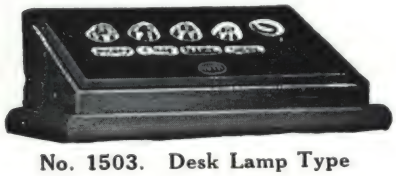
Finishes—Wherever bronze is specified, the finish may be made to match any sample.

No. 1501 One Light Executive's Desk Annunciator—Size: 1⅝ in. wide, 1⅞ in. long, 2¼ in. high. This is an all bronze portable annunciator with an unusual indication visible from all sides. Reset button on base. Lamp easily replaced by unscrewing lamp guard hood. Furnished complete with 6 ft. of cord attached to small relay box to mount in knee space of desk. Buzzer in relay box.

Cat. No. 1501

No. 1503 Desk Annunciator—Hardwood or bronze case. Top plate bronze. Lamps and name cards changed without disturbing top plate. Complete with 6 ft. of cord attached to hardwood relay box to be mounted in knee space of desk. Buzzer in relay box.

Note: We recommend the use of Auth Separable Connectors, floor or wall type, for connecting desk annunciators. See description hereinafter.



No. 1503. Desk Lamp Type

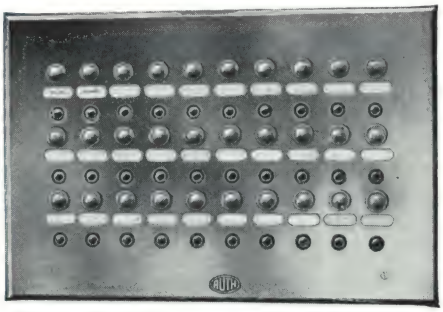
Continued on next page

No. 1504 and No. 1505 Flush Wall Type Group and Individual Reset—Solid bronze ⅛-in. face plates, opal indications ⅜ in. in diameter.

Lamps and name cards may be changed without removing face plate.

All No. 1504 and 1505 lamp annunciators are completely equipped with Auth Separable Connectors so that the entire annunciator may be removed by merely pulling the connectors from their sockets. Buzzer in case.

Note: Cut shows buttons for individual reset. When group reset is required a group reset button is provided.



Cat. No. 1504. Group Reset
Cat. No. 1505. Individual Reset

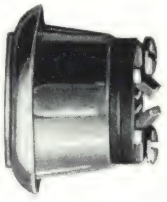
No. 1506 Solid Bronze Face Plate, Flush Type, Screw Base Lamps — Trim and locked hinged door are provided to facilitate relamping. Opal indications are ¾ in. in diameter and have numbers which are visible when lamps are lighted. Name cards are inserted from rear of door. This annunciator equipped with Auth Separable Connectors.

Cat. No. 1506

PUSH BUTTONS AND PLATES

Push Buttons

No. 115 Midget Push Button—Well constructed, good appearance and small. Fits a ⅝-in. hole. Perfect scraping contacts, pearl center, rim finished in polished nickel or brushed brass.



No. 115

No. 118 Flush Cast Bronze Entrance Weatherproof Push Button — Button has rawhide diaphragm and is fully protected from the weather.

No. 118

Desk Pads

No. 105 Moulded Bakelite Directory Type Desk Pad—A well proportioned pad, practically unbreakable. Furnished in durable moulded bakelite finishes of oak, mahogany or walnut. Name cards easily removable without tools. Nonskid rubber bottom. An excellent directory type desk pad for general office service.

No. 105

No, 106 All Metal Directory Type Desk Pads—Portable type desk pad of heavy gauge metal with felt or nonskid rubber bottom. Finest construction and materials.

Name cards removable without disturbing top plate. Bases of solid bronze or brass or with durable natural grained lacquer finishes in oak, mahogany or walnut.

Top plates of solid bronze or brass.

No. 106

Button Plate

No. 109 Solid Bronze Directory Type Button Plate—For flush mounting in wall, desk or table top. High grade design and materials.

Name cards removable from front of plate.

No. 109

RETURN CALL ANNUNCIATOR SYSTEMS

These systems are used principally in Y. M. C. A. clubs, small hotels, nurses' homes and similar buildings.

No. 1547 Electric Reset Annunciator—Flush or surface type, with No. 501 drop (as previously shown) is used. One drop and one button are required on the annunciator for each room. Room numbers are mounted directly on the drop targets and are visible only when the drops are set. Room numbers are also engraved on return call buttons. Calls from rooms to the office are indicated on drops. Office signals back to rooms by pressing the corresponding buttons.

Cat. No. 1547. Return Call Annunciator

No. 1550 Return Call Buzzer — Buzzers for rooms may be flush or surface type with brass or bakelite plates. Consist of call button and return call buzzer. Flush plates are standard single gang size and fit a standard switchbox. Surface plates fit a standard surface conduit box. Standard system requires one direct and two common wires from each room to the annunciator. Two separate sources of current supply are required.

An electric reset drop may be used in addition to the buzzer to obtain a permanent record of a call until reset by means of the reset button also on the plate.

Flush Wall Buzzer Cat. No. 1550

Continued on next page

FIRE ALARM SYSTEMS

Fire Alarm Systems for Schools, Hospitals, Small Hotels, etc.

No. 1569

Fire alarm systems are subject to local conditions and Fire Department regulations. Various systems using standard apparatus can be devised.

No. 1569 Flush "Break Glass" Fire Alarm Station—Fits a standard switch box. Can be furnished with open or closed circuit contacts. Contacts are closed or opened upon the breaking of the glass. Keys are provided for opening glass door for testing.

No. 1704

No. 1704 Alarm Bells—For all voltages a-c. or d-c. current. Gong sizes, 6 in. to 12 in.

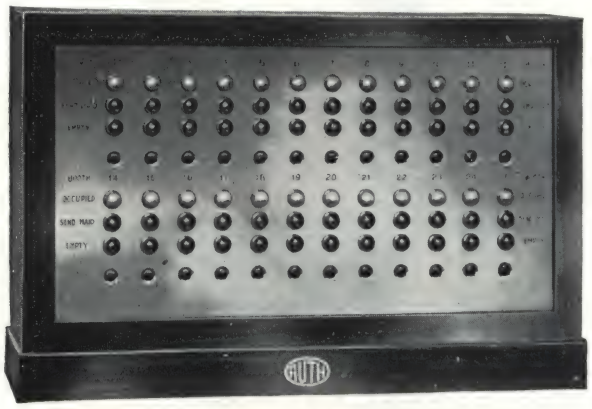
No. 1568 Fire Alarm Annunciator—This annunciator is used in buildings where it is desirable to have preliminary fire signal in the office of the engineer or custodian. The breaking of the glass at any station indicates on a drop and rings a medium sized bell at the annunciator.

The engineer proceeds to the station indicated and ascertains the extent of the fire. A switch is provided on the annunciator to control the alarm bells at each station or group of stations. In the case of a small fire only the bells in the danger zone are sounded. If the fire is serious all the bells in the building can be sounded simultaneously by means of an all-ring switch. This system eliminates the possibility of a panic through a false alarm or small fire.

No. 1568

BEAUTY PARLOR SIGNAL SYSTEMS

Beauty parlor signal systems are varied in design and scope of service. The system described is one which is satisfactorily serving a number of large beauty parlors.

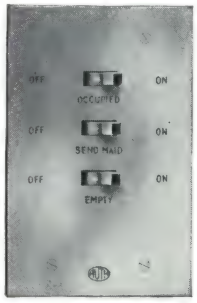


No. 1526

No. 1526 Lamp Annunciator—Installed at the main desk has a section for each booth. White, red and green lamps indicate respectively that booth is occupied, maid is required and booth is empty. A calling button for each booth operates a buzzer in the booth. Suitable engravings are provided in the plate. Standard finish for plate is polished chromium. Wood case finished to match surrounding wood work.

No. 1525 Booth Calling Station—Flush type booth calling stations have three toggle switches and concealed buzzer. Suitable signal designation will be made on plate. Standard finish polished chromium.

Alternating or direct current between 12 and 24 volts is required for operation of this system.



No. 1525

DAY RAID HOLD UP ALARM SYSTEMS FOR BANKS

In addition to actual protective service rendered, a good hold up alarm system entitles a bank to a substantial reduction in insurance rates. The system described here is designed principally for small banks. The same type of system, with additions, can be used for larger institutions. The system is closed circuit, completely electrically supervised. The cutting or breaking of any wire, opening of control cabinet door or failure of current supply will instantly sound an alarm. All alarm buttons, switches, etc., are wired for low voltage, 24 volts a-c. or d-c. Modifications of the system for special conditions can easily be made.

No. 1544 Closed Circuit Control Panel—A complete closed circuit alarm panel in a heavy gauge steel cabinet for flush or surface mounting. This panel receives all alarm signals. Door has Yale lock. Input operating current is 110 volts, a-c. or d-c. Apparatus is provided in the alarm panel for reducing this to 24 volts a-c. or d-c. for feeding the closed circuit loops through alarm buttons and switches. A closed circuit relay is provided for each zone (there may be one or more), a trouble relay, dry batteries and bell to indicate failure of current supply or opening of alarm panel by unauthorized persons, and a cut-out switch for each zone. Mechanical locking electric reset relay for operating the siren or alarm bells, siren cut-out switch for testing, a milliammeter indicating current flowing in closed circuit loops and a main cut-out switch. All material is mounted on a bakelite panel. A complete set of instructions for operation and testing is furnished with each panel.

No. 1544

Continued on next page

No. 1545 Tellers' Foot Rail Switch—Size, 18x5x 5½ in. Used principally under tellers' counters. By the use of it, the teller can send in an alarm without the knowledge or interference of an individual standing on the opposite side of the counter. The alarm contact is made by placing the toe of the foot in the deep recess in the front of the housing and lifting the contact making bar which extends the full length of the housing.

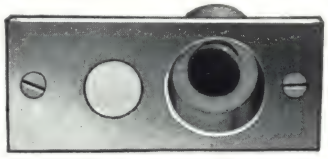
No. 1545

False alarm by accidental operation of the switch is practically impossible. Housing is of heavy gauge diamond grid steel, finished in green Duco. Contact springs are extra long and heavy with scraping silver contact points.

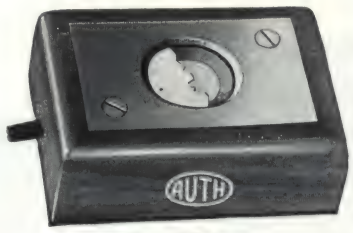
No. 1509

No. 1509 Squeeze Push—A cast bronze button for flush mounting in desk or counter. Buttons are in a deep recess. Alarm contact cannot be made unless both buttons are pressed simultaneously. This prevents accidental false alarms. Furnished for momentary contact or with mechanical lock and reset as shown on cut.

No. 1508 Flush Counter Push—Plate ⅛ in. bronze. Paging button is flush with plate top. Alarm button is in a deep recess.



No. 1508



No. 1516

No. 1516 Membrane Push—A heavy paper membrane covers the alarm button. Pressing the button breaks the membrane. This prevents tampering with alarm button. The standard push has a hardwood base and bronze top plate. Membrane is easily replaced.

No. 1507 Knee Push—This push is mounted on the side of a desk or counter and operated by knee pressure. Material is bronze.

No. 1507. Knee Push

No. 1577

No. 1577 Weatherproof Siren—The exterior alarm for the hold-up system. For all standard a-c. and d-c. voltages. The siren is often mounted in a flush box covered with a bronze grille. No. 1704 alarm gongs are used for interior alarm signal.

No. 1520 Zone Annunciator—Operated from the relays in the control panel. The numbers are 2 in. high and inform the guard from which zone the alarm signal has come.

No. 1520

COUPON BOOTH LIGHTING AND SIGNAL SYSTEMS

These systems are designed to insure supervision and inspection of coupon booths by the attendants after the depositor has left.

System B-40—This system consists of a No. S-40 light switch inside the booth which has a push button set and a lock reset, a 2 gang pilot light unit No. P-40 over the entrance to the booth and a door switch No. D-40 operated by the door. When a depositor enters a booth, the opening of the door lights the green pilot light over the door. When he presses the lighting switch, the lights in the booth are lighted and also the red pilot over the door. When leaving the booth, the depositor cannot put the lights out. The door action, however, puts out the green pilot. The attendant seeing only the red pilot light burning proceeds to the booth, inspects it and puts out the booth lights and the pilot by means of his key.

System B-41—This system has a special feature which makes it necessary for the attendant to look at the floor of the booth underneath the counter before extinguishing the lights. This precaution eliminates the possibility of having securities left underneath the counter in the booth. The system consists of a momentary contact switch No. M-41 in the booth, an electrical locking relay No. 1578 with reset button on the wall under the counter and a pilot light No. P-40 over the door of the booth. The depositor operates the switch in the booth. This energizes the relay which makes contacts to light the lights in the booth and the pilot light. When leaving, the depositor cannot put the lights out. The attendant can put the lights out only by reaching under the counter and pressing the relay reset button.

Note: As an auxiliary to systems B-40 and B-41 a lamp annunciator is placed at the head attendant's desk to indicate which booths are occupied.

No. S-40

No. D-40

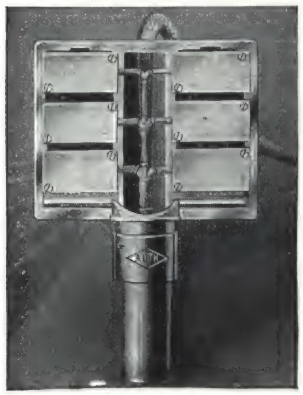
No. P-40

No. 1578

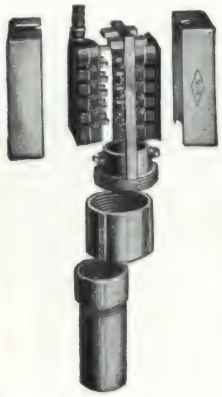
Continued on next page

AUTH SEPARABLE CONNECTORS, TERMINAL STRIPS AND FUSED BATTERY STRIPS, ETC.

Auth Separable Connectors—Are multiple contact plugs and receptacles. They are used for making connections to portable button pads, annunciators, telephones or any low tension equipment permanently fastened to a desk, table, etc. They afford the following advantages: Signal equipment may be instantly disconnected for testing circuit wires or for moving furniture. Apparatus and circuit wires are easily tested independently. Expensive and troublesome splices are eliminated. Grounds and short circuits are impossible. Installation of signal systems may be expedited by terminating and testing all circuit wires on the Separable Connector receptacles prior to the receiving of the signal apparatus. Signal apparatus can be connected to plug ends of Separable Connectors by the manufacturer. Apparatus is ready for operation as soon as the plugs are put in the receptacles.



Cat. No. C60



Cat. C10

Cat. C10

Floor Type

Cat. D. Desk Type

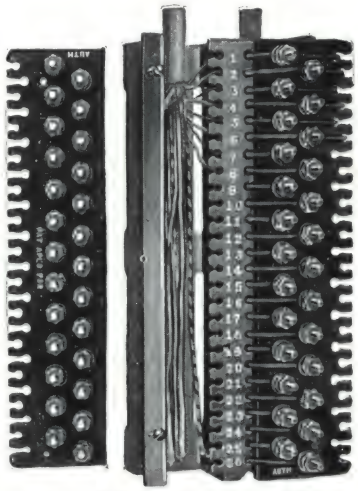
Type C Floor Connectors—Standard Type C Connectors are furnished in sizes ranging from four-wire to sixty-wire. Connectors are equipped with nipples to fit all standard conduit and underfloor duct outlets. All Type C Connectors are enclosed in substantial bronze housings finished in natural brushed bronze.

Type D Surface Wall Mounting Separable Connectors—Furnished in No. 4, 10 and 20-wire sizes. Material cast bronze.

Type WF Flush Wall Mounting Separable Connectors—Apparatus located adjacent to walls may be connected through flush type connectors. Furnished in 4, 10, 20 and 30-wire standard sizes. Larger sizes can be furnished. 4 and 10-wire sizes fit a standard single gang box, 20-wire a 2-gang, and 30-wire a 3-gang box. Each additional ten wires require an additional gang. Material of plate and housing is bronze. Standard finish brushed bronze.

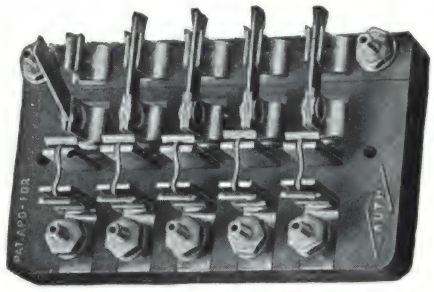
Type WF

Type TC Terminal Strips—The efficiency of a signal system is largely dependent upon the wiring of it. An adequate number of interconnection boxes properly located should be provided. Every wire should be properly identified so that future call changes can be made and testing be done at the interconnection boxes. Type TC terminal strips are designed to conform with these features. They are made in two sizes, TC-26 26-wire and TC-52 52-wire. Every wire fits into a slot and is identified by a number. No cable forming or lacing is required.



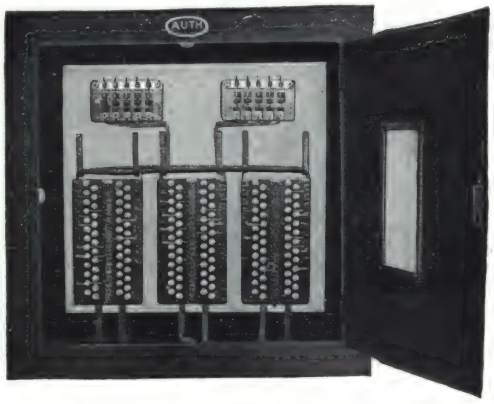
Type TC-52 Terminal Strip

Type BS Low Tension Fuse Strips—Low tension fuse strips protect signal apparatus, wires, motor generators and batteries from the dangers of short circuits and leaks. They also reduce the fire hazard to a minimum. Auth moulded fuse strips are made in three-circuit and five-circuit sizes. Each circuit has a cut-out switch. Link fuses which are easily and cheaply renewed are supplied. Auth fuse strips can be supplied with standard glass enclosed fuses if specified.



No. BS-5

Interconnection Cabinet No. 1553—Complete interconnection cabinet, flush or surface type. Cabinet is of heavy gauge steel and contains a shellacked pine back board having mounted thereon the required number of TC-52 terminal strips and BS-5 battery strips.



Cat. No. 1553. Flush Type Interconnection Cabinet

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DOCTORS' IN AND OUT REGISTER SYSTEM (LAMP TYPE)

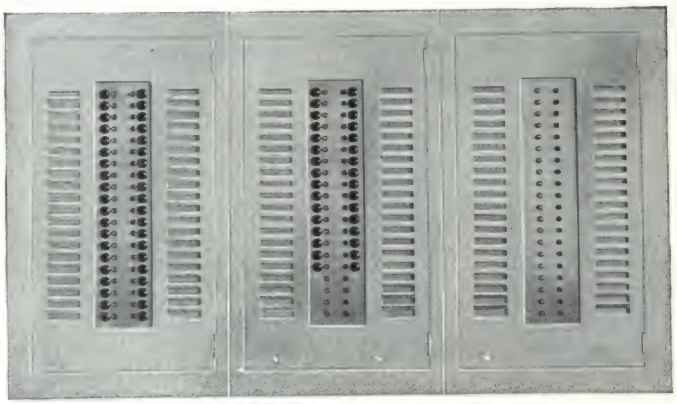
A system by means of which doctors, executives, salesmen and others can conveniently register and so keep the telephone operator and others informed of their presence and absence. The system consists of a keyboard located at one or more entrances which operates indicators conveniently located at the main entrance and telephone switchboard. The keyboard has a toggle switch and cardholder for each individual by means of which he registers his arrival and departure. *The indicators* have a lamp compartment, with a glazed opening, for each individual. Lighted indications denoting the individual's presence in the building are distinctly visible. Two types of indications are available: Type A, directly lighted. Names are made up of gummed letters on glass slides which are inserted directly behind the compartment windows. Type B, indirectly lighted. Printed name cards inserted in metal cardholders behind the compartment windows. *The type of indication that is desired should always be specified.*

No. 500—Entrance register keyboard only, flush type. Consists of a toggle switch and cardholder for each individual.

No. 503—Combined entrance register keyboard and indicator. Consists of a flush metal cabinet having a toggle switch and an illuminated name indication for each individual. Names of individuals "in" the building are brilliantly illuminated. For use at the main entrance.

No. 505—Office indicator. This unit has the illuminated name indications only. It is operated from the Entrance Register Keyboard or in conjunction with the combined Entrance Register and Indicator.

Current Supply—This system is best operated from a transformer of suitable voltage and capacity. Where only direct current is available, a motor generator is recommended.



No. 503 Combined Entrance Register and Keyboard

DOCTORS' PAGING SYSTEM "A"

In a hospital, the rapid paging of doctors and hospital officials is of great importance. This system has been designed to inform the party wanted in a quiet and efficient manner. This system is also used as an executive's call in department stores. The system consists of the following:

(a) A number of lamp paging annunciators located in the corridors and other public spaces throughout the building and mounted so that they can readily be seen from all adjacent points;

(b) A transmitting unit called a selector keyboard placed near the telephone operator. A control cabinet which may be placed at any convenient location (usually the basement).

The system has a maximum of 120 different code calls of three digits each. Three doctors may be paged at once.

Annunciators—Each lamp annunciator has 10 digits (0 to 9 inclusive) which are arranged in 2 vertical rows of 5 digits each and staggered. The 3 digit code numbers are read from the top downward. Lamp annunciators may be flush type or surface type with single or double face for wall, ceiling or partition mounting depending upon the location.

Selector Keyboard—The selector keyboard has three circuits. Each circuit has ten locking type control buttons engraved from 1 to 9 and 0 with a "start" button at the top and a "stop" button at the bottom of the row. A row of numbered bullseye indications at the side indicates the code numbers being flashed on the annunciators. Code numbers are set on each of the three circuits by pushing the proper numbered buttons and pressing the "start" button. Code numbers for circuits 1, 2 and 3 are automatically flashed on all annunciators in rapid rotation.

Any circuit can be cut out without interfering with the other circuits by pressing "stop" button. An audible signal can be arranged in the annunciators to sound with each code number. The button controlling this signal is on the selector keyboard. Selector keyboard can be made for flush or surface wall mounting or for portable use.

Control Cabinet—The steel control cabinet contains a panel on which is mounted a motor driven flasher and relays necessary for the operation of the system. 110 volts a-c. or d-c. is recommended for operation of system.

No. 674 Lamp Annunciator System "A"

No. 602 Selector Keyboard System "A"

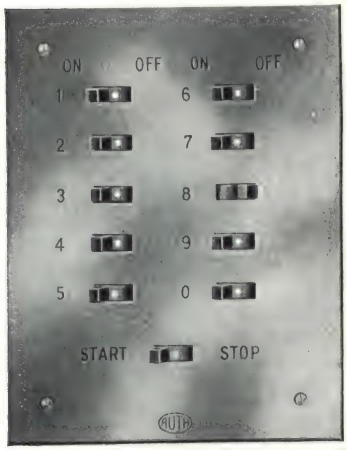
Continued on next page

No. 605. Control Cabinet System "A"

Single Circuit Paging System "B"

With this system, only one person can be called at a time. A maximum of 120 code calls of 3 digits each are available. The system can be furnished with or without a flasher control to flash the code numbers. Annunciators are 10 digit, exactly the same as for system "A."

The selector keyboard has 10 toggle switches engraved 1 to 9 and 0 and a "start" and "stop" switch to set and cancel signals and control the flasher mechanism. 110 volts a-c. or d-c. is recommended for operation of this system.



No. 600. Selector Keyboard System "B"

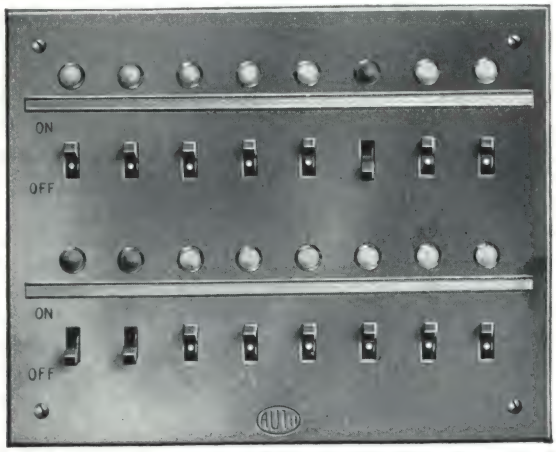
Multiple Signal Paging System "C"

For institutions which require the paging of a large number of persons at one time. Also especially suitable for small offices requiring the paging of from 6 to 30 persons. A lamp indication is provided for each person to be called. The capacity of the system is limited only by the space available for the annunciators. (For size of annunciators figure 3 sq. in. per indication.) All persons can be called simultaneously. Annunciators may be flush or surface wall types.

No. 604. System "C"

Selector keyboard has a toggle switch and pilot signal for each person to be called. Furnished for flush surface or portable mounting.

System "C" can be operated on 110 volts a-c. or d-c. or low voltage from a transformer.



No. 601. Selector Keyboard System "C"

AUTH DOCTORS' LOCATION AND "IN AND OUT" SYSTEM

This system is designed to overcome the disadvantage common to doctors' paging systems utilizing paging annunciators located in corridors and other public spaces. Doctors spend a large part of their time in the hospital in private rooms and wards, but with such systems the doctor can receive his paging call only when he is passing through corridors.

The Auth Doctors' Location System in combination with the telephone system which is standard equipment in every modern hospital forms a system with which it is possible to communicate with any doctor in the hospital regardless of his location without loss of time or effort. In addition, the system serves as a doctors' "in and out" register. Systems are made with varying capacities up to 400 calls.

Description—Each doctor is given a key (all keys are alike and interchangeable). When a doctor is not in the hospital, his key is left in the key panel located near the main entrance. The key panel includes a lamp type "in and out" register. The telephone operator has a unit comprising a lamp type "in and out" register, a jack and lamp for each doctor, a single plug and a floor dial. Each floor of the hospital has a wall unit with a jack for every doctor.

Operation—The system operates as follows:

(1) *Doctor A enters the hospital* and takes his key from the key panel at the entrance. This immediately registers at the entrance and telephone operator's instruments indicating that Doctor A is in the hospital.

(2) *Doctor A goes to 4th floor and places his key in jack* as he arrives there. Enters room 6 on 4th floor.

(3) *Telephone operator receives a call for Doctor A.* "In and out" register shows Doctor A is in building. Operator puts plug in Doctor A's jack, then moves floor dial over range of floors. As dial indicates floor 4, Doctor A's lamp lights indicating that he is on 4th floor.

(4) *Telephone operator calls nurse's station 4th floor* and asks for Doctor A. Nurse reports Doctor A has just entered room 6. She will inform him he is wanted.

(5) *Doctor A takes telephone call* at nurse's station or room 6.

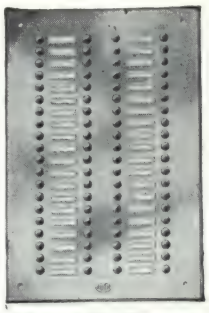
Continued on next page

Doctors' "In and Out" Systems

Doctors' "In and Out" Systems indicate what visiting and staff doctors are in the building. These systems are an invaluable aid to the Doctors' Paging Systems (described on pages 7 and 8) since the telephone operator must know whether or not a doctor is in the building before she attempts to page him.

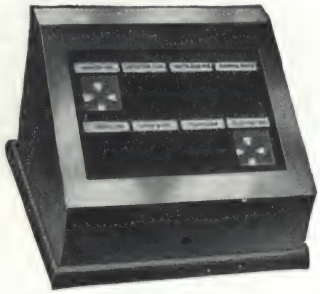
System D—This system consists of a keyboard located at one or more entrances operating one or more annunciator indicators located at the telephone switchboard or near the main entrance annunciator. "In" and "out" indicators have metal cases with finishes as required and may be surface or flush types. The drops show no indication whatever unless they are in the set position. No doctor's name is visible unless he has registered "in" on the entrance keyboard. Standard indicators have a space provided for the doctor's name. Standard size names are visible at 10 ft. Larger name space can be provided if required. Name cards are easily changed. *No current is used by the system except at the instant of registering at the entrance keyboard.* Entrance keyboard consists of a bronze plate, surface or flush mounting, having a large card holder and a toggle switch for each doctor. When entering, the toggle switch is thrown to the "in" side, causing the name to appear on the annunciators. When leaving, the switch is thrown to the "out" side and the indication is eliminated. The keyboard serves as an additional indicator since the positions of the switches indicate what doctors are in. Standard operating voltage 24 volts a-c. or d-c.

No. 401-A "In and Out" Indicator


No. 400 Button Plate System A1

System A1—This system requires a button plate at one or more entrances and indicating annunciators at the telephone operator's desk or near the main entrance or both. The button plate at the entrance may be surface or flush type. A card holder and two buttons are provided for each doctor. Pressing the "in" button when entering sets the drop. Pressing the "out" button when leaving resets the drop.

Indicating annunciators may be flush, surface or desk types. Drop indications may be No. 500 or completely disappearing type No. 501 above. Standard operating voltage, 10 to 24 volts a-c. or d-c.


No. 405-A Desk Type "In and Out" Indicator System A1

NURSES' CALL SYSTEMS

Patients' Calling Stations

Style No. 200—Private Room Calling Station—Intended for use in private rooms, but may also be used in wards where there are only a few beds. Standard equipment comprises an Auth locking and resetting button with 8 ft. of Tirex washable rubber cord. This is attached to a 4-prong detachable plug that fits into a receptacle attached to a standard single gang switch plate of solid brass. Finish, white ivory standard.

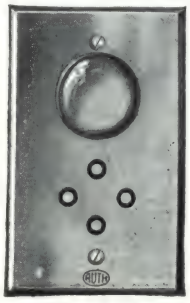
Catalogue No. 200-A—Private room calling station.

Catalogue No. 200-B—Same as No. 200-A, but two cords and one plug serving two beds from one outlet.

Any style No. 200 fits standard single gang cover.

No. 200

Style No. 201—Ward Calling Station—Used in wards having a number of beds, thus making it possible for the nurse to know who called without questioning or disturbing the other patients. At time call is put in, a bull's-eye signal on plate from which call originated, lights. It is automatically put out when nurse resets button in usual manner. Standard equipment is same as Style No. 200 plus bull's-eye signal on plate as mentioned above. Finish, white ivory standard.


No. 201

Catalogue No. 201-A—Ward calling station.

Catalogue No. 201-B—Same as No. 201-A but with two cords and one plug serving two beds from one outlet.

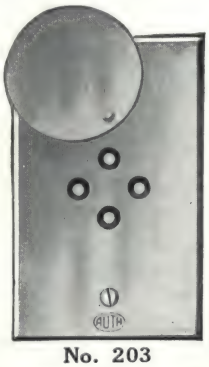
Any style No. 201 fits standard single gang cover.

No. 202

Style No. 202—Wall Type Calling Station—This station has no cord with the locking button. Intended for bathrooms, toilets, operating rooms, porches, and other locations where patients are apt to be at times. Mechanism and reset identical in action to the Auth locking button but especially designed so it does not take up more than 1½ in. in depth, enabling the use of a standard depth outlet box, solid brass plate. Standard finish, white ivory.

Catalogue No. 202—Wall type calling station.

Any style No. 202 fits standard single gang cover.


No. 203

Style No. 203—Bronze Weatherproof Calling Station—Intended for solariums or other exposed locations such as porches and balconies. A cap is provided which effectively closes the receptacle to the weather when the outlet is not being used. A rubber gasket is furnished to prevent the moisture getting at the rear of the plate where it rests on the wall. Standard equipment includes in addition to the above an Auth locking and resetting button and 15 ft. of Tirex cord. Solid bronze plate finished natural bronze.

Catalogue No. 203—Bronze weatherproof calling stations. Any catalogue No. 203 fits standard single gang cover.

Continued on next page

Emergency Calling Stations

No. 205

Style No. 205—Wall Type Calling and Emergency Call Station—This is the same as our Catalogue No. 202, but has in addition a distinctive colored locking push (engraved "Emergency") under the regular calling button. Plate is of solid brass. Standard finish white ivory.

Catalogue No. 205—Wall type calling and emergency call station.

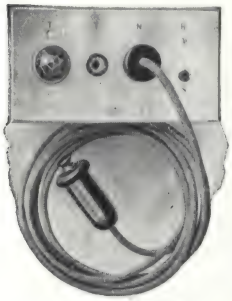
Any catalogue No. 205 fits a standard single gang cover.

Note: Any Auth Calling Station can be equipped with the No. 205 type emergency button if so specified; add an extra gang except on Catalogue No. 202 to obtain cover size.

Combination Station

We make a variety of combination calling station devices. The one shown herewith is a very useful and modern type.

Style No. 200-D—Private Room Calling Station Combination—A combination of style No. 200 with various convenience outlets such as a duplex lighting outlet, an X-ray outlet, a telephone outlet, or a radio outlet. Each extra outlet increases the standard No. 200 single gang sized plate by one extra gang. All plates fit standard covers of same gang size. We furnish the complete outlets, plates and all receptacles. Solves the problem of how to combine outlets to make a serviceable, compact and neat installation.


No. 200-D

Catalogue No. 200-D—Private room calling station combination. (Specify by name convenience outlets desired.)

Any style No. 200-D fits standard gang covers allowing one outlet per gang.

If a 110-volt outlet is on same plate allow one extra gang for barrier space.

Pilot Lamp Stations

Style No. 300—Dome Type Corridor Lamp Station—Intended for use over room doors in corridors. Dome projects out from the wall 2½ in., rendering it easily visible throughout entire length of the corridor. May also be used as a one-lamp pilot station to indicate calls originating from a certain wing, floor, or part of a building. Furnished with an opalescent white dome, capable of enclosing 1, 2, 3 or 4 lamps. Mounting ring is hinged allowing easy access for lamp renewals. Plate is solid brass, finished standard white ivory.

No. 300

Catalogue No. 300—Single dome type corridor lamp station, 1 lamp, fits 2 gang cover.

Catalogue No. 300-2—Single dome type corridor lamp station, 2 lamps, fits 2 gang cover.

Catalogue No. 300-3—Single dome type corridor lamp station, 3 lamps, fits 2 gang cover.

Catalogue No. 300-D—Double dome type corridor lamp station, fits 4 gang cover.

Catalogue No. 300-T—Triple dome type corridor lamp station, fits 6 gang cover. Lamps may be colored ruby red or emerald green, if specified. White lamp is standard.

Domes may be furnished in ruby red or emerald green, if so specified. Standard is white lamp under white dome.

Style No. 303—Dome Type Pilot Lamp and Buzzer Station—Used in Diet Kitchens or Utility Rooms and other places where nurses are apt to be. Same as style No. 300 with additional space on plate for a flush buzzer and a toggle cut-off switch. May be used to serve as a pilot call to bring to the nurses' attention that a signal has been registered on her annunciator at the nurses' station. Solid brass plates. Standard white ivory finish.

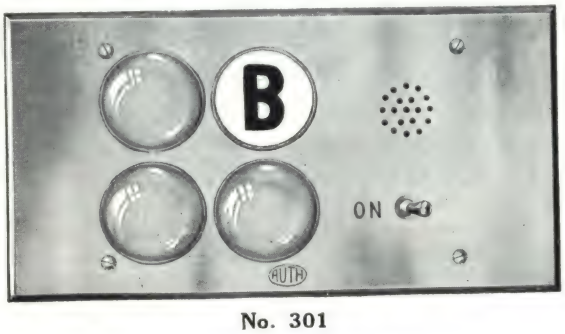
No. 303

Catalogue No. 303—Single dome type pilot lamp and buzzer station, fits 4 gang cover.

Catalogue No. 303-D—Double dome type pilot lamp and buzzer station, fits 6 gang cover.

Catalogue No. 303-T—Triple dome type pilot lamp and buzzer station, fits 8 gang cover.

Style No. 301—Pilot Lamp Annunciator and Buzzer Station (Regional Style)—Used at nurses' stations, allowing elimination of nurses' annunciator.



No. 301

Continued on next page

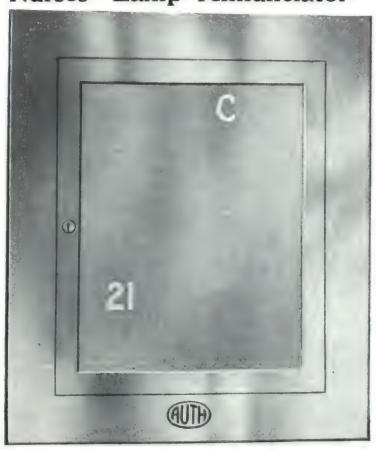
A pilot for each wing, floor, or part of building is provided. The nurse thus knows where to proceed to look for the corridor dome which shows the room or ward calling. Solid brass plate. Standard white ivory finish.

Catalogue No. 301—Regional pilot lamp annunciator, 4 lamps, fits 4 gang cover.

Catalogue No. 301-6—Regional pilot lamp annunciator, 6 lamps, fits 5 gang cover.

Catalogue No. 301-8—Regional pilot lamp annunciator, 8 lamps fits 6 gang cover.

Nurses' Lamp Annunciator



No. 305. Flush Type

Style No. 305—Used at nurses' stations. Made in surface or flush type. Each calling station has its own numbered indicating signal which is only visible if lamp is lit due to a call having been registered. Also has a buzzer which can be silenced by a cut-off switch. Each number indication has numbers approximately 1¼ in. high. Indications are marked to correspond to room numbers. Surface case is wood; standard finish, white ivory. Flush type has a brass trim finished in white ivory. Door has lock and key and is hinged to facilitate easy removal of the lamps. Outlet boxes are furnished with flush annunciators.

Night Lights

No. 302

Style No. 302—Used to provide subdued illumination in wards so as not to disturb the other patients; also used in corridors or wherever else a dimmed light for night use is needed. Illumination is kept mainly below the level at which the apparatus is set. A diffused light is produced which renders nearby objects discernible. Style No. 302 is an adaptation of style No. 300 with which it is identical, except that only the lower portion of the dome is translucent, the upper portion being opaque.

Furnished either in low voltage or with 110 volt lamps for operation from the lighting circuit. Solid brass plate, standard finish white ivory.

Catalogue No. 302-A—Night light only, fits 2 gang cover.

Catalogue No. 302-B—Night light and cut off switch, fits 3 gang cover.

SPECIMEN SYMBOLS FOR ARCHITECTS AND ENGINEERS

Catalogue 200-A—Private room calling and resetting station, single cord.

Catalogue 200-B—Private room calling and resetting station, double cord.

Catalogue 200-A–205—Emergency private room calling and resetting station, single cord.

Catalogue 200-B–205—Emergency private room calling and resetting station, double cord.

Catalogue 201-A—Ward calling and resetting station, single cord.

Catalogue 201-B—Ward calling and resetting station, double cord.

Catalogue 201-A–205—Emergency ward calling and resetting station, single cord.

Catalogue 201-B–205—Emergency ward calling and resetting station, double cord.

Catalogue 202—Wall type calling and resetting station.

Catalogue 203—Balcony calling and resetting station, single cord.

Catalogue 204—Flush type buzzer station for diet kitchen.

Catalogue 205—Wall type emergency calling and resetting station.

Catalogue 300—Dome type corridor lamp stations over doors.

Catalogue 300-D—Double lamp corridor stations over doors.

Catalogue 301—Lamp annunciator and buzzer station for Nurse's Duty Room.

Catalogue 303—Dome type pilot and buzzer station for Nurse's Duty Room.

Catalogue 305—Annunciator for Head Nurse's Room or Superintendent's Office.

Catalogue 306—Elapsed time recorder for Superintendent's Office.

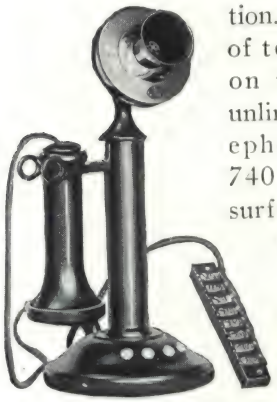
Continued on next page

INTERCOMMUNICATING TELEPHONE SYSTEMS AND MAIL BOXES

Intercommunicating Telephone Systems

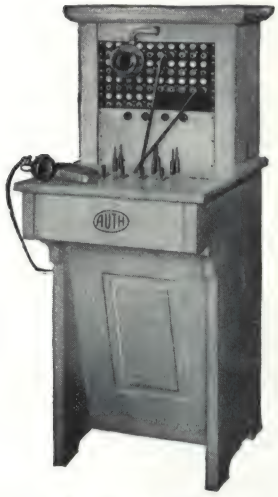
Selective Ringing, Common Talking System A2—Provides for one conversation at a time and selective ringing from any station to any other station. Number of telephones on system is unlimited. Telephones No. 740 flush or surface types, No. 750 or No. 760 desk telephones.

No. 740 Surface Intercommunicating Telephone
Steel case with hinged front



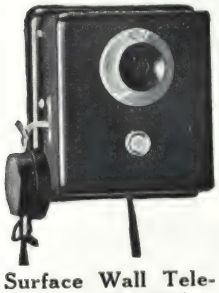
No. 750

Central Station System A5—Provides for common talking. System consists of a master telephone with buttons to call all outlying stations selectively. All outlying stations have but one button to call master station. Outlying stations can communicate with each other by first calling master station. Master station telephones No. 740 flush or surface types, No. 750 or 760. Outlying telephones No. 705, No. 700, No. 750 or No. 760.



Cabinet Type Lamp Signal Switchboard No. 771

Central Station System A43—Provides for selective talking and ringing. Master telephone is No. 736 telephone annunciator with jacks and plugs. Communication can be had simultaneously between a pair of outlying stations and between another outlying station and the master station. Outlying telephones Nos. 705, 700, 750 or 760.



Surface Wall Telephone No. 705
Steel case, hinged front. 1 button No. 7051, 2 button No. 7052

Private Exchange Switchboard System—Includes lamp or drop type telephone switchboard with selective talking and ringing and complete cross connecting features between outlying stations. Switchboards are available in flush, surface, recessed and free-standing cabinet types. Only the latter is shown in accompanying cut. Outlying telephones are Nos. 705, 700, 750 or 760 as shown.

Apartment House Telephone Systems

For service between vestibule, lobby, apartments, Janitor and tradesman.

Vestibule telephones are made with cordless loudspeaking receiver, swinging arm receiver and watchcase receiver on armored cable. Vestibule telephones can be built into mail boxes.

Janitors' telephones are furnished with or without buttons to call apartments. Janitor may have a telephone annunciator with a drop for each apartment and to indicate calls.

Cradle Telephone No. 760
Heavy bakelite hand set
Steel base

Apartment telephones No. 700 and 705 flush and surface types can be furnished with or without buttons for operating door opener or calling janitor.

Flush Wall Telephone No. 700
Face plate is steel, hinged to trim.
Steel outlet box furnished. 1 button No. 7001, 2 button No. 7002

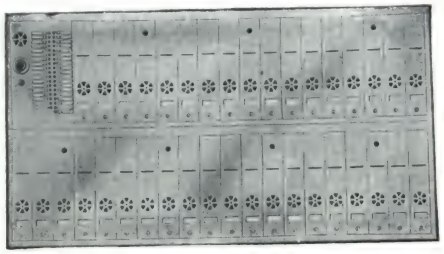
Standard finishes for vestibule telephones natural brushed brass; for apartment telephones, duco black.

Other commercial finishes to order.

Note: Our complete catalogue shows apartment house systems in great variety.

Type C Mail Boxes

These conform with all Post Office Department regulations regarding apartment house mail boxes. Tilting doors facilitate insertion and removal of mail. Economical in use of space. Standard finish natural brushed brass. Mail boxes must be mounted so that the postman's lock is not over 66 in. from the floor.



Type C Mail Box Combined with No. 710 Loudspeaking Telephone

THE AUTOCALL COMPANY

Paging, Fire Alarm, Local and Proprietary Supervisory Systems, Program Dismissal Signals, etc.

1003 Franklin Avenue, SHELBY, OHIO

BRANCH OFFICES

BALTIMORE, MD.	CHICAGO, ILL.	INDIANAPOLIS, IND.	NEW YORK, N. Y.	ST. LOUIS, MO.
BOSTON, MASS.	CLEVELAND, OHIO	LOS ANGELES, CAL.	PHILADELPHIA, PA.	SAN FRANCISCO, CAL.
BUFFALO, N. Y.	DETROIT, MICH.	MILWAUKEE, WIS.	PITTSBURGH, PA.	SEATTLE, WASH.

Products

CALLING SYSTEMS: Audible Code Calling or Paging Systems; Combination Audible and Visual Code Calling Systems; Combination Code Calling and Intercommunicating Telephone Systems; Combination Code Calling and Fire Alarm Systems (Dual); Program and Dismissal Systems.

SIGNALS: Heavy Duty Single Stroke and Vibrating Gongs in Surface, Semi-Flush and Weatherproof Types, for all voltages and currents; Light Duty "Tapper" Single Stroke and Vibrating Bells with all types of bell shells including saucer bells, tea bells, cow bells, sleigh bells, etc., for all voltages and currents; Light and Heavy Duty Motor and Vibrating Horns; Electrically Operated Air Whistles.

FIRE ALARM SYSTEMS: Non-code Fire Alarm Systems; Straight Code Fire Alarm Systems; Pre-signal Coded Fire Alarm Systems; Group Type Fire Alarm Systems; Automatic Fire Alarm Systems; Combination Code Calling and Fire Alarm Systems (Dual).

SUPERVISORY SYSTEMS (Proprietary Type): Watchman's Supervisory Systems; Combination Fire Alarm and Watchman's Supervisory Systems; Water Flow Alarm Systems for Automatic Sprinklers; Sprinkler Supervisory Systems for Automatic Sprinkler Controls.

PROTECTIVE SYSTEMS: Special Recording Protective Systems for Banks, Department Stores, Silk Mills, etc.; Vault Supervisory Systems, etc.

Autocall Signaling and Protective Systems

THE AUTOCALL COMPANY, a pioneer in the electrical signaling field, has, for more than twenty years, been a leader in the development, manufacture and sale of miscellaneous items of signaling equipment as well as complete individual and combination systems.

Engineering Service and Special Literature

A competent staff of Sales Engineers for all signaling problems is permanently located in the larger cities; in addition to this, consulting engineers from the factory are constantly in the field. At the Home Office at Shelby, Ohio, a staff of designing and experimental engineers is maintained.

Engineering Service is therefore available to architects, contracting and consulting engineers and property owners at all times. This service is furnished without obligation to the inquiring persons.

A. I. A. folders and specially prepared catalogues for permanent files sent on request.

The New Autocall Paging Service (Model 31)

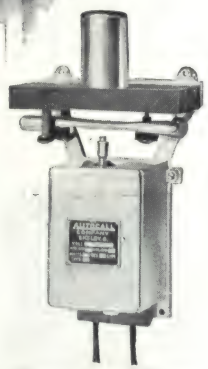
The most common use of the Autocall Paging Service is to locate some one who does not hear his telephone.

The new Model 31 Autocall of today, however, will not only call people when they are wanted, but tells them for what purpose they are wanted. It will tell a number of things all confidentially, but with a surety that is unmistakable.

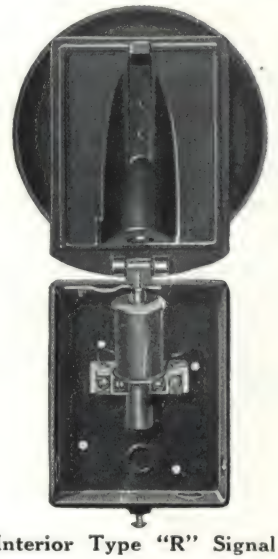
It is the *only* form of paging or code calling service that will differentiate, by code, the nature of the business that awaits the person being paged.

When a customer calls, when an important telephone message is received, when long distance calls, when the chief is wanted out in the plant, when one executive needs to consult with another, when an emergency arises—in these and dozens of other situations, some of which arise every day in every organization, the Autocall renders invaluable service. The enormous saving in time, temper, trouble, work and worry effected by Autocall Paging Service is obvious.

Autocall Central Sending Station



Executive Chime



Interior Type "R" Signal

Type "R" Signal

Continued on next page

Autocall Audible Paging Service—The standard Autocall Paging system consists of a central sending station, master relay and audible signals of various kinds to suit existing conditions. It is operated from the available lighting or power circuits, or on low voltage through a transformer or battery. The code calls are sounded simultaneously on all signals, thus instantly reaching the party wanted regardless of his whereabouts on the premises.

Autocall Combination Audible and Visual Paging Service—This is a service especially designed for retail establishments where in some departments they prefer visual colored lamp signals to silently page the party wanted, while in other departments the code is simultaneously sounded on the audible signals. By means of the one Central Station and one operation the telephone operator is able to page and locate the party wanted.

The code is *not* flashed on the visual signals but is indicated by various combinations of colored lamps that come on and stay on until the call is answered. By reason of the audible signals being adaptable to the majority of the departments very little of the greater efficiency of the audible paging service is lost.

Systems of this type are built to order to fit the conditions peculiar to the individual job. Suggestions and estimates given without obligation.

Autocall Combination Paging and Intercommunicating Telephone Service—For the small institution without regular P.B.X. or other telephone service, or the one desiring a private intercommunicating system of telephones for departmental or night use in addition to the regular P.B.X., the Tel-Autocall renders unequalled service.

It is a combination of the regular Autocall Paging System and a common talking circuit of departmental desk type telephones.

It requires but a single additional pair of No. 19 twisted telephone wires to include the telephone service throughout the premises.

Details of this new system of paging and intercommunicating will be furnished on request.

Central Sending Station—This may well be called the "heart" of the paging system. By the insertion and a quarter turn of the operating plug, signals are actuated to give the code call indicated by the number on the plug plate above the opening where plug was inserted.

Master Relay—This is in reality a secondary transmitter. It receives the electric impulse and transmits it to the signal circuits.

Audible Signals—Some signals suitable for various locations in plant, warehouse, vault, office, etc., are illustrated. The "Executive," with its soft xylophone note; and the Autotone, with its chimed-tone signal, are used especially in quiet or slightly confused areas. The Type "R" bell, Type "N" electrically operated air whistle, and the Klaxon horn are used in noisy industrial areas. Autocall representatives are available for consultation on the proper selection of signals for all conditions.

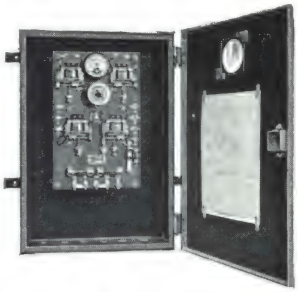
Autocall Fire Alarm Systems

While the intent and purpose of Fire Alarm Systems is to bring about quick and orderly exits and to summon trained assistants to a fire in every emergency, the nature of occupancy and the scope of this work are so great that any line of Fire Signal Systems less diversified than the Autocall line would be wholly inadequate to serve the needs of the country's fire prevention problems.

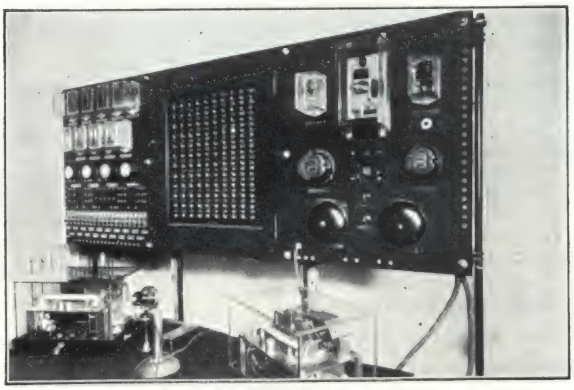
The Autocall line of Fire Alarm Systems is so complete that from the smallest school to the country's largest industrial plants no property is too small or too large to be adequately served by some one of the Autocall Fire Alarm Systems.

An idea of the range of equipment will be secured from the statement that the Autocall line contains more than eight hundred various items of fire signal apparatus. The illustration of the Type "D" single circuit fire alarm control panel (which measures only 15 in. wide by 21 in. high) shows the control center of the small system for schools, loft buildings, offices, etc., where a minimum of equipment is required.

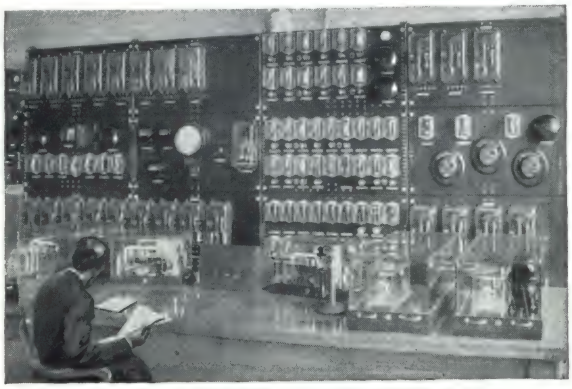
Compare this with the illustration of the control equipment used in the Provident Mutual Life Insurance Building of Philadelphia, the Home Office of one of the country's leading Insurance Companies; also the illustration of the control room of the Aluminum Goods Manufacturing Company of Two Rivers, Wis. (a large industrial installation) and you have a picture of the wide scope of Autocall Company's signaling equipment and its engineering service.



Type "D" Fire Alarm Panel



Provident Mutual Life Insurance Building, Philadelphia, Pa.



Aluminum Goods Manufacturing Company, Two Rivers, Wis.

Several of the more popular types of Autocall Fire Alarm boxes are illustrated. In all, the present line contains five basic types or designs ranging from the most simple Type N.C. Non-Coding Station to the Solid Bronze Station for fine office buildings, banking institutions, etc. The several basic designs have all the optional variations required to meet any fire signaling problem.

Continued on next page

As mentioned elsewhere Autocall Fire Alarm Systems are available in both Local and Proprietary classifications and include:

Plain Non-code Systems; Supervised Non-code Systems; Plain Coded Supervised Systems; Pre-signal Coded Supervised Systems; Plain or Pre-signal Group Type Supervised Systems; Automatic Systems; Combination Paging and Supervised Fire Alarm Systems.

Autocall Fire Alarm Equipment—Autocall Fire Alarm Systems consist essentially of the control panel (which controls and electrically supervises the transmitting and signal devices), fire alarm boxes (transmitting units), fire alarm signals (gongs, whistles, tapper bells, horns, etc.), recording units (which provide a permanent record of all alarms), and where necessary, batteries and battery chargers for the power supply.

The systems are furnished to meet all State, Local, National and Insurance Department rulings and each and every piece of equipment as well as the complete system is approved by the National Board of Fire Underwriters and the Associated Factory Mutual Insurance Companies.

All systems are designed to operate direct from the available lighting or power circuits or from suitable battery supply where necessary.

The problem of fire prevention and the wide variation in local and other rulings makes it impractical to recommend here the type of service best suited for the individual job; however, the large engineering and sales staff of the Autocall Company makes possible immediate consultation on your problems, and furthermore literature is available on request.

Address or telephone the nearest Autocall district office or the Home Office at Shelby, Ohio.

Type "N.Y." Fire Alarm Box

Type "L" Fire Alarm Box Door Open

Type "M" Fire Alarm Box Door Closed

Type "L" Break Glass, Pull Lever Fire Alarm Box

School Signaling Equipment

As the function of signaling equipment in schools is in some degree different from other installations, THE AUTOCALL COMPANY specializes in co-operation with the Architect, Engineer, Contractor and Board interested in this work.

School Signal Systems—Primarily schools require fire alarm and program dismissal bell systems and in some of the larger institutions paging service is desirable.

School Fire Alarm Systems—The fire alarm systems in any school should first of all provide for the training of the children by conducting periodical drills, to make instantaneous and orderly exits when the fire or emergency signal sounds.

Secondly, provision should be made for a connection between the school system and the city fire signal system, where possible or permissible. This insures prompt response of the city fire department in the event of an actual emergency alarm.

Autocall Line of School Signaling Systems Includes—Type N.C. Plain Fire Alarm System in which the breaking of the fire box glass causes the continuous ringing of a system of vibrating fire gongs.

Type N.C. Supervised Fire Alarm System in which a general code of 4-4-4 is repeated four times on a system of single stroke gongs when a fire box glass is broken.

Type S.A. System in which a coded alarm, indicating the location of the operated fire box, is sounded four times on a system of supervised fire gongs, howlers or other form of suitable signal.

Type "RV" Corridor Signal

Type "T.A." Class Room Signal

Type "R.W." Yard Signal

Optional features, such as city fire connection, connections to manual pull rod systems, etc., can be furnished with all types.

Program Dismissal Bells for Schools—The accompanying illustrations show several of the numerous types of single stroke and vibrating signals especially designed for corridor and classroom installation in schools.

This line includes both single stroke and vibrating heavy duty gongs for the corridor, the full grid guarded weatherproof gong for the playground or yard and a full line of 2 and 2½-in. light duty saucer gongs and tea bells for the class room.

Special literature on your problem supplied on request.

Hospital, Institutional and Clinic Signaling Equipment

Like the problem of serving a specialty field in schools, there are certain conditions in hospitals, institutions, etc., that demand slight variations in the signaling equipment and require special engineering and planning.

The Autocall Line Includes—

Paging Service for Doctors' Calls, Attendants' Calls, etc.

Fire Alarm Systems of the Plain Coding, Pre-signal Coding and group plan types.

Light Duty Tapper Bells, Sounders, Buzzers, Flashers, etc., for the nurses' call system.

Watchman's or Guard's Supervisory Systems for the extremely large institution.

For specific recommendations, literature, etc., mention that your signaling problem concerns this class of service and the facilities of our engineering department will be at your disposal.

Autocall Supervisory Systems

For the office building, industrial plant, hotel, department store, mill, lumber plant, etc., Autocall is especially prepared to assist in the planning of large signal systems for protection and supervision.

In these, and countless other risks, the *Underwriters'* latest classification "Proprietary" covers the scope of signaling, protective and supervisory service. From the first page of this series will be noted the various forms of signaling and protective systems available.

We will not review the fire alarm and paging services as they vary only with the nature of the risk, atmospheric conditions, physical layout, nature of occupancy, etc.; however, a very brief description of Watchman's, Water Flow and Sprinkler Supervisory Systems is given.

Continued on next page

Autocall Watchman's Supervisory Systems—General Operation

Watchmen are required to patrol the property at predetermined intervals, and in making each tour to report at individually coded watchman's boxes located at selected points along the watchman's route. The watchman's boxes are connected in a simple series circuit to the recording unit installed in the local central office or other convenient location.

Operating Watchman's Box

As the watchmen reach the various boxes from which they are to report, they insert their box key and give it a quarter turn. This operates the coding mechanism of the box. As each station is operated in this manner, its code number is transmitted to the recording unit. The recording unit punches in a paper tape the code number of each watchman's box as it is operated. Immediately following the punched code and printed in ink is the exact time that the box was operated. This ink impression shows the year, month, day, meridian, hour and minute at which the record was made.

The paper tape furnishes an unalterable record of the watchman's performance and the measure of protection the property is receiving.

The illustration in next column shows a section of paper tape indicating that watchman's box No. 2-4 was operated April 11, 1925, at exactly 3:47 P. M. The operation of each watchman's box provides a similar record.

There is no divided responsibility where Autocall Watchman's Supervisory Service is employed. The patrolling watchmen must operate the watchman boxes in proper sequence, for their numbers appear on the paper tape in the order in which the boxes are operated.

Section of Tape Record

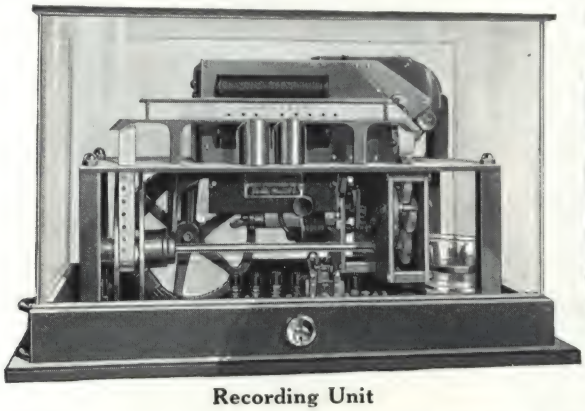
The Autocall Elapsed Time Indicator automatically transmits a warning signal in the event of negligence or failure on the part of the watchman.

Box Location	Box No.	Hour	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7
Office	1	01	–	✓	✓	00	✓	✓	✓	✓	✓	02	✓	✓	✓	✓	✓
Mach Rm.	2	03	✓	04	04	✓	✓	✓	✓	✓	✓	✓	02	✓	✓	✓	✓
Forge	3	04	✓	✓	05	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Foundry	4	07	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Core Rm.	5	09	✓	✓	✓	✓	✓	09	✓	✓	✓	✓	✓	10	✓	✓	✓
Patterns	12	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Grinding	13	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Plating	14	17	✓	✓	18	✓	✓	✓	✓	✓	✓	18	✓	✓	✓	18	✓
Assembly	15	20	✓	✓	21	✓	✓	21	✓	✓	✓	✓	✓	✓	✓	✓	✓
Shipping	21	23	✓	✓	✓	✓	✓	25	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stock Rm.	22	28	✓	✓	✓	✓	✓	29	✓	✓	✓	✓	✓	✓	✓	✓	✓

Typical Checking Sheet

A checking sheet, as illustrated above, is provided for the supervisor or other person delegated to check the watchmen. The record given on the paper tape is transferred to this form, which is daily inspected and approved by some official of the organization.

Any discrepancy between the checking sheet and the paper tape is readily noted and brought to the attention of the individual at fault.


Recording Unit

Local Central Office of a Supervising System

Autocall Sprinkler Supervisory Systems

Through the medium of electrical equipment the Autocall Sprinkler Supervisory System brings to light all hazardous conditions on the automatic sprinkler system. All abnormal conditions on the sprinkler system are instantly and automatically indicated at a local centralized office. Coded audible, visual and recorded alarms are given, as well as a printed record of elapsed time.

Immediate warning is given when water in gravity or pressure tanks is too high or too low. Signals are given to indicate the location of any closed or partly closed control valve.

When water flows from opened sprinkler heads or leaks, a selective alarm of distinctive character is given, showing the location of trouble.

Abnormal air pressure, either high or low, in dry pipe systems or in pressure tanks is instantly indicated.

The power supply to steam or electric fire pumps, high and low temperatures in exposed tanks, outside post indicator valves and all other essential parts of the sprinkler are similarly supervised.

The Autocall Sprinkler Service is not a rented service. The equipment is sold outright and becomes the permanent property of the purchasing company, together with all records and reports. It is neither subject to outside interests, nor dependent on remote devices. It is deservedly regarded as a most perfect means of making a sprinkler system 100% efficient in its operation, and consequently in the fundamental purpose for which it is designed—protection against fire's ravages.

THE BRYANT ELECTRIC COMPANY

Manufacturers of "Superior Wiring Devices" Since 1888

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For Our Other Products, see Manufacturers' Index

BRYANT HOSPITAL SIGNALING DEVICES

THE BRYANT ELECTRIC COMPANY manufactures a complete line of Hospital Signaling Devices. Switches may be operated either magnetically or by pull cord.

These devices are listed and fully described in separate bulletins.

The dependability of Bryant Hospital Signaling Devices is evidenced by the fact that there are now more than 40,000 stations in successful operation in more than 700 hospitals.

The Bryant name is, in itself, a guarantee of quality, but the popularity of this equipment is augmented by the fact that the devices operate on standard voltage, eliminating the necessity of installing transformers or other auxiliary apparatus.

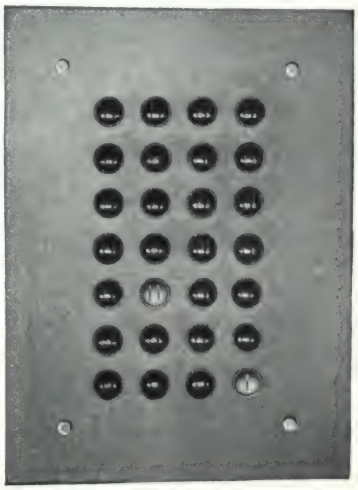
This reduces both first cost and maintenance expense, and, what is most important, increases the reliability of the service.

A few Hospital Devices are illustrated on this page, but, for complete information, write our nearest office for bulletins.

In addition, our engineering department will be glad to co-operate with you in drawing up your specifications.

Dome Signal Light

Combination Calling Station, Bull's-eye and Switch



Twenty-eight Station Annunciator

Calling Station

Combination Calling Station, Bull's-eye, Switch and Duplex Receptacle

CONNECTICUT

HOSPITAL SIGNAL SYSTEMS

TELEPHONE
AND
SIGNAL SYSTEMS

FOR
APARTMENT HOUSES
RESIDENCES
INDUSTRIAL PLANTS
SCHOOLS AND BANKS

CONNECTICUT
SIGNALING SYSTEMS

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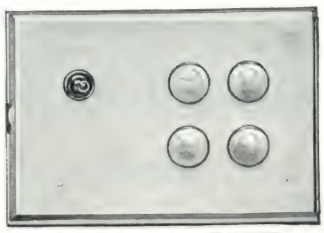
CONNECTICUT

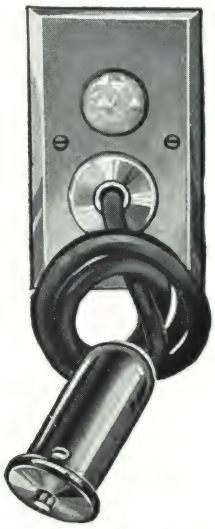
LOW VOLTAGE AUTOMATIC NURSES' CALL SYSTEM

CORRIDOR LAMP



INDICATING DUTY STATION

ELAPSED TIME RECORDER



WARD CALLING STATION

THE BUTTON
THE HEART OF THE SYSTEM

FLUSH ANNUNCIATOR

Connecticut Nurses' Call System is a complete, flexible and dependable low-voltage (12-volt a-c. or d-c.) lamp signaling system for calling the nurse to the bedside of the patient requiring attention.

The calling button is the heart of the system. When the patient, either in ward, private room or solarium, presses the plunger of the calling button, it mechanically closes a circuit switch and the call is flashed automatically to the dome type lamp above the ward or private room door; to the pilot lamp annunciator at nurses' duty and diet kitchen stations, and the head nurse's or superintendent's office. It also operates buzzers where desired. This mechanical operation eliminates the need of relays, magnetic switches, solenoids, or other similar devices, reducing to a minimum the cost of installation and maintenance. This is the simplest form of system, but it may be laid out to any degree of moderation or elaboration desired.

The component parts of the system and their uses are more fully described in the following pages, so that the users of this catalogue will have complete information.

All parts have been designed and engineered after a very careful study of the problems involved and are guaranteed to be free from electrical and mechanical defects.

Continued on next page

THE CONNECTICUT AUTOMATIC CALLING BUTTON

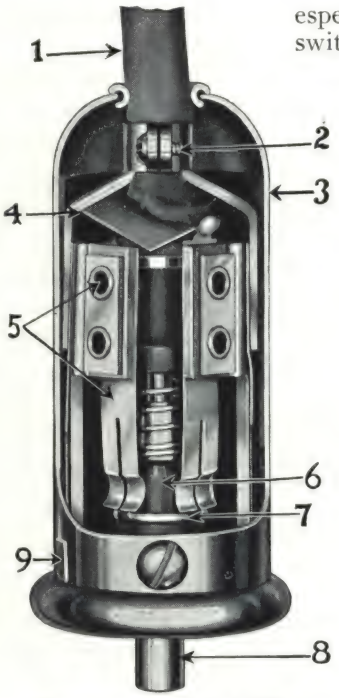
With the Lamp Flashing Signal Feature

The Most Important Part of the System

The calling button is the most important part of the system as it is from here that all calls emanate. The button is foolproof and stands up under severest usage. It is all metal, including the plunger, practically eliminating replacements due to breakage and assuring positive operation.

All the springs and connections are riveted and maintain a permanent adjustment. A substantial clamp for fastening the rubber covered extension cord is punched out as a part of the frame. The outside case is made of heavy brass, chromium plated.

The plunger passes through a metallic bushed hole to obviate sticking. The cord connections are easily accessible. The current-carrying parts are safely insulated from the case besides having an insulating shell like that used in electric light sockets. The plug is similarly insulated.



Cut-away View of Calling Button (*Full size*)

1. Tyrex Rubber cable
2. Improved Clamp for fastening cable
3. Heavy gauge brass shell, chromium plated, fibre insulated
4. All-metal mounting frame
5. Contact springs riveted to frame
6. Bakelite plunger body
7. Solid brass contact ring
8. Chromium plated plunger
9. Finger or key release

Special Flashing Feature

One of the special features of our button is that the patient can cause an intermittent flash on all lamps connected to that bedside station by alternately pressing the plunger. A full thrust of plunger operates buzzers at duty stations; releasing permits plunger to slip back in the locking position, closing lamp circuit and lighting signals on bedside pilot, corridor door light, duty stations, and master annunciator. Continued pressure of plunger, after call has been made and button locked, flashes the lamp and sounds buzzer. This flashing feature is valuable in attracting attention, especially at duty stations if buzzers have been switched off for quietness.

Release Features for Resetting the Call

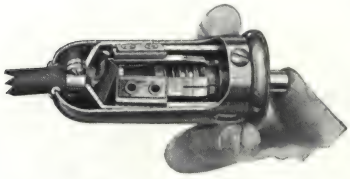
When a call has been made by a patient and the lamps lighted, they can only be extinguished and the call cancelled at the bedside by releasing the button. Two methods are provided: key release and finger release. For key release a bushed hole is placed just below the rim of the cap. A small key is provided which works through the opening against a trigger, releasing the button. Any small, dull instrument may be used in place of the key. For finger release a slot is provided with a spring, above the trigger, and the button is released by pressing the spring with the finger. Slot is so shaped and located that the call cannot be reset by the patient handling the button.

Advantages of the 5-Contact Station

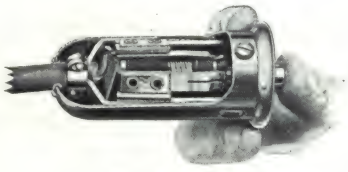
The cost of installation can be materially reduced by using 5-contact stations which permit running an extra common wire back to a central point and terminating at a single pilot lamp, as against individual wires with the 4-contact station, terminating at annunciator. It also permits many additional special signals and makes possible combining telephone service between bedside station and central points, using the regular nurses' calling system wiring, by inserting telephone plug in place of button plug.

Special Safeguard Signal Feature—In case the plug is pulled out of the receptacle by accident, all lights on system are at once lighted as in case of a regular call.

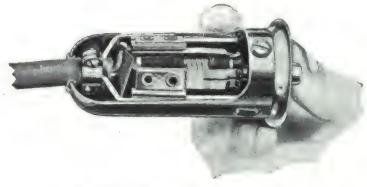
PROGRESSIVE ILLUSTRATIONS SHOWING OPERATION OF THE BUTTON



Ready for Signal
Neither lamp nor buzzer in circuit



Full Thrust
Flashes lamps and sounds buzzer



Normal "On" Position
Keeps lamps lighted but breaks buzzer circuit

Sanitary Cord

This cord has stranded copper conductors, encased in a heavy coating of highest grade live rubber giving unusually long life, and colored for identification. Its smooth surface is easily washed. To prevent undue pull on the wires, a strain bushing is slipped under the outer insulation at end, directly inside the plug shell, eliminating the necessity of knotting the conductors.

Washable Cord

Metal Plug

This is a specially designed all-metal plug with four or five poles according to the circuit requirements. The plug is detachable by either a slight side or direct pull, preventing undue strain upon the cord. The case is made of heavy brass, chromium plated and insulated in the same manner as the button.

Five Point Plug

Continued on next page

CALLING STATION EQUIPMENT

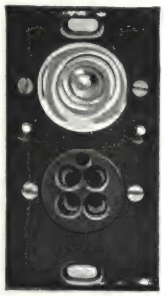
Under this heading is included all the equipment usually installed in the wall, at the bedside or at any other point to which it may be necessary or desirable to summon a nurse or doctor in case of emergency. The push button, cord and plug already described are detachable parts of many of these stations.

Construction Details

Receptacles have moulded bakelite base with contact springs of bronze to insure perfect contact and long life. The springs are held in place by eyelets which are riveted, making a rigid unit in which there is nothing to come loose and cause trouble. Face of the receptacle which forms a guide plate, through which the contact pins of the plug are inserted, is also of black moulded bakelite. Line connections are made to screw terminals, brass threaded, with safety cup connectors. Receptacles are made for 4-way or 5-way plugs to meet different wiring conditions.

Sub-plates Prevent Marring Finish

A special feature of all Connecticut wall stations is the double plate consisting of a sub-mounting plate and a finished plate. The sub-mounting plate permits the installation of the equipment complete, including making all connections, before the final finish is put on the walls. It protects the mechanism and wiring from damage during the finishing of the walls. The finish plate can be screwed in place at a later date after the room is finished and decorated.



Ward Station Sub-plate

The sub-plate is of heavy steel with sprayed, black lacquer finish. It is punched to accommodate the necessary receptacles and sockets and is provided with slots for accurate alignment. It fits standard gang outlet boxes.

The finish plate is of .060-in. brass except for No. 9039W which is of cast bronze. It is the same size as the standard switch plates and covers the sub-plate to which it is attached by screws.

Finish

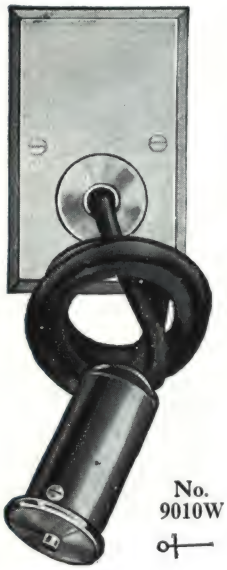
The standard finish is Egyptian white enamel, will not chip or crack, is washable and easily kept clean. No. 9018W Balcony Station is finished in black enamel only.

CATALOGUE NUMBERS OF STATIONS TO USE FOR VARIOUS LOCATIONS

Location	Nurses' calling only	Page	Calling with emergency feature	Page	Location	Nurses' calling only	Page	Calling with emergency feature	Page
Private rooms.....	9010W	5	9010WE	6	Solariums (open)....	9018W	7	9018WE	7
Semi-private rooms...	9010W*	5	9010WE*	6	Solariums (closed)...	9020W	7	9020WE	7
Private wards.....	9014W*	5	9014WE	6	Contagious rooms....	9038W	7	.....	..
Public wards.....	9014W*	5	9014WE	6	Operating rooms.....	9039W	7	.....	..
Balcony	9018W	7	9018WE	7	Baths, Toilets.....	9020W	7	9020WE	7

*When room stations are equipped with double cord for two-bed service, add letter "D" after catalogue number, i.e. 9010W-D or 9014W-D.
For stations with service light, see page 6.

Nurses' Calling Stations



No. 9010W

No. 9010W Private Room Calling Station

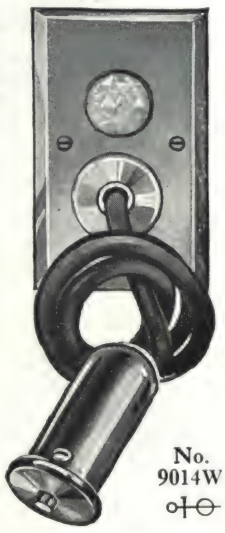
This is the simplest type of calling station and consists only of a receptacle for the plug connected to the calling button. It is intended for use in private and semi-private (2-bed) rooms. It may be used in wards if no bed pilot lamps are required, but the No. 9014W Station is preferable for ward service.

Fits any standard 1-gang switch box or outlet box cover; extreme depth, 1⅜ in.

No. 9014W Ward Calling Station With Bull's-eye Signal

This station is similar to No. 9010W with the addition of a bull's-eye signal above the receptacle. This signal indicates at once to the nurse entering the ward which bed is calling. The bull's-eye is removable for easy replacement of lamps. Lamp socket is equipped with tension spring to prevent lamp jarring loose.

Fits any standard 1-gang switch box or outlet box cover; extreme depth, 1⅝ in.



No. 9014W

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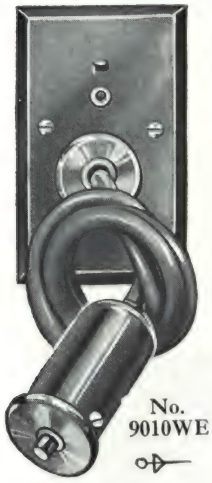
Emergency Calling Stations

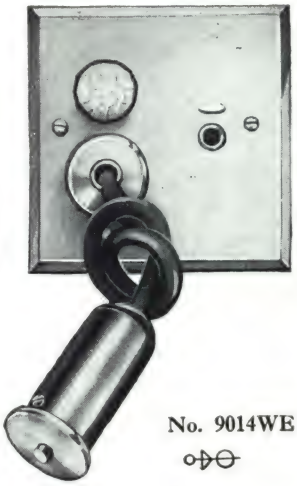


No. 9010WE

Wherever the maximum in service is to be rendered, these emergency calling stations should be installed.

Should the nurse answering a call find the patient in critical condition, these stations enable her to send in a call for a doctor and additional nurses without leaving the bedside or stopping such emergency measures as she may be able to take before the arrival of the doctor.

They have the regular equipment of the stations described on page 4, and in addition have an emergency button. This is an automatic button with green plunger mounted on the wall plate to operate a similar system of green lights* distinctive from the white light signal of the Nurses' Call. Instead of sounding a buzzer momentarily, as in the case of the Nurses' Call, depressing the button starts the ringing of emergency bells in the doctors' rooms, nurses' duty rooms, etc. These bells continue to ring until the call is answered and the button reset at the bedside.



No. 9014WE

No. 9010WE Private Room Station with Emergency Call

Similar to No. 9010W with the emergency button mounted above the receptacle for the cord plug.

Fits any 1-gang switch box or outlet box cover; extreme depth, 2¼ in.

No. 9014WE Ward Station with Emergency Call

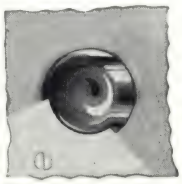
Similar to No. 9014W with the emergency button mounted beside the receptacle for the cord plug.

Fits any 2-gang switch box or outlet box cover; extreme depth, 2¼ in.

**Note:* Green has been selected instead of red because of conflicting fire prevention laws.

Calling Stations with Service Light

When calls are answered at night, these stations provide sufficient light for the nurse to attend the ordinary wants of the patient, without brilliantly illuminating the entire room or ward. The hood of the service lamp may be rotated to throw the rays to the point desired. These stations require no extra wiring for service light feature. This light operates on 12 volts and draws its supply from the feed wires which are already at the outlet for the signaling system.



Hood Rotated to Throw Light to Left

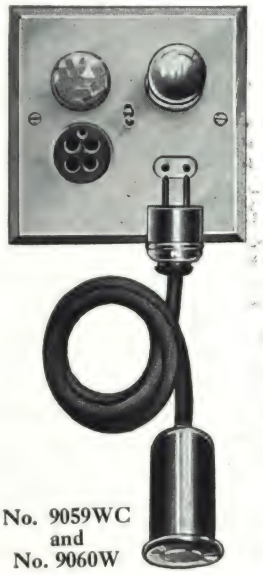
No. 9059W

Hood Rotated to Throw Light to Right

An additional feature that may be incorporated in any of these stations is the extra receptacle for extension lamp for throat or minor examinations. When specified, add letter "C" to style number. May be added to stations described below without increasing size of plate or outlet box.

No. 9059W Ward Calling Station with Service Light

Consists of the standard No. 9014W Ward Station Equipment and in addition a service lamp with hood and toggle switch mounted at the side. The bull's-eye signal light serves to guide the nurse to the bedside where it can be extinguished after throwing the switch to light the service light. Fits any standard 2-gang switch box or outlet box cover; extreme depth, 1⅝ in.



No. 9059WC and No. 9060W

No. 9059WC Ward Calling Station with Service Light and Extension Cord Jack

Same as No. 9059W but fitted with jack receptacle for service light.

No. 9059WE Ward Calling Station with Service Light and Emergency Call

Same as No. 9059W with the addition of the emergency button. Fits any 3-gang switch box or outlet box cover; extreme depth 2¼ in.

No. 9059WEC Ward Calling Station with Service Light, Emergency Call and Extension Cord Jack

Same as No. 9059W but fitted with jack receptacle for service lamp.

No. 9060W Extension Lamp

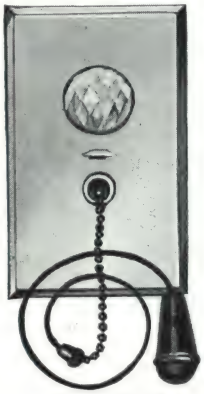
For use with No. 9059WC and No. 9059WEC calling stations. Equipped with plug, 6 ft. rubber cord and 12-volt lamp enclosed in chromium plated brass shell with clear lens.

Continued on next page

Calling Stations for Special Locations

For Nurses' Telecall System, see page 34

No. 9038W Contagious Room and Ward Station



No. 9038W

The circuit closing mechanism is mounted on the sub-plate on the under surface of a .060 single gang brass plate and is operated by a 6-ft. extension cord terminating in a neat pendant. Cord is attached to plunger through a removable bushing which permits easy replacement.

Construction is practically an inverted automatic button. When cord is pulled, plunger is locked in position, keeping the lamp circuits closed until released by the trigger just above cord bushing. A slight extra pull on cord sounds the buzzers momentarily and flashes lights. Operating equipment is remote from patient and cords may be easily replaced at little expense.

Furnished less bull's-eye for private rooms and with bull's-eye for ward use. Fits standard 1-gang switch box or outlet box cover; extreme depth, 2¼ in.

No. 9020W

No. 9020W Wall Calling Station

Designed for bathrooms, toilets, etc., and for operating rooms not requiring foot operated station.

The mechanism consists of an automatic button assembled to sub-plate, mounted on the underside of a .060 gauge, single gang brass plate. The operation is the same as the automatic button except that the plunger is released by the trigger directly above the button. Can be equipped also with the emergency button on same size plate. Fits standard 1-gang switch box or outlet box cover; extreme depth, 2¼ in.

No. 9039W Operating Room Calling Station

No. 9039W

Designed to mount in the base board of the room to operate by a pressure of the foot or at such height on the wall as to operate by a touch of the elbow. Construction similar to our standard type of locking button and operated by a lever, pressure on which locks the plunger in position, keeping lamp circuits closed until released by resetting the lever. All mechanism is mounted on the sub-plate.

A pilot lamp should be located at some convenient point in the room to show that the call is in.

Constructed ruggedly to withstand the hard treatment to which it is subjected when operated by the foot. The finish plate is of cast bronze. Operating lever is of bronze, 1¼x½x⅛ in. Fits any standard 1-gang switch box or outlet box cover; extreme depth, 2¼ in.

No. 9018W Weatherproof Calling Station

No. 9018W

For use in solariums, balconies, porches and exposed locations. The equipment and functions are the same as No. 9010W. Finish plate is provided with a hinged cap which can be closed when station is not in use and which keeps out moisture. Finish is black enamel. Regularly equipped with 15-ft. cord. Is not equipped with safety receptacle. Fits standard 1-gang switch box or outlet box cover; extreme depth, 1⅜ in.

Extra Cords, Plugs and Buttons

All calling stations are regularly furnished complete with automatic button, cord and plug. It is advisable to have on hand a few extra buttons, cords and plugs already assembled for use in case of accident or other emergency. These may be ordered separately as follows:

No. 9022W Single Cord—Consists of an Automatic Button, 6 ft. of special rubber-covered, washable cord and plug. Suitable for use with No. 9010W and No. 9014W Calling Stations.

No. 9023W Double Cord—Consists of two Automatic Buttons and two 6-ft. cords connected to a single plug. For use with stations serving two adjoining beds. Individual cord holes in the plug eliminate the necessity of a combined cord. Stock cord cut to length is brought together at the terminals.

No. 9023W

No. 9024W Single Weatherproof Cord—Consists of an automatic button, 15 ft. of rubber-covered, washable cord and plug. For use with No. 9018W Weatherproof Calling Station.

No. 9057W Blank Plug—A special plug to prevent signals from a calling station when the regular plug cord and button is removed. A number of these are furnished with each system.

No. 9060W Extension Lamp for Throat Examinations—Consists of a special lamp holder with 6-ft. extension cord and attachment plug for connection to 9059WC stations. Furnished with longer cord when desired. We are prepared to furnish stations with an automatic cord reel.

Extension Lamp Receptacles—For this feature on any calling station, add letter "C" to style number.

Directions for Ordering

Key Release—For this feature, add "K" to the style number.

Keyless Release—For this feature, add "T" to the style number.

Four-contact Station—For this feature, include "4" after the style number.

Five-contact Station—For this feature, include "5" after the style number.

Double Cords—For double 6-ft. cords on calling stations, add "D" to the style number.

Emergency Button—For this feature on any calling station, add "E" to the style number.

No. 9060W Extension Cord is not furnished with station and should be ordered separately.

Continued on next page

CONNECTICUT CORRIDOR LAMP STATIONS

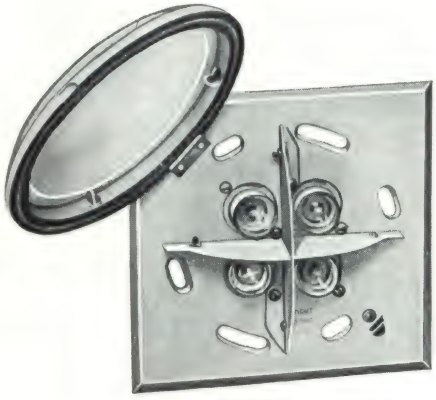
With the Double Lamp Protection Feature

Most authorities agree that the corridor lamp station is one of the most important signals in the system. They are used generally in the corridor above the doors to private rooms and wards to locate the patient calling. They are also used in corridors of large hospitals at the end of branch corridors to indicate whether the call is to the right or left. They are also used for emergency calls and may be used at the Duty Quarters as a central pilot station with from 1 to 4 lamps. Our stations have many special patented features which are described below.

Both Lamps Lighted

One Lamp Burned Out

No. 9025W Corridor Lamp Station



No. 9025WE

View with hinged dome raised showing double barrier feature

The Corridor Lamp Station

It consists of an opalescent glass dome held within a gasketed dustproof light-tight brass frame, hinged to a brass plate having 2-gang drilling. A snap catch holds the frame tightly closed but a slight pressure opens it and exposes the lamp unit. The hinged cover is especially desirable for relamping as a ladder is generally required to reach the fixture. By a unique arrangement it can be mounted either on the diagonal or the straight horizontal, as preferred; this does not affect the installation of the outlet box. No screws show on the face of the plate as all are within the diameter of the dome.

The Double Lamp Protection Feature

It is of the utmost importance that the corridor lamp station be ready for operation at all times. In order to overcome the possibility of the station being out of service due to the burning out of a single lamp, we recommend two lamps wired in multiple as a safeguard. These are arranged on opposite sides of a barrier so that if one burns out only half of the dome will be lighted, indicating that one lamp must be replaced as well as registering the call. This eliminates the necessity of depending on one lamp, and of discovering by accident that a lamp has burned out.

The use of the double barriers allows the station to be used for emergency or additional service; with clear lamps on one side and green lamps on the other. While lighting only one half of the dome for each service, both calls would come in simultaneously without interference. The doubly protected feature is also used in this service with the double barrier.

The domes are fitted for one, two, three or four lamp outlets, and with single or double barrier or without barrier depending on circuit and service requirements.

Finish of Frames and Plates

White Enamel is the standard finish and is very durable and will not crack or check. Other color finishes can be supplied at a slight additional charge over the standard finish when so required.

Types and Numbers of Dome Corridor Lamp Stations

All types fit the standard 2-gang outlet box or cover; extreme depth, 1⅝ in.

No.	Type and Service	Lamps	Barrier
9025W	Corridor Station Protective Feature	Two	Single
9025WE	Corridor Station, Emergency Call Protective Feature	Four	Double
9026W-1	Corridor Lamp Station	One	None
9026W-2	Corridor Lamp Station	Two	None
9026W-3	Corridor Lamp Station	Three	None
9026W-4	Corridor Lamp Station	Four	None

No. 9032W

No. 9032W Buzzer Station

This flush buzzer station is equipped with silencing switch mounted on sub-base assembled to standard .060 gauge single gang brass plate. For use when it is desirable to have buzzer independent of pilot station or annunciator.

Finish is white enamel. Fits standard 1-gang switch box or outlet box cover; extreme depth, 2 in.

No. 9035W Corridor Exposed Lamp Station

This is an inexpensive type of station. It consists of an exposed frosted bulb and candelabra socket in a standard size switch plate. Plate is finished in white enamel. Two lamps may also be supplied on the same size plate for safeguard or emergency service.

No.	Type and service	Lamps
9035W-1	Corridor Station, Exposed Lamp	One
9035W-2	Corridor Station, Emergency Call, Exposed Lamps	Two

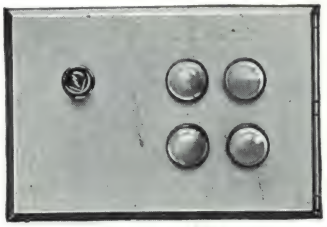
No. 9035W

Continued on next page

DUTY STATIONS

General

The stations shown on this page are intended for use in duty rooms, diet kitchens, utility rooms, etc. They are of two types: one with an individual bull's-eye indicator for each circuit; one with a dome, beneath which as many as four lamps may be mounted. Both have a low-tone buzzer and silencing switch.



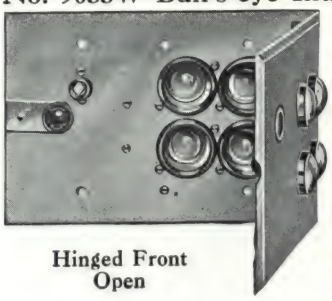
No. 9033W

Front plate of brass is hinged to a sub-plate on which lamp sockets and buzzer are mounted. When front plate is swung back it permits access to the lamps, etc. When closed it conceals all mounting screws. It is held closed by a snap catch.

Finish—Standard is white enamel which is washable and easily kept clean.

Outlet Boxes—All stations illustrated fit standard 3-gang switch box or outlet box cover; extreme depth, 2 in.

No. 9033W Bull's-eye Indicating Duty Station



Hinged Front Open

Front View

Taken from Angle of 80°

Opal Lens Bull's-eye Indicators

Used to indicate a group of private rooms, wards or sections or any combination of them.

The bull's-eyes are opal lenses with smooth outer surface which prevents the accumulation of dirt. They are of such a character that the indication, which is a Gothic letter or numeral engraved on the inner surface, becomes magnified and is readily discernible even when viewed from the side. The bull's-eyes are fastened permanently into the hinged front plate and cannot get out of alignment.

Standard Sizes—

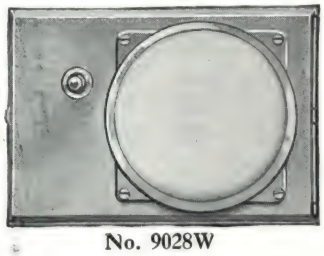
No. 9033W-2, Two-lamp
No. 9033W-4, Four-lamp
No. 9033W-6, Six-lamp
No. 9033W-8, Eight-lamp

Larger sizes are built to order.

For each additional two lamps over four, increase the size of the outlet box by one gang.

No. 9028W Dome Type Duty Station

Used to indicate a group of private rooms, wards or sections, or any combination of them where a common signal is desired and identification signals are not required. It consists of an opalescent glass dome held by means of a cast frame to a hinged front plate. Is fitted with from 1 to 4 lamps beneath a single dome for circuit purposes, each lamp operating on a respective sectional wire. A buzzer and cut-out switch are provided for audible signal.



No. 9028W

This station can also be furnished with a bell for emergency service, our No. 9028WE.

Standard Sizes—

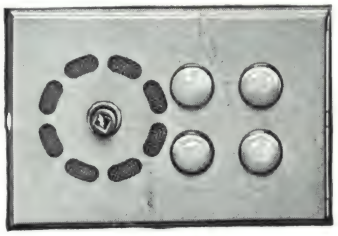
No. 9028W-1, One-lamp
No. 9028W-2, Two-lamp
No. 9028W-3, Three-lamp
No. 9028W-4, Four-lamp

Larger sizes are built to order.

For each additional dome over one, increase the size of the outlet box by two gangs.

No. 9031WE Bull's-eye Duty Station with Emergency Bell

This station is similar to No. 9033W with the addition of a permanently connected bell behind the screened openings. It is used only on systems equipped with the emergency call feature. Signals for the nurse indicate on the bull's-eyes and by the buzzer. When the nurse answering the call requires additional assistance and presses the emergency button on the wall station, the light lights and the bell continues to ring until the call is answered and cancelled by the emergency nurse.



No. 9031WE

Standard Sizes—

No. 9031WE-1, One-lamp
No. 9031WE-2, Two-lamp
No. 9031WE-3, Three-lamp
No. 9031WE-4, Four-lamp

No. 9034WE Emergency Bell and Buzzer Station

No. 9034WE

This station is used where it is desirable to indicate to those within hearing that a call has been made, but it is not necessary to indicate the location. The nurse hearing the buzzer or bell must go to the corridor or duty room to ascertain the section or ward calling.

The buzzer is used on the Nurse's Call System. It is provided with a silencing switch which cuts the buzzer out of service when not required.

The bell is mounted behind the screened opening and is permanently connected to the emergency calling circuit for summoning a doctor or another nurse.

Continued on next page

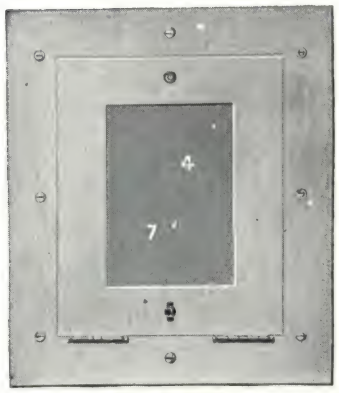
SUPERVISORY EQUIPMENT

Lamp Annunciators for Head Nurse's and Superintendent's Office

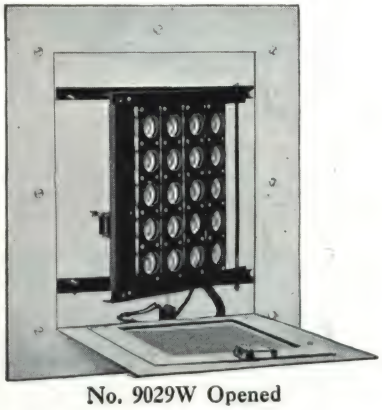
In every complete system some means of supervising the work of the nurses is desirable and in large hospitals it is essential. The equipment shown on this page is for use in the Superintendent's office, at the Head Nurse's desk or in any place where central supervision is desired.

It provides a quick means for determining whether calls are being answered promptly, where the load is heaviest and possibly more help is needed. It protects the patient against undue delay in answering calls and protects the nurse against unjust complaints of lack of attention.

Flush and Surface Type Annunciators



No. 9029W



No. 9029W Opened

No. 9009W

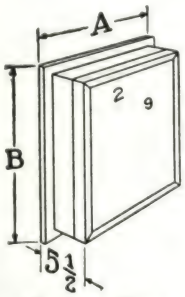
General

Lamp annunciators are built in two types, Flush and Surface. Both have a white glass front showing engraved Gothic letters or numerals when illuminated. Each lamp is shielded to prevent cross lighting of adjacent numbers. Porcelain, candelabra base lamp sockets, fitted with a tension spring to prevent the lamp from jarring loose, are used in both types of annunciators.

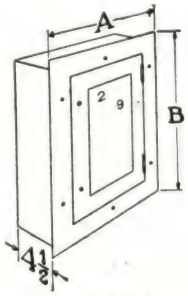
A buzzer mounted inside the case sounds momentarily when a lamp lights and again whenever the patient depresses the automatic locking button before the call is answered. A silencing switch is provided to cut the buzzer out of service when desired.

All annunciators are supplied complete with lamps but a reserve stock should always be kept on hand to replace any which burn out.

No. 3514-A Mazda Lamp—Is standard for all apparatus. It is a candelabra base, 12-volt, 3-watt, tungsten filament lamp.



Surface Type



Flush Type

No. 9029W Flush Type Lamp Annunciator

Has metal trim with hinged door containing the glass front. Door is provided with a lock. The lamp sockets, arranged in banks of five, are mounted on an iron frame which is integral with the front. The frame swings outward and to the right for convenience in handling incoming wires. Sockets are permanently cabled at the factory to fixed terminal strips in outlet box. Line wires are brought in and fastened under the screw heads of the terminal strip.

Annunciator is furnished complete with a heavy gauge sheet metal outlet box with standard knockouts. Box may be shipped and installed in advance of the apparatus.

When so specified, the outlet box may be fitted with extra 2-way or 4-way connectors, making a convenient central testing point for all circuits.

No. 9009W Surface Type Lamp Annunciator

Has hardwood case in which the glass front is mounted. Front is removable for convenience in installing. Sockets are arranged in banks of five in the smaller sizes and ten in the larger. They are mounted in the case on steel frame which is hinged to the back and swings open to permit access to the incoming wires and connections. Sockets are permanently cabled at the factory to fixed terminal strips on the back of the case. Line wires are brought in through the back and connected under the screws of the terminal strip.

DIMENSIONS OF ANNUNCIATORS, INCHES

Surface type			Flush type					No. of stations
No.	Overall		No.	Overall		Wall opening		
	Width	Height		Width	Height	Width	Height	
9009W-10	15	8 1/8	9029W-10	19 1/2	16 1/2	17 7/8	14	10
9009W-15	15	9 7/8	9029W-15	19 1/2	16 1/2	17 7/8	14	15
9009W-20	15	11 5/8	9029W-20	19 1/2	21 1/2	17 7/8	19	20
9009W-25	15	13 3/8	9029W-25	19 1/2	21 1/2	17 7/8	19	25
9009W-30	25	9 7/8	9029W-30	19 1/2	21 1/2	17 7/8	19	30
9009W-40	25	11 5/8	9029W-40	19 1/2	25 1/2	17 7/8	23	40
9009W-50	25	13 3/4	9029W-50	19 1/2	29 1/2	17 7/8	27	50

Note: Depth of outlet boxes, 4 1/2 in.

Continued on next page

ELAPSED TIME RECORDER

No. 9030W 20-Station Recorder

This is an automatic instrument usually installed in the Superintendent's office for making a permanent record of all calls. It records in ink on a strip chart every call made from each station, showing the time the call was made and the time consumed in answering it. The chart feeds continuously for 15 days before renewal. Regularly furnished in 20-station units. A number of these units can be grouped in one cabinet and numbered for ready identification. Cabinets may be of wood or metal with glass doors and finished as desired to match the furniture in the office.

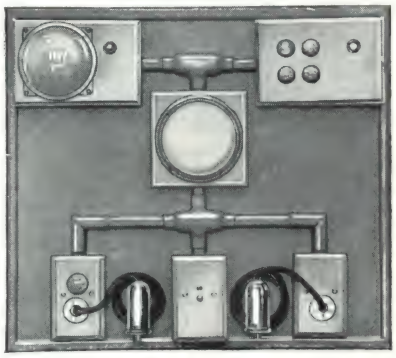
The instrument is substantially built and is housed in a heavy metal case with glass panels. Standard finish of metal parts is white enamel.

No. 9030W

NURSES' CALL SYSTEM FOR EXISTING HOSPITALS

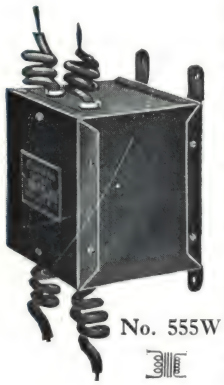
Existing hospitals and institutions equipped with an antiquated system or none at all will find that Connecticut apparatus readily adapts itself to standard metal molding fittings. System may be installed or extended with very little disturbance, without drilling or cutting large holes in the wall. Metal molding, containing all wiring, may be run along the wall and when painted the same color, is very inconspicuous. We would be pleased to furnish further information on this class of installation, on request.

The illustration at the left shows the method of installation and appearance of Connecticut equipment when installed in an existing hospital with metal molding.



POWER SUPPLY EQUIPMENT

Heavy Duty Type Transformer



No. 555W

For operating Nurses' Call System where alternating current is available, we recommend a Heavy Duty Type Transformer for the most economical operation. It should be of a design approved by the National Board of Fire Underwriters. We furnish transformers built especially for this class of service and recommend their purchase with balance of signaling apparatus as a guarantee for proper operation. Standard transformers are designed for use on 110-volt, 60-cycle current with 12-volt secondary. When ordering, specify primary and secondary voltages, wattage and frequency.

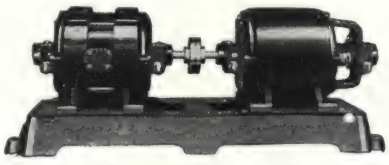
No. 555W— 50-watt, 110-volt, 60-cycle—12-volt secondary
No. 555W—100-watt, 110-volt, 60-cycle—12-volt secondary
No. 555W—250-watt, 110-volt, 60-cycle—12-volt secondary
No. 555W—500-watt, 110-volt, 60-cycle—12-volt secondary

Data for Ordering Transformer

To arrive at correct size of transformer, multiply the total number of lamps by three (watts) and divide by three. As there are seldom more than one-third the total number of lamps lighted at one time, the transformer selected should have an output in wattage equal to that figured.

Motor Generators, Batteries and Charging Panels

Where direct current only is available, a motor generator set is usually supplied in conjunction with a storage battery. We supply the equipment complete with battery racks, charging panel and necessary instructions for installing. When ordering, the voltage and service available should be given.



Motor Generator Set

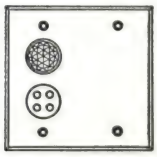
No. 23W—12-ampere Storage Battery Glass Jar Type Cell
No. 23W—24-ampere Storage Battery Glass Jar Type Cell
No. 23W—40-ampere Storage Battery Glass Jar Type Cell
No. 24W—Battery Cabinet, 12-cell capacity
No. 14W—Charging Panel complete in steel case

Continued on next page

EXTRA GANG PLATES FOR ADDITIONAL EQUIPMENT ON HOSPITAL STATIONS

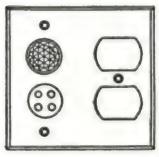
The following extra gang sizes are for the accommodation of additional equipment (equipment not included) on same plate with calling stations. Nurses' Calling Stations all have standard single gang plates .060 thick.

Special plates for extra service can be furnished up to eight gangs. Face plates are of the struck-up type but solid plates can be furnished upon request. Standard finish, white enamel; special finishes when so ordered. Outlet boxes are not supplied.

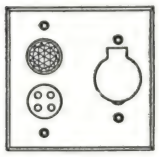


A—Blank for Covering Outlet Not Being Used or for Possible Future Use

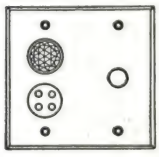
B—Accommodating Standard Single Receptacle Convenience Outlet; without Cover



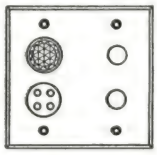
C—Accommodating Duplex Plug Receptacles Bryant No. 122, H & H No. 1482 or Similar



D—Accommodating Standard Flush Plug or Lamp Receptacles; with Lift Cover

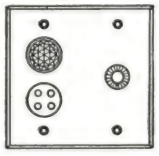


E—Accommodating Single Radio Jack for One Circuit

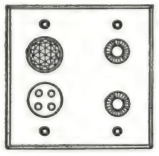


F—Accommodating Double Radio Jack for Two Circuits

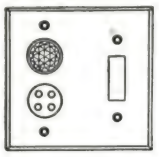
G—Accommodating "W.E." No. 190 or No. 367 Telephone Jack for Plugging in Portable Type Telephone or Public Phone Service Desk Stand



H—One Bushed Hole for Bringing Out Telephone Cord for Use Where Cord Outlet Is Required for Desk Telephone



J—Two Bushed Holes for Bringing Out Telephone and Radio Cords.



K—Accommodating Standard Flush Lighting Switch; Toggle Type

STANDARD BOXES FOR CONNECTICUT EQUIPMENT

Connecticut apparatus described on the preceding pages fits standard outlet boxes and covers, but these are not supplied with equipment. We do, however, furnish boxes for all flush type annunciators which will be shipped in advance of other material. Boxes are of heavy gauge sheet metal with standard knock-outs on four sides and are marked for identification before shipping.

When low voltage wall stations are ganged with other units requiring 110-volt current for operation, it is required by the Underwriters to separate the low and high voltage wiring by a metal barrier.

Steel City Electric Company and National Electric Products Corporation, Pittsburgh, Pa., now stock boxes to fit any of the standard size plates with metal partitions for any combination.

On installations where the various units are mounted on surface of wall, the majority of the stations described are adaptable to standard metal mold fittings as manufactured by National Electric Products Corporation, Pittsburgh, Pa., or The Wiremold Company, Hartford, Conn. Special wood mats are supplied for such units as do not mount on stock fittings.

On installations where two-inch fireproof partitions make it impossible to install deep type boxes and where conduit must be concealed, wood frames of the required thickness must be used and will be furnished at slight additional cost over regular stations.

Continued on next page

STANDARD SPECIFICATIONS FOR NURSES' CALLING SYSTEM

For Operation on 12 Volts A.C. or D.C.

System

Install, as directed in these specifications, a complete Nurses' Calling System operating on 12 volts A.C. or D.C. No relays, magnetic switches, solenoids, or other similar devices shall be used in the system.

Operation

At each bed there shall be a calling station having a cord with an automatic button attached. A patient desiring a nurse shall press the button which, in the case of a private room, shall cause a lamp to light at the following locations: Corridor over the door of the room calling; pilot stations; diet kitchen and nurses' duty room; annunciator at the nurses' desk on that floor; in wards a pilot lamp will also light on station of patient calling; and at the same time shall sound momentarily, buzzers in the annunciator and pilot stations.

Should plug disengage from receptacle by accident, all lamps on circuit shall light as in the case of a regular call.

All lamps must remain lighted until the nurse releases the button at the bedside of the patient calling. If there are two or more calls on at the same time, each call shall remain on until the button of each station is released.

The button shall be so designed as to permit the audible signal being sounded repeatedly, if necessary, by the patient in order to attract the nurse's attention, and constructed so that the repeating of the audible signal shall flash the lamps intermittently until the call is reset by the nurse in the usual manner. The system shall be provided with switches so that the audible signals may be cut in or out, as desired.

Equipment

Private Room Stations—Install in all private rooms, at points indicated by symbol on the plans, a No. 9010W Nurses' Calling Station. Station shall consist of standard single-gang brass plate containing plug receptacle with safeguard feature, and having an easily detachable plug with 6 ft. of washable cord and an all-metal automatic calling button attached.

This station shall fit any standard single-gang switch box or outlet box cover.

Ward Stations—Install in each ward, at points indicated by symbol on the plans, a No. 9014W Nurses' Calling Station. Station shall consist of standard single-gang brass plate containing plug receptacle with safeguard feature, bull's-eye covering a lamp, easily detachable plug with 6 ft. of washable cord with automatic calling button attached. Bull's-eye shall be removable so that the lamp can be easily examined or replaced, and so designed and colored as to be visible at a distance and from any angle.

This station shall fit any standard deep type single-gang switch box or cover, having a clear opening of 1⅞x2⅞ in. and not less than 2½ in. deep. Station shall be located at a height of 4 ft. from the floor.

Corridor Lamp Stations—Install in corridors, over the door of each ward and private room, at points indicated by symbol on the plans, No. 9025W Dome Type Corridor Lamp Station with doubly protected lamp. Station shall be equipped with two lamps with barrier between and shall indicate a lamp burn-out by lighting but half of the dome. It shall be dust and light-tight and readily seen when lamp is illuminated, even if exposed to the sunlight.

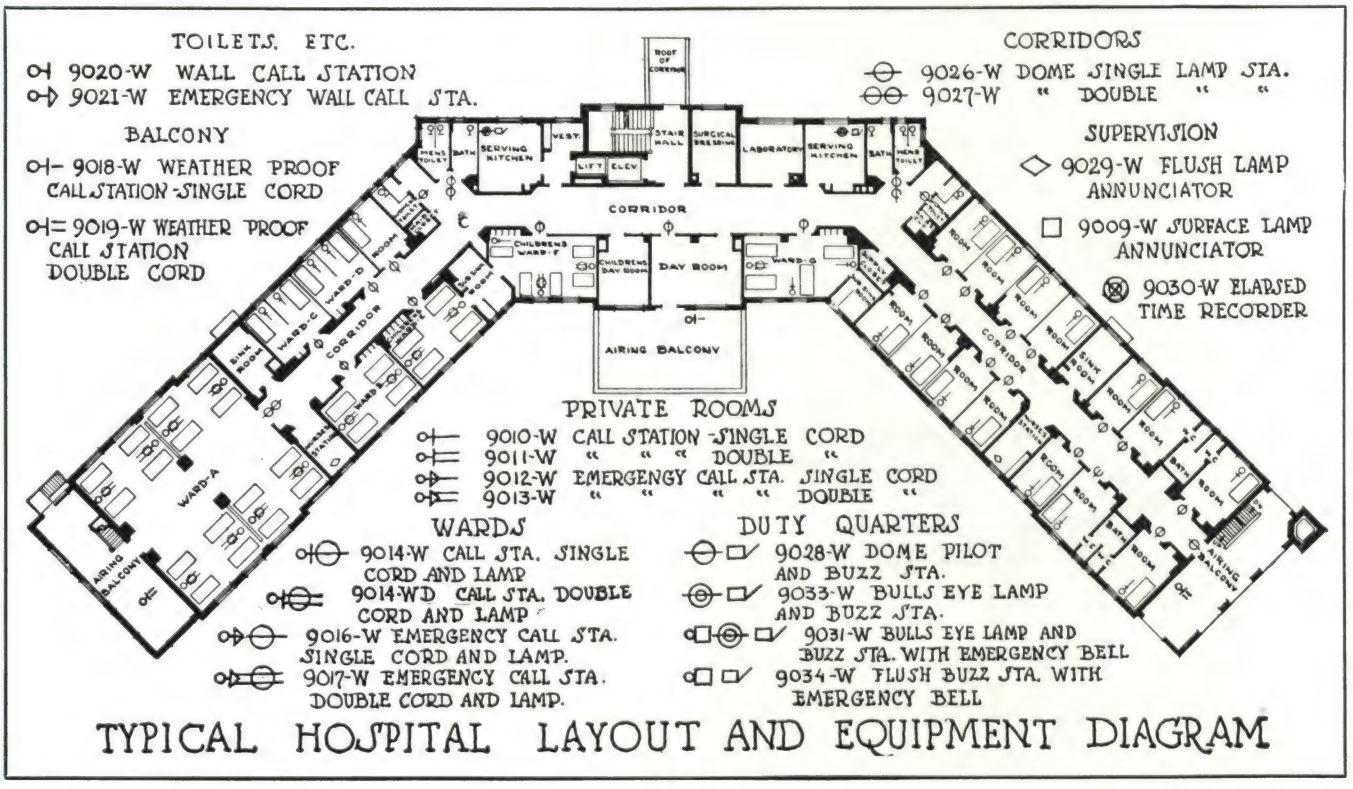
Station shall consist of brass plate, having mounted thereon a glass dome covering candelabra base receptacles and lamps. Dome shall be frosted white inside and set in hinged frame with snap catch so that lamps can be easily replaced.

This station shall fit any two-gang outlet box with cover, not less than 2½ in. deep.

Bull's-eye Indicating Duty Station—Install in each diet kitchen and duty room, at points indicated by symbol on the plans, a No. 9033W Bull's-eye Indicating Duty Station. Station shall consist of a brass plate having two or more lamps. Each lamp shall have an individual cap lettered to indicate source of the call. It shall have an audible signal contained within the case, and a control switch mounted on the outside of the trim so that the audible signal can be cut in or out. The face plate shall be hinged for access to lamps and have snap fastener.

The two and four-lamp stations shall fit a standard three-gang outlet box with cover, not less than 2½ in. deep. For each additional two lamps, over four, the plate will be increased one gang.

Supervisory Annunciator—Install at the nurses' desk on each floor, at point indicated by symbol on the plans, a No. 9029W Lamp Annunciator. This shall be of the flush type, all metal, and of sufficient capacity to indicate all calls on the



TYPICAL HOSPITAL LAYOUT AND EQUIPMENT DIAGRAM

Continued on next page

system. It shall be of hinged door construction. There shall be an audible signal contained inside the case which shall have a control switch mounted flush in trim of cabinet by means of which the audible signal can be silenced.

The lamps shall be so arranged and the glass so marked as to indicate the floor and the ward or private room calling. All indications shall be clean-cut and without diffusion.

Current

The system shall operate on 12 volts A.C. Where there is a reliable source of alternating current in the building, such current shall be reduced to 12 volts by means of an approved two-coil transformer furnished by the manufacturer. If there is no alternating current available, then the system shall be operated by means of a storage battery charged by a motor generator set. The manufacturer shall furnish the motor generator set, charging panel and battery.

Wiring

All wiring used in the system shall be run in iron conduit in an approved manner. There shall be no joints or splices except at regular junctions in outlet boxes. All taps, splices and joints shall be made in a thorough and workmanlike manner. Feed wires must not be less than No. 14 B & S rubber covered. Wires running to calling stations from the feed wires may be No. 16 B & S rubber covered, providing this size will not cause too great a drop in voltage.

The manufacturer shall furnish a wiring diagram showing the layout of the system and the method of installation.

Outlet and Switch Boxes—Wherever outlet or switch boxes are specified, these shall be of standard size and make, not less than 2½ in. deep to meet the requirements.

Finish

The finish of the annunciators and of all other stations shall be white enamel, unless otherwise specified in order to harmonize with other surroundings.

Manufacturer's Guarantee

The trade numbers referred to herein are those of the Connecticut Telephone & Electric Corp., Meriden, Conn.

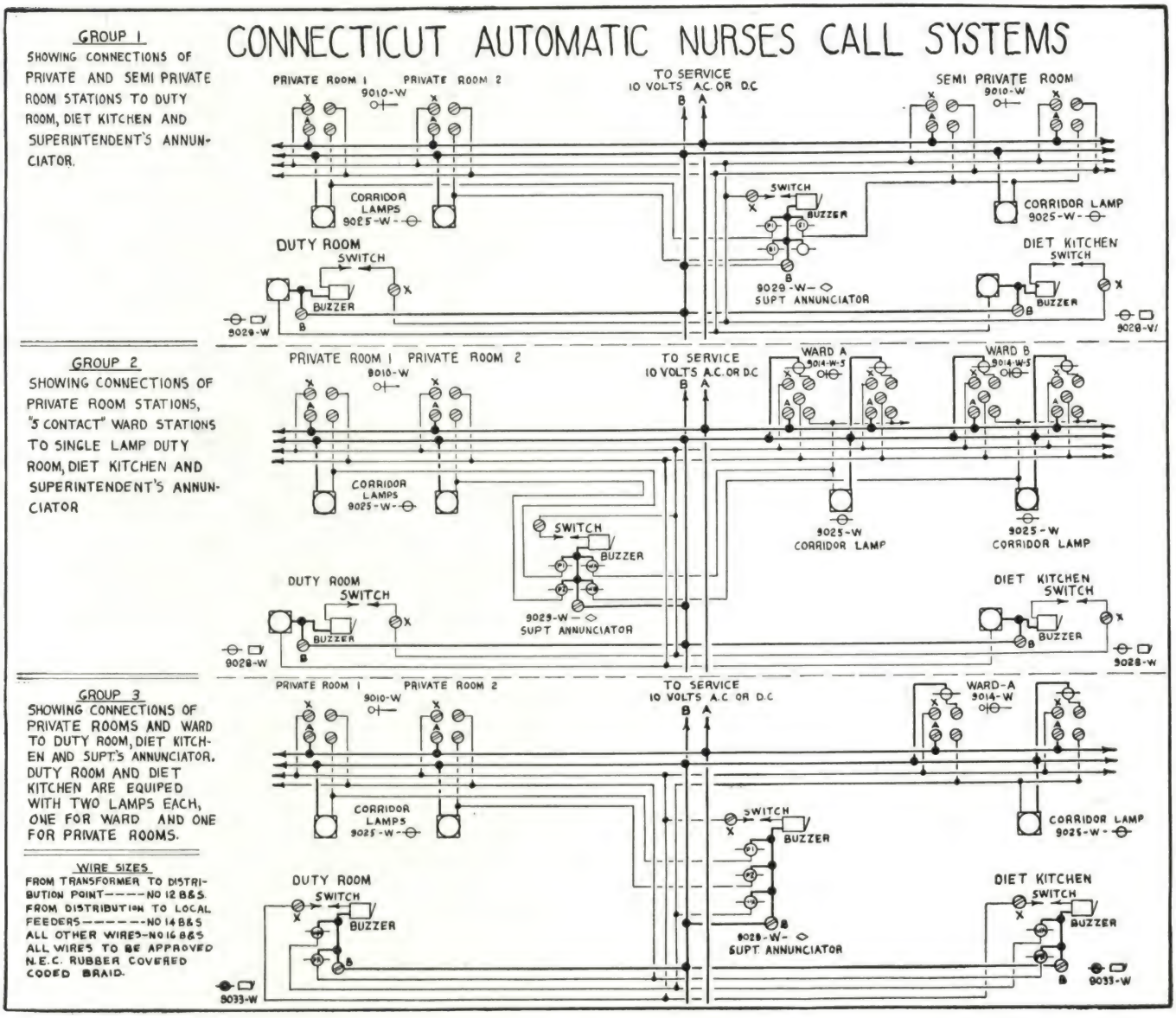
The manufacturer guarantees all apparatus against electrical or mechanical defects for a period of one year.

Contractor's Guarantee

The Electrical Contractor installing this system shall test it free from grounds, short circuits, or other electrical troubles. He shall leave it in first-class operating condition, and shall guarantee his work for a period of one year from the date of acceptance of the system.

General

Samples of any other material will have to be submitted and approved.



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NURSES' CALL EQUIPMENT FOR PSYCHOPATHIC HOSPITALS

For Operation on 12 Volts A.C. or D.C.

General

In hospitals devoted to the mentally disturbed patients, a system for the purpose of affording patients a means of summoning a nurse is not required, as is the case in general hospitals. What is required is a signal system having special features and arranged in such a way so as to make it possible for a nurse to summon assistance if necessary. Therefore, a system of this type is primarily an emergency system and one that must be depended upon by a nurse to operate when required, but which the patient cannot operate nor disarrange.

The system of necessity should operate on low voltage current so that no harm may come to the patient or the nurse by the accidental grounding or short circuiting of service wires. The system may be operated from either a transformer if alternating current is available or a storage battery if direct current is available.

An automatic locking button with electric reset device is located in the patient's room and is normally de-energized or "dead," thus, the patient is unable to operate any part of the system as no current is available at that location. Another automatic locking button with bull's-eye is located outside of the room in the corridor adjoining the door trim. This station is operated by the nurse before she enters the patient's room, which action operates the bull's-eye on this station, indicating that a nurse is in this room and at the same time causes the station inside of the room to become energized or "live" and ready for use in an emergency.

Should it become necessary for the nurse to summon assistance, she presses the button on station in the room, which action causes to be lighted the corridor lamp signal above the door, and indicator at the nurses' station, a pilot lamp in the various duty rooms and also sounds a bell in the annunciator at the nurses' station and all duty rooms. The lamps remain illuminated and the bell operates continuously until assistance arrives at the room and the automatic buttons in both the corridor and patient's room are reset from the control station in corridor.

Equipment can be furnished with any modification in wiring or change in signaling units to meet special requirements.

No. 9087W

No. 9087W Room Station

Consists of a single-gang brass plate and electrically tripped automatic button mounted on sub-plate. Button is concealed by flexible leather disc which is flush with front of plate. Special head screws for fastening front plate to sub-plate make it impossible to remove same without special wrench. Fits any one-gang switch box or outlet box cover with an extreme depth of 2¼ in.

No. 9088W Corridor Control Station

Consists of a single gang brass plate with an automatic locking button and bull's-eye signal receptacle mounted on sub-plate. This station is equipped with a nurse's pilot light and button for energizing and de-energizing the room stations. The bull's-eye is removable for easy replacement of lamps. Is equipped with

No. 9088W

3-watt lamp and candelabra socket having tension spring to prevent lamp jarring loose.

Fits any one-gang switch box or outlet box cover with an extreme depth of 2¼ in.

Where pilot light is not desired on corridor control station we recommend the use of our No. 9020W station, as shown on page 7. In this case the protective type corridor lamp station having two lamps and barrier should be used. One lamp will light when corridor control button is depressed and the remaining lamp will operate when room station button is operated.

Dome Corridor Lamp Stations

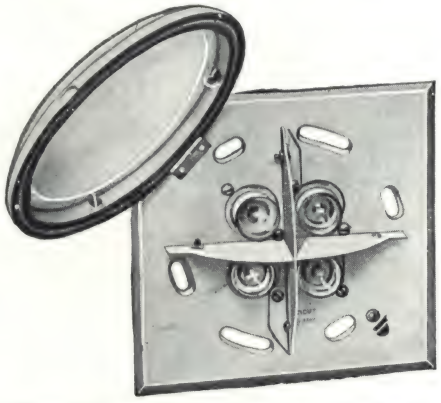
No. 9025W (Protective)—This station, with doubly protected feature, consists of an opalescent glass dome held in a light-tight brass frame, hinged to a two-gang brass plate having mounted thereon two 3-watt mazda lamps wired in multiple with a barrier between; with both lamps operating, signal shows full dome light. With one lamp burned out but half the dome is lighted, indicating the necessity for lamp replacement as well as registering the call. Is held closed by means of a snap catch, which permits easy replacement of lamps.

Closed—One Lamp Burned Out

This station is generally mounted in the corridor above the doors of patients' rooms, wards and recreation rooms to locate the nurse requiring assistance.

Fits any two-gang switch box or outlet box cover with an extreme depth of 1⅝ in.

Where the single lamp corridor station is specified, we suggest the use of our No. 9026W Dome Corridor Lamp Station.



Open—Showing Double Barrier Feature No. 9025W Corridor Lamp Station

No. 9026W—Consists of an opalescent glass dome held in a light-tight brass frame, hinged to a two-gang brass plate having mounted thereon a single candelabra base receptacle and 3-watt mazda lamp. Is held closed by means of a snap catch, permitting easy replacement of lamps.

This station is generally mounted in corridor above the doors of patients' rooms, wards and recreation rooms to locate the nurse requiring assistance.

Fits any two-gang switch box or outlet box cover with an extreme depth of 1⅝ in.

Continued on next page

No. 9090W Bull's-eye Indicating Duty Station with Emergency Bell

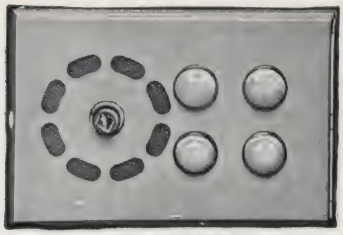
Consists of required number of bull's-eye indications mounted on beveled plate hinged to sub-plate which contains the emergency bell and candelabra base sockets fitted with 3-watt mazda lamps. A screened opening behind which bell is mounted permits the emission of sound.

This station is used to indicate a group of patients' rooms, wards, recreation rooms or sections or any combination of them where a common signal is desired and definite identification signals are not required.

Standard Sizes—

No. 9090W-1, One-lamp
No. 9090W-2, Two-lamp
No. 9090W-3, Three-lamp
No. 9090W-4, Four-lamp

Larger sizes to specifications.



No. 9090W

Station illustrated fits standard three-gang switch box or outlet box cover; extreme depth, 2½ in. Each additional two bull's-eye indications require an additional gang plate.

No. 9089W Emergency Bell Station

Consists of a double gang brass plate with screened opening for concealed bell which is mounted on sub-plate.

No. 9089W

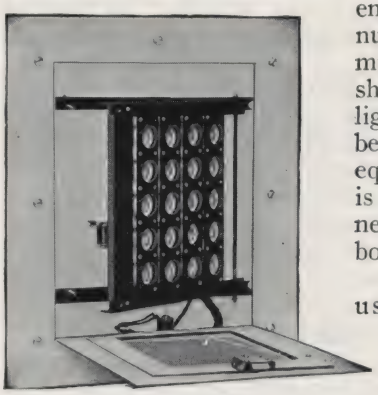
This signal is used where it is desirable to indicate to those within hearing that a call for assistance has been made, but it is not necessary to indicate the location as the source of call is located by pilot lights.

Fits any two-gang switch box or outlet box cover with an extreme depth of 2½ in.

No. 9029WP Flush Type Supervisory Lamp Annunciator

Consists of metal cabinet having a metal trim with hinged door containing the glass front.

Door is provided with lock. The lamp sockets are arranged in banks of five or ten depending upon the size of the annunciator and are mounted on an iron frame which is integral with the front. The frame swings outward and to the right for convenience in handling incoming wires. Sockets are permanently cabled at the factory to fixed terminal strips at the bottom of the front. The white glass front shows engraved Gothic letters or numerals only when illuminated. Each lamp is shielded to prevent cross lighting of adjacent numbers. Annunciator is fully equipped with lamp. Bell is included and is permanently connected. Outlet box is included.



No. 9029WP

This annunciator is used as a means of quickly determining the exact location where assistance is desired.

No. 555W Heavy Duty Type Transformer

For operating Nurses' Call System where alternating current is available, we recommend a No. 555W Heavy Duty Type Transformer for the most economical operation. It should be of a design approved by the National Board of Fire Underwriters. We furnish transformers built especially for this class of service and recommend their purchase with balance of signaling apparatus as a guarantee of proper operation. Standard transformers are designed for use on 110-volt, 60-cycle current with 12-volt secondary. When ordering, specify primary voltage, wattage and frequency.

No. 555W

No. 555W— 50-watt, 110-volt, 60-cycle—12-volt secondary
No. 555W—100-watt, 110-volt, 60-cycle—12-volt secondary
No. 555W—250-watt, 110-volt, 60-cycle—12-volt secondary
No. 555W—500-watt, 110-volt, 60-cycle—12-volt secondary

STANDARD SPECIFICATIONS FOR PSYCHOPATHIC HOSPITAL CALLING SYSTEM

For Operation on 12 Volts A.C. or D.C.

System

Install, as directed, in these specifications, a complete Psychopathic Hospital Calling System operating on 12 volts A.C. or D.C. No cords or other detachable devices shall be used in the system. System shall be so arranged that patient cannot operate signals.

Operation

In each private room, ward and recreation room there shall be the desired number of room calling stations having an electrically tripped automatic button. Outside of each of these rooms there shall be a corridor control station having a pilot light and automatic button. A nurse on entering a room presses the button on the corridor control station, which operates the bull's-eye on this station, indicating that a nurse is in this room and at the same time causes the room station to become energized and ready for use in an emergency.

Should a nurse require assistance, she presses button in room station which action shall light the corridor lamp signal above the door of said room, an indication at the nurses' station annunciator, a pilot lamp in the various duty rooms and also sound a bell in the nurses' station annunciator and all duty rooms.

All lamps to remain lighted and bell to ring continuously until nurse resets the button in the corridor control station, which action shall also release button on room station.

The room station shall be so designed as to permit the flashing of the lamps intermittently by the nurse calling for assistance in order to attract the attention of other attendants.

Continued on next page

Equipment

Room Stations—Install in all private rooms, wards and recreation rooms, at points indicated on the plans, a No. 9087W Room Station. Station shall consist of standard single-gang .060 gauge brass plate containing an automatic button with unbreakable metal plunger and its associated electric release.

This station shall fit any standard single-gang switch box or outlet box cover not less than 2½ in. deep.

Corridor Control Stations—Install in corridor outside of each room, and adjoining door trim at lock side of door at points indicated by symbol on plans, a No. 9088W Corridor Control Station. Station shall consist of a standard single-gang .060 gauge brass plate containing an automatic button with unbreakable metal plunger and bull's-eye covering a lamp. Bull's-eye shall be removable so that the lamp can be easily examined or replaced, and so designed and colored as to be visible at a distance from any angle.

This station shall fit any standard single-gang switch box or cover not less than 2½ in. deep.

Corridor Lamp Stations—Install in corridors, over the door of each private room, ward and recreation room, at points indicated by symbol on the plans, No. 9025W Dome Type Corridor Lamp Station with doubly protected lamp. Station shall be equipped with two lamps with barrier between and shall indicate a lamp burn-out by lighting but half the dome. It shall be dust and light-tight and readily seen when lamp is illuminated, even if exposed to sunlight.

Station shall consist of brass plate, having mounted thereon a glass dome covering candelabra base receptacles and lamps. Dome shall be frosted white inside and set in hinged frame with snap catch so that lamps can be easily replaced.

This station shall fit any two-gang outlet box with cover not less than 2½ in. deep.

Bull's-eye Duty Station with Emergency Bell—Install in each diet kitchen and duty room, at points indicated by symbol on the plans, a No. 9090W Bull's-eye Duty Station with Emergency Bell. Station shall consist of a brass plate having two or more lamps. Each lamp shall have an individual cap lettered to indicate source of the call. It shall have a permanently connected bell contained within the case which is to be concealed behind screened opening. The face plate shall be hinged for access to lamps and have snap fastener.

The two and four-lamp stations shall fit a standard three-gang outlet box with cover not less than 2½ in. deep. For each additional two lamps, over four, the plate will be increased one gang.

Annunciator—Install at the nurses' desk on each floor, at point indicated by symbol on the plans, a No. 9029WP Lamp Annunciator. This shall be of the flush type, all metal, and of sufficient capacity to indicate all calls on the system. It shall be of hinged door construction. There shall be a permanently connected bell contained inside of case.

The lamps shall be so arranged and the glass so marked as to indicate the floor and the various rooms calling. All indications shall be clean-cut and without diffusion.

Current

The system shall operate on 12 volts A.C. Where there is a reliable source of alternating current in the building, such current shall be reduced to 12 volts by means of an approved two-coil transformer furnished by the manufacturer. If there is no alternating current available, then the system shall be operated by means of storage battery charged by a motor-generator set. The manufacturer shall furnish the motor generator set, charging panel and battery.

Wiring

All wiring used in the system shall be run in iron conduit in an approved manner. There shall be no joints or splices except at regular junctions in outlet boxes. All taps, splices and joints shall be made in a thorough and workmanlike manner. Feed wires must not be less than No. 14 B & S rubber covered. Wires running to calling stations from the feed wires may be No. 16 B & S rubber covered providing the size will not cause too great a drop in voltage.

The manufacturer shall furnish a wiring diagram showing the layout of the system and the method of installation.

Outlet and Switch Boxes—Wherever outlet or switch boxes are specified, these shall be of standard size and make, not less than 2½ in. deep.

Finish

The finish of the annunciators shall be white enamel and all other stations shall be white enamel unless otherwise specified in order to harmonize with other surroundings.

Manufacturer's Guarantee

The trade numbers referred to herein are those of the CONNECTICUT TELEPHONE & ELECTRIC CORP., Meriden, Conn.

The manufacturers guarantee all apparatus against electrical defects for one year.

Contractor's Guarantee

The electrical contractor installing this system shall test it free from grounds, short circuits, or other electrical troubles. He shall leave it in first-class operating condition, and shall guarantee his work for a period of one year from the date of acceptance of the system.

General

Samples of any other material will have to be submitted and approved.

ASSOCIATE SYSTEMS

Catalog No. 405—Covering details, typical specifications and complete information on Connecticut Fire Alarm Systems:

Non-interfering Fire Alarm Systems.
Code Alarm Systems.
Non-code Systems.
Tank Alarm Systems.

Catalog No. 406—Covering details, typical specifications and complete information on Connecticut Electric Time Systems:

Master and Secondary Clock Systems.
Program Systems.
Combination Telephone and Program Systems.
Watchman's Clock Systems.

Continued on next page

CONNECTICUT NIGHT LIGHTS

N. E. C. Standard

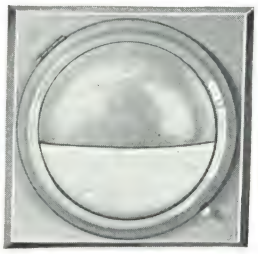
On High Voltage (110-volt) System

Night lights are designed to provide subdued illumination in corridors, wards, private rooms or wherever a guide light is required for service at night. For this service 10-watt lamps are usually supplied. When used near the beds, they are installed at the same height as the calling station. They will give a greater amount of light than the small night light on the plate with the calling station (9059W). When used in corridor, they are generally located about 18 in. from floor.

Dome Type

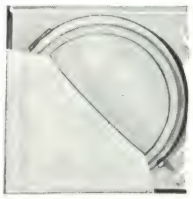
No. 9049W Dome Night Light (for Corridors, Wards, Private Rooms and Guide Lights)

They are similar in appearance to the corridor lamp station, being the same size and having the hinged cover, snap fastener, and opaque glass dome. They differ in that the night light has a metal hood over the upper half of the glass dome which confines light to the required level. Equipped with 10-watt lamp with intermediate base.

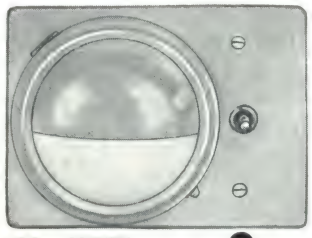


No. 9049W

Mounting Plate and Outlet Box—Plate is of .060 gauge brass, 5¼ in. square, with adjustable slots for box mounting. Mounts on standard square box with ¾-in. 2-gang cover. Extreme depth, 1⅞ in. Standard finish of plate is white enamel.



Dome Rotated to Left



No. 9075W

Dome Rotated to Right

No. 9075W Roto Night Light for Bedside Use (with Standard 10-watt, 110-volt Lamp)

This night light is similar to No. 9049W, but is designed so that the metal hood, instead of being fixed, can be rotated so as to throw the light in the position desired. This is furnished with toggle switch on same plate to control the light; chain pull switch may be furnished if desired.

Mounting Plate and Outlet Box—Plate is of .060 gauge brass 6¾x5 in., and mounts on a standard 3-gang cover or outlet box. Total depth is 1⅞ in. Lamp is a standard 10-watt, 110-volt Mazda lamp with intermediate base. Finish of plate is white enamel.

Louvred Type

No. 9074W Louvred Night Light, Vertical Type (with Standard 15-watt, 110-volt Lamp)

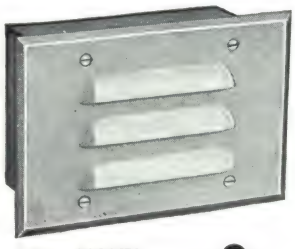
This louvred night light is of great use to indicate direction and afford sufficient illumination for moving about without lighting up the whole corridor. It is usually placed 18 to 24 in. above the floor, flush with the wall.

It consists of a louvred front plate with the louvres at an angle so that the light is directed to the floor. The plate is .060 gauge brass, 4⅝x6¾ in., hinged to an underframe for easy access to the lamp. A 15-watt, 110-volt Mazda lamp and standard socket is used.

Outlet box is 4x5½x2⅝ in. deep, of 14 gauge steel with one ½-in. and one ¾-in. knockout, top and bottom, finished white enamel on inside to give best possible reflection. The finish of plate is washable white, but can be finished to match the surrounding decoration if desired.

No. 9074W

No. 9080W Louvred Night Light, Horizontal Type



No. 9080W

This louvred night light is similar to the No. 9074W, but is arranged for horizontal mounting where height of space has to be considered. Plate is 6¾ in. wide x 4⅝ in. high overall. Outlet box is 5½ in. wide x 4 in. high x 2⅝ in. deep.

Continued on next page

THE PULL CORD TOGGLE SWITCH SYSTEM

For 110-volt Direct or Alternating Current or 12, 18 or 24-volt Operation

The Toggle Switch System

In addition to the automatic low voltage (10-volt) nurses' call system previously described, another dependable high grade system has been developed using toggle switch equipment for high (110-volt) or low (10-12 or 18-24) voltage A.C. or D.C. Primarily, the object in mind has been to meet conditions of installations where the first cost is a deciding factor, or where, due to its operation on 110-volt service, preference is given to this type of equipment.

The performance of this system as well as the circuit and method of operating the mechanism is identical with that accomplished by the automatic locking button with the exception of the method of operation. The difference is that with the locking button, the patient presses a plunger which is connected on the end of an easily detachable portable cord having electrical conductors, while with the toggle switch the patient pulls a linen cord which is attached directly to the handle of the switch of the calling station.

The nurse answering the call resets the switch by merely moving the lever to the "off" position as in turning off an electric light

The installation of the toggle type switch, because of the pull cord operation, must be carefully planned as many obstacles may arise tending to reduce its full efficiency. As a result of this it is necessary to install the stations in the wall and properly locate them with relation to the patient's bed, so that the cord will have as direct a pull as possible and that the switch may be operated with the least amount of effort. For this reason it is recommended that the switch be mounted on the wall at the head of the bed at a height of approximately 4 ft. 6 in. from the floor, arranging the cord so as to prevent the possibilities of it getting out of reach of the patient.

General Information

The apparatus used in this system is furnished complete with lamps, these being of the candelabra base type. Outlet boxes are included with supervisory annunciators and in cases where it is necessary to meet special construction of duty room and diet kitchen stations. Sizes of outlet boxes for other equipment are given under the descriptive matter of each piece.

Combinations of plates including the toggle station, convenience receptacles, radio and telephone outlets, night lights, etc., can be furnished to meet any requirement.

Nurses' Calling Stations

For High or Low Voltage

No. 9130W Private Room Calling Station

No. 9130W

Consists of a single gang brass plate with toggle switch having 6-ft. linen cord and pendant attached. A cord guide mounted below switch permits easy operation. Momentary buzzer contact may be disconnected with key through opening in front plate. Fits any standard 1-gang switch box or outlet box cover; extreme depth, 1¾ in.

No. 9130WE Private Room Station with Emergency Call

This station is similar to No. 9130W but equipped with extra toggle switch for emergency call. This switch is arranged with continuous bell contact that sounds emergency bells until reset at station. This service permits nurse to call assistance if patient is found in critical condition. Fits any standard 2-gang switch box or outlet box cover; extreme depth, 1¾ in.

No. 9140W

No. 9140W Bath or Toilet Station

Consists of a single gang brass plate with toggle switch having short cord and pendant. Is arranged with momentary buzzer contact. This station is also used in operating rooms, solariums and for emergency service, and may be arranged with continuous bell ringing contact. Extreme depth, 1¾ in.

No. 9131W Ward Calling Station

No. 9131W

This station consists of a 2-gang brass plate with toggle switch having 6-ft. linen cord and pendant and a bull's-eye pilot to indicate at once to the nurse entering the ward which patient is calling. A separate mounting complete with 115-volt lamp is supplied. Momentary buzzer contact may be disconnected with key through opening in front plate. Fits any standard 2-gang switch box or outlet box cover; extreme depth, 2 in.

No. 9131WE Ward Calling Station with Emergency Call

No. 9131WE

This is similar to No. 9131W but equipped with extra toggle switch for emergency call.

This switch is arranged with continuous bell contact that sounds emergency bells until reset at station. This service permits the nurse to call assistance if the patient is found in a critical condition. Fits any standard 3-gang switch box or outlet box cover; extreme depth, 2 in.

Continued on next page

CORRIDOR LAMP STATIONS

No. 9133W

No. 9133W Single Dome Corridor Lamp Station

Consists of a single gang brass plate with semi-opalescent glass dome, receptacle and 115-volt carbon filament lamp.

Fits any standard 1-gang switch box or outlet box cover; extreme depth, 1¾ in.

No. 9132W Exposed Lamp Station

Consists of single gang brass plate with candelabra base receptacle and 115-volt carbon filament lamp. May be fitted with two lamps for nurses' call and emergency service.

Fits any standard 1-gang switch box or outlet box cover; extreme depth, 1¾ in.

No. 9132W

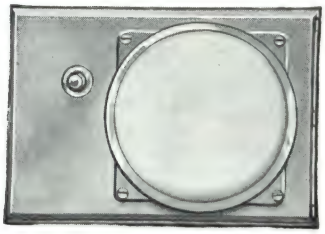
No. 9141W Double Dome Corridor Lamp Station

This station is used when both regular nurses' call and emergency service are required. Two domes are mounted on hinged front, a white for nurses' call and a green for emergency call. The green light is recommended for emergency service rather than red as a red lamp signal is prohibited in many States for anything but Exit lighting. The hinged front construction permits easy replacement of lamps. Fits any standard 3-gang switch box or outlet box cover mounted vertical; extreme depth, 1¾ in.

No. 9141W

Duty Room and Diet Kitchen Stations

No. 9136W Dome Type Duty Station



No. 9136W

Used to indicate a group of private rooms, wards or sections where identification signals are not required. Opalescent glass dome held by means of a cast frame to hinged front plate. Candelabra base receptacle and 115-volt carbon filament lamp, buzzer and silencing switch are mounted on sub-plate. Furnished with 1, 2, 3 or 4 lamps under dome for sectional service. Fits any standard 3-gang switch box or outlet box cover; extreme depth, 2 in.

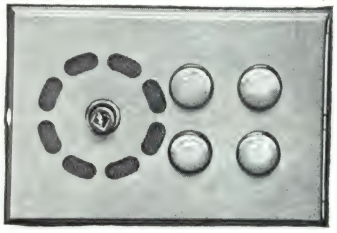
No. 9135W Bull's-eye Indicating Duty Station

No. 9135W

Used where it is desired to indicate the room, ward or section calling. The bull's-eyes are opal lenses with smooth outer surface with Gothic characters engraved on the inner surface. Lenses are fastened permanently to hinged front plate. Candelabra base receptacle and 115-volt carbon filament lamp, buzzer and silencing switch are mounted on sub-plate.

Up to four lamps fits standard 4-gang switch box or outlet box cover. Each additional two lamps require an extra gang. Extreme depth, 2 in.

No. 9137W Bull's-eye Duty Station with Emergency Bell



No. 9137W

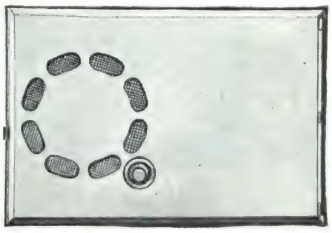
Similar to No. 9135W with the addition of a permanently connected bell behind the screened openings. Used only on systems equipped with the emergency call feature. Up to four lamps fits any standard 4-gang switch box or outlet box cover. Each additional two lamps require an extra gang. Extreme depth, 2 in.

No. 9134W Buzzer Station

A flush station consisting of a buzzer and silencing switch for use where it is desirable to have buzzer independent of pilot station or annunciator.

Fits any standard 2-gang switch box or outlet box cover; extreme depth, 2 in.

No. 9138W Emergency Bell and Buzzer Station



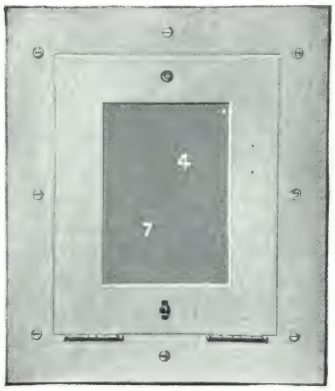
No. 9138W

Similar to No. 9134W with the addition of a permanently connected bell beneath the screened openings. Used only on systems equipped with emergency call feature. Fits any standard 3-gang switch box or outlet box over; extreme depth, 2 in.

Supervisory Annunciators

Sub-annunciators are usually installed at the nurses' stations on each floor and a master annunciator in the superintendent's office.

No. 9139W is furnished with hinged brass front and flush lock with glass panel. Indications are engraved on glass in clear cut Gothic figures to indicate room calling and are discernible from a distance. Lamps are mounted in banks of five and screw in porcelain receptacle. All wiring is hinged to terminal strips in outlet box. A buzzer is furnished and is controlled by a cut-out switch mounted in trim. Both are furnished as regular equipment. Where emergency service is required, indications show up in green. Outlet boxes are supplied on all annunciators and may be shipped in advance of equipment.



No. 9139W

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SIGNALING EQUIPMENT FOR NURSES' HOMES

Annunciator Telephone System

For Communicating with Nurses in Their Rooms

Two methods are used for getting in touch with the nurses in their rooms; by an intercommunicating telephone system and by the return call systems described on opposite page.

The equipment described below is for use in Nurses' Homes and wings in hospitals for communication between the nurse's room and head nurse or attendant at the switchboard. Annunciator can be equipped for intercommunication between outlying stations, group ringing either in sections or in whole, for general assembly or for emergency service. A special code of rings would be arranged for this signal.

We recommend this type of system in preference to the Return Call System, as it is much more efficient, saves time, and costs very little more per station.

SYSTEM No. 30

Operation

Operator to call, inserts plug in jack numbered to correspond with room wanted and presses ringing button which sounds bell in room phone. To call annunciator, button on side of phone is pressed, throwing visual target, indicating room and sounds annunciator bell or buzzer. Operator then inserts plug in respective jack and takes message. Calls are cancelled by reset button on panel.

Equipment

No. 7500W Type T Telephone Annunciator—Is for surface mounting and is usually placed in main office near switchboard, or in head nurse's office. Consists of individual jacks and target type drops and operator's set.

No. 7500W

Drops are mounted in upper panel and marked to correspond with rooms; indications are in gold on black face plate. Jacks, operator's plug, reset button, etc., are mounted on a similar panel, properly marked in lower section.

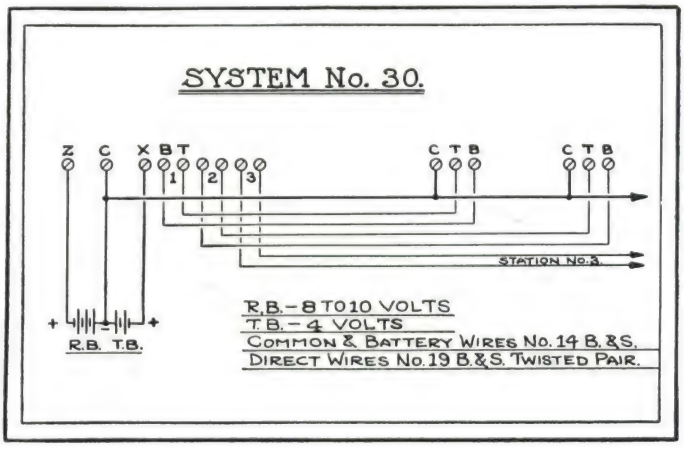
Operator's transmitter and receiver mounts on side of cabinet, but desk phone or hand phone may be supplied at no additional cost. When specified, annunciator will be equipped with cross connecting cords for intercommunication between rooms, or group ringing service.

Outgoing wiring on hinged front is cabled to terminals on molded strips mounted on face of back board for convenience in installing. Standard finish, golden oak with nickel trim. Annunciator may be furnished for flush mounting when so ordered.

No. 600W

No. 600W Connectaphone for Nurses' Rooms—Is elliptical in shape with body of dark brown bakelite, designed to harmonize with any style of modern architecture. Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism and single push button. Front plugs into moulded terminal strip mounted on steel back plate. Has slotted screw holes for alignment and fits standard outlet boxes and covers. All painting and decorating may be done before plugging in phone. Described in detail on pages 37 and 38.

No. of drops	Overall dimensions, in., for 7500W and 7400W Annunciators		
	Width	Height	Projection
12	10 3/8	31 1/8	3 7/8
15 & 20	10 3/8	31 1/8	3 7/8
25 & 32	10 3/8	36 5/8	3 7/8
40 & 50	23 1/4	31 1/8	5
60	26 1/2	39 1/4	5 7/8
70 & 80	26 1/2	44 3/4	5 7/8
90 & 100	29 3/4	47 3/4	5 7/8



Return Call Annunciator Systems

For Signaling Only

Systems described on this and the following page provide for two different classes of service. One sounds audible signal at wall station; the other, in addition to audible signal, indicates call by visual target signal, registering call in nurse's absence. A return call button on either type of station indicates at annunciator.

SYSTEM No. 97

Operation

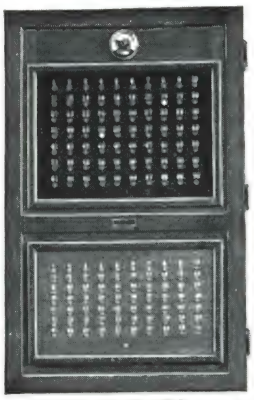
Operator, to call room, presses button on annunciator corresponding to room number and sounds buzzer on flush wall station. Nurse acknowledges presence by

Continued on next page

pressing button on this station which indicates on annunciator; she would then go to floor phone for instructions. A reset button cancels call on annunciator.

Equipment

No. 7400W Type R Annunciator—Is for surface mounting and is usually placed in main office near switchboard or in head nurse's office. Consists of individual calling buttons and target type drops. Drops are mounted in upper panel and marked to correspond with rooms; indications are in gold on black face plate. Calling buttons and reset buttons are on a similar panel in lower section.



No. 7400W

When specified, annunciator will be furnished for individual reset, group calling in sections or in whole. This special signalling may be used for general assembly or emergency service. A special code of rings is arranged for this signal.

Outgoing wiring on hinged front is cabled to terminals on molded strips on face of back board for convenience in installing.

No. 305W

Standard finish, golden oak with nickel trim. Annunciator may be furnished for flush mounting when so ordered.

No. 305W Flush Type Return Call Station—Consists of a concealed buzzer and push button mounted on sub-base and fits single gang outlet box or cover, 1½ in. deep. Top plate is installed after all interior decorating is completed. Standard finish, mat gold, brush brass or sprayed bronze.

For surface mounting, use Wiremold fitting No. 5748 or National Electric Products fitting No. 439.

Wiring

Standard wiring, 1 common, 2 direct from each outlying station. Can be supplied for 2 common and 1 direct. When so ordered, specify System No. 97A. For general call service, equipment will be wired for System No. 97 only.

SYSTEM NO. 98

Operation

Similar in operation to System No. 97, but indicates call on room station by visual target signal and registers same in nurse's absence. The nurse, on entering room, and seeing call set up would reset drop and press return call button, which would indicate at annunciator. She would then go to floor phone for instructions.

Equipment

No. 7400W Type R Annunciator—Same as described under System No. 97. (See page 21 for dimensions.)

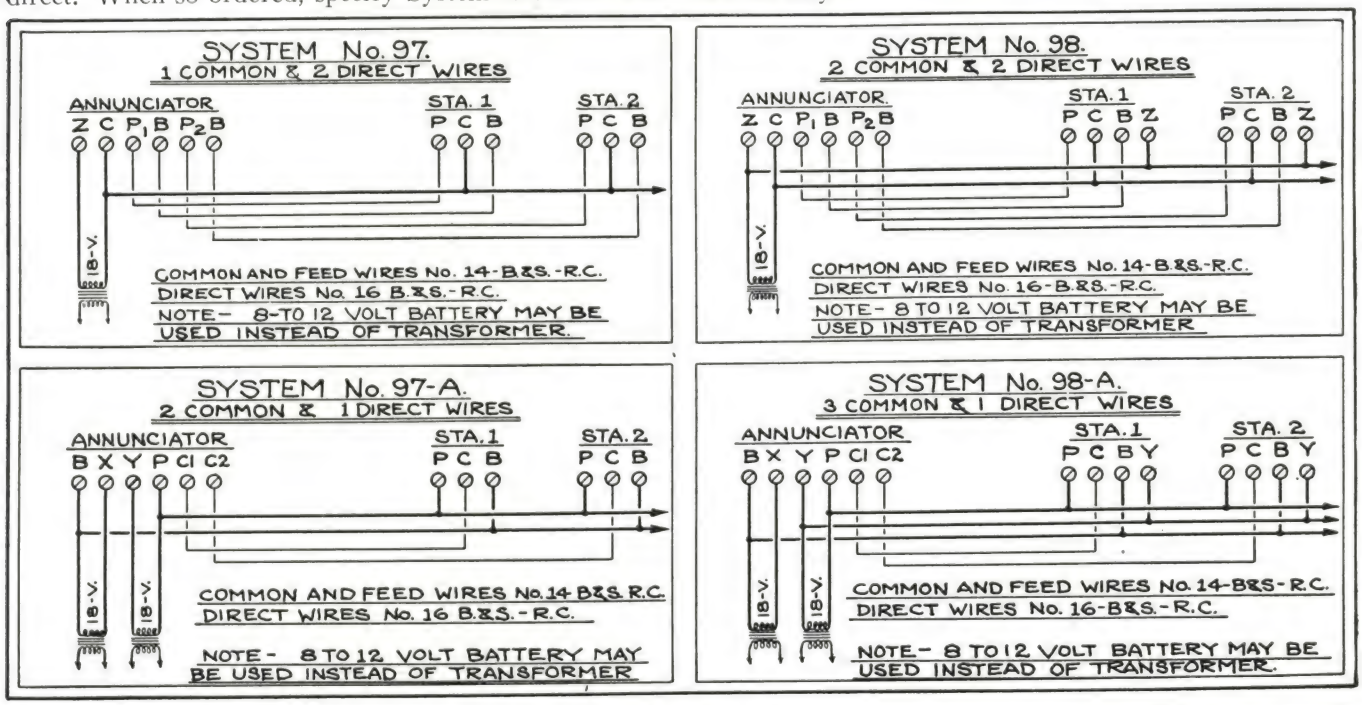
No. 304W Flush Type Return Call Station with Indicator—Consists of concealed buzzer, push button for calling, target type drop, and reset button mounted on two-gang sub-plate. Top plate is .060 gauge brass and is installed after all interior decorating is completed. Standard finish, mat gold, brush brass, or sprayed bronze. Fits any standard two-gang switch box or outlet box cover; extreme depth, 2¼ in.

No. 304W

For surface mounting, we supply a special wood mat for attaching to wall surface. No other fittings are required. When ordering, specify No. 304W-S.

Wiring

Standard wiring, 2 common, 2 direct from each outlying station. Can be supplied for 3 common, 1 direct. When so ordered, specify System No. 98A. For general call service, equipment will be wired for System No. 98 only.



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DOCTORS' AND STAFF "IN AND OUT" REGISTERING EQUIPMENT

With Indirect Lighted Annunciators

Low Voltage (12 to 48-volt) System

Some means of knowing at all times which of the doctors and members of the staff are in the building is one of the most important requirements of a well equipped and efficient hospital. The Connecticut System furnishes this information in a positive, efficient and silent manner.

The equipment consists of an indirect lighted annunciator located at the main entrance for registering the doctors and staff as they enter and leave and acting as the master annunciator. Secondary annunciators are located at the telephone switchboard, superintendent's office or other places as desired and connected to the Master Annunciator. If there is more than one entrance commonly used by the doctors and staff a keyboard should be placed at each such entrance, all connected to the main and secondary annunciator.

Where desired, the Master Annunciator at the entrance may be replaced by a keyboard which operates secondary annunciators at the telephone switchboard or elsewhere.

An auxiliary to this system is the Doctor's Recall Service by means of which any doctor can be notified immediately on entering or just before leaving the building that there is a message for him at the office.

Flush Type Indirect Lighted Annunciators

No. 9062W Flush Master Annunciator

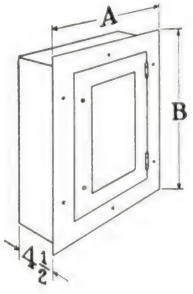
This is the master annunciator placed at the main entrance used by Doctors and Staff upon entering and leaving the building, and if possible within view of the telephone operator.

The annunciator has a heavy brass frame surrounding a hinged door with glass panel and flush cylinder lock. Annunciators are arranged with card holder compartments behind the glass panel with individual names. A toggle switch is provided alongside of and corresponding to each compartment and marked "On" and "Off." When the Doctor enters, he throws the switch to "On" to register "In." This illuminates the compartment containing his name. On leaving the building the toggle switch is thrown to "Off" position, putting out the light. These switches will also operate secondary annunciators described later.

The glass panel of door is sprayed white with openings for names 2¾x½ in. The card holders snap in slots provided for them which permits name cards to be readily inserted or changed. Annunciators are fully equipped with 12-volt lamps.

Standard finish is dark bronze, or may be finished as desired at a slight additional cost. Heavy gauge metal outlet box, with standard knockouts, will be sent in advance of the rest of the apparatus.

No. 9062W-12 [D]



DIMENSIONS OF ANNUNCIATORS

Capacity	Arrangement		Width, in.	Height, in.	Wall opening, in.	
	Across	Down			Width	Height
20	2	10	16½	25⅛	14⅜	23
40	4	10	28	25⅛	25⅞	23
60	4	15	28	32⅝	25⅞	30½
80	4	20	28	40⅛	25⅞	38
100	4	25	28	47⅝	25⅞	45½
120	8	15	56	32⅝	53⅞	30½
160	8	20	56	40⅛	53⅞	38
180	12	15	84	32⅝	81⅞	30½
200	8	25	56	47⅝	53⅞	45½

No. 9063W Flush Secondary Annunciator

This annunciator is similar to No. 9062W, but without the toggle switches. It is used near the telephone operator or wherever else desired. When the doctor throws the toggle switch on the master annunciator or entrance keyboard (see next page for description) it also registers on the secondary annunciator.

No. 9084W Flush Master Annunciator for Doctors' Recall Service

This annunciator is similar to No. 9062W but equipped with an additional pilot or recall lamp beside each name. This is used as a signal to notify the doctor arriving at the hospital, or before leaving, to get in touch with the telephone operator. This signal is controlled by the operator with an individual switch mounted beside each doctor's name on her annunciator or on a keyboard.

No. 9081W Flush Secondary Annunciator for Doctors' Recall Service

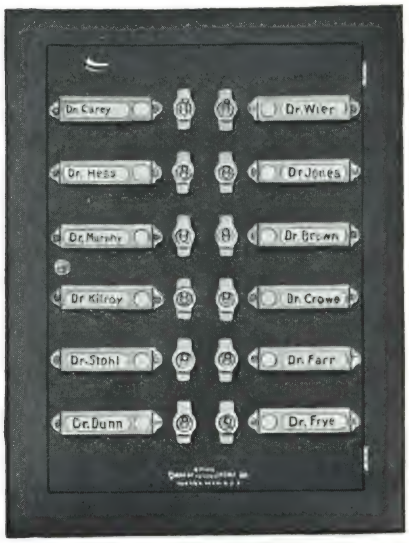
This annunciator is similar to No. 9063W but equipped with an individual switch beside each doctor's name. It is used near the telephone switchboard or elsewhere. The operator by throwing the proper switch lights the recall lamp in No. 9084W Annunciator to indicate to the doctor that there is a message for him at the office.

Continued on next page

Keyboards for Doctors' "In and Out" System

When more than one entrance is commonly used by the doctors and staff, means should be provided for them to register at each such entrance. For this a No. 9062W Master Annunciator is used at the main entrance and a keyboard at other entrances.

The keyboard contains toggle switches, card holders and pilot lights for each doctor and member of the staff. The keyboards and annunciators are so connected that when a switch is thrown "On" the pilot light at the keyboard and the corresponding lights in the master and all secondary annunciators are lighted. The pilot light in the keyboard indicates that the doctor is in and also that all lamps are lighted for if any lamp is burned out none will light and doctor knows at once that he has not registered and can report his presence in the building.



No. 9067W

No. 9067W Flush Type Keyboard

Metal trim is heavy gauge brass with hinged door and flush lock. On the door are mounted toggle switches, card holders and pilot lights. Standard finish is dark bronze.

Heavy gauge metal outlet box with standard knockouts will be sent in advance of apparatus when so ordered.

No. 9066W Surface Type Keyboard

Has a hardwood case with hinged front containing a brass plate on which are mounted the switches, card holders and pilot lights. Operation is the same as for the flush type. Standard finish of brass plate is dark bronze. Case is finished to match the trim of the room.

No. 9082W Flush Type Keyboard for Doctors' Recall Service

Similar to No. 9067W but equipped with an extra pilot lamp for each name in addition to the regular equipment.

No. 9083W Surface Type Keyboard for Doctors' Recall Service

Similar to No. 9066W but equipped with an extra pilot lamp for each name in addition to the regular equipment.

No. 9066W

DIMENSIONS OF 9067W KEYBOARD

Capacity	Arrangement		Width, in.	Height, in.	Wall opening, in.	
	Across	Down			Width	Height
20	2	10	16 3/8	18 1/4	13 7/8	15 3/4
40	4	10	24 7/8	18 1/4	22 3/8	15 3/4
60	5	12	29 3/16	20 3/4	26 11/16	18 1/4
80	5	16	29 3/16	25 3/4	26 11/16	23 1/4
100	5	20	29 3/16	30 3/4	26 11/16	28 1/4
120	6	20	58 3/8	20 3/4	55 7/8	18 1/4
160	8	20	58 3/8	25 3/4	55 7/8	23 1/4
180	9	20	87 9/16	20 3/4	85 1/16	18 1/4
200	10	20	58 3/8	30 3/4	55 7/8	28 1/4

DIMENSIONS OF 9066W KEYBOARD

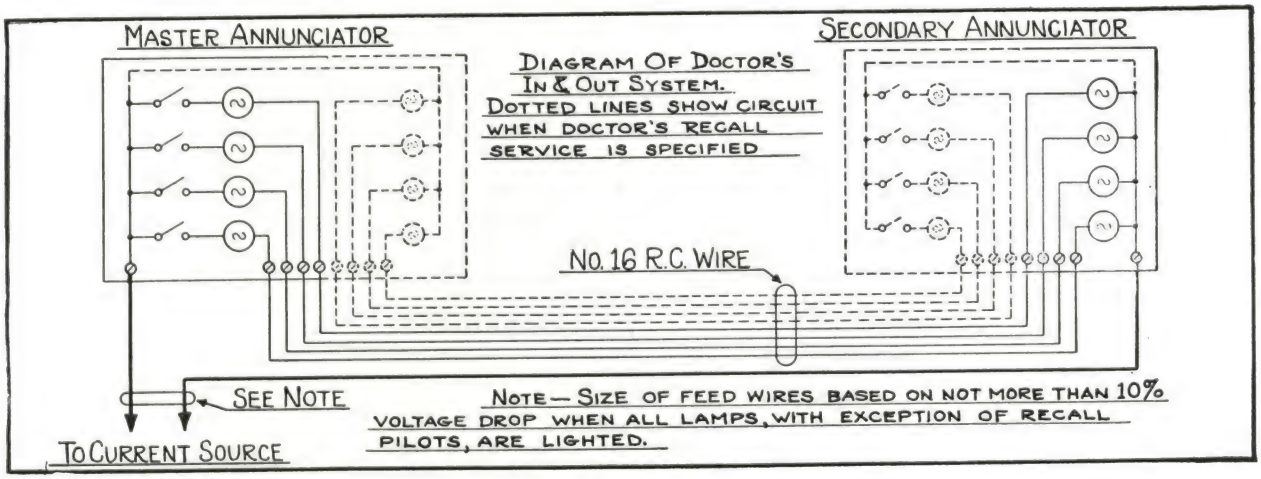
Capacity	Arrangement		Width, in.	Height, in.
	Across	Down		
20	2	10	12 7/8	17 1/4
40	4	10	20 7/8	17 1/4
60	5	12	25	19 3/4
80	5	16	25	24 3/4
100	5	20	25	29 3/4
120	6	20	29 1/8	29 3/4
160	8	20	37 1/8	29 3/4
180	9	20	41 1/4	29 3/4
200	10	20	45 1/4	29 3/4

Keyboards without Lamps for Doctors' Recall Service

Where Doctors' Recall Service is installed and the Master Annunciator is within view of the telephone operator, a keyboard is required to operate the recall lights. For this service No. 9067W and No. 9066W are furnished with toggle switches and card holders but without lamps.

Current Supply

For alternating current use a step-down transformer; for direct current, a motor generator. For capacity of either, multiply total number of lamps on system by 3 watts. Standard operating voltage, 12 volts a-c. or d-c. When two or more annunciators are used, they are wired in series. Blue prints should be obtained from factory before installing.



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Typical Form Specification

System—This specification is to cover furnishing and installing a complete Doctors' and Staff "In and Out" System of the lamp indicating type with equipment located as shown on plans, complete with all necessary keyboards, indirect lighted annunciators, conduit and wiring, making all connections, and leaving entire system ready for service.

Operation—A doctor or member of staff upon entering the hospital may register "In" by throwing the switch opposite his name to the "On" position. This lights up compartment in sub-annunciators containing his name and also indicates on entrance pilot. All pilot and compartment lights shall be wired in series so as to insure positive registration and check system for defective lamps. On leaving hospital, doctor would throw switch to "Off" position, extinguishing his light on the various units.

Equipment—***Entrance Keyboard (Optional)***—Furnish and install at each entrance or at location indicated on plans a No. 9067W Flush Type Master Keyboard (or No. 9062W Master Annunciator), containing all necessary keys, pilot lamps, etc., for proper operation of system. Front to be of heavy gauge sheet brass, hinged to frame and provided with flush cylinder lock, and finished as directed by architect.

Master Annunciator (Optional)—No. 9062W Annunciator with all necessary switches and indirect lighted name compartments may be installed in place of No. 9067W Keyboard.

Sub-Annunciators—Furnish and install, in view of switchboard operator, superintendent's office, or where shown on plans, No. 9063W Sub-Annunciators, flush type, equipped with all necessary switches and name compartments. Front shall be of heavy gauge sheet brass, hinged to frame, with flush cylinder lock. All keys and locks on this system shall be interchangeable.

Current—This system shall operate off transformer of proper voltage, where there is a reliable source of alternating current in building. If no alternating current is available, then system shall be operated by means of storage battery, charged by a motor generator set. Manufacturer shall furnish motor generator set, charging panel, and battery.

Wiring—All wiring shall be rubber-covered, run in iron conduit in approved manner. There shall be no joints or splices, except at regular junctions, in outlet boxes. No individual wire shall be smaller than No. 16B&S. Feed wires of capacity to carry 100% load, depending on number of lamps on system. Wiring diagram to be furnished by manufacturer.

General—All apparatus to be of best quality, as approved by architect and engineer, and shall be maintained without extra charge for a period of one year from date of acceptance.

All trade numbers referred to are those of the CONNECTICUT TELEPHONE & ELECTRIC CORP., Meriden, Conn.

NOTE: If the extra service for signaling doctors to report to the telephone operator on arriving, or before leaving hospital, is required, specify No. 9084W Master Annunciator or No. 9081W Secondary Annunciator or No. 9082W Keyboard, flush type, or No. 9083W Keyboard, surface type.

DOOR AND AMBULANCE SIGNALING SYSTEM

General

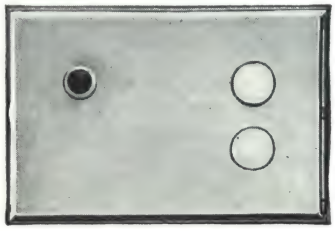
This system provides an efficient means of signaling from front door and ambulance entrance to attendant. Ambulance or doctor arriving at night after entrance doors have been locked, may indicate arrival on lamp annunciator located at information desk or orderly's room. Push button at entrance sounds buzzer and lights bull's-eye signal, indicating source of call. Signals remain lighted until reset at annunciator.

Entrance Button

No. 7002W Solid Bronze Weatherproof Button—Arranged for surface or conduit mounting. Plunger is recessed to prevent accidental signaling. Finish, polished bronze, sprayed with weather-resisting lacquer.

No. 7002W

No. 9033W-A Bull's-eye Indicating Stations—Used at both information desk and orderly's room. Front plate of heavy gauge brass is hinged to sub-plate on which buzzer, lamp sockets, etc., are mounted. The bull's-eyes are opal lenses with engraved indications FD and AE. Hinged front with concealed snap catch permits easy replacement of lamps. Mounts on standard 3-gang switch box or cover; extreme depth, 2 in. Standard finish, white enamel.



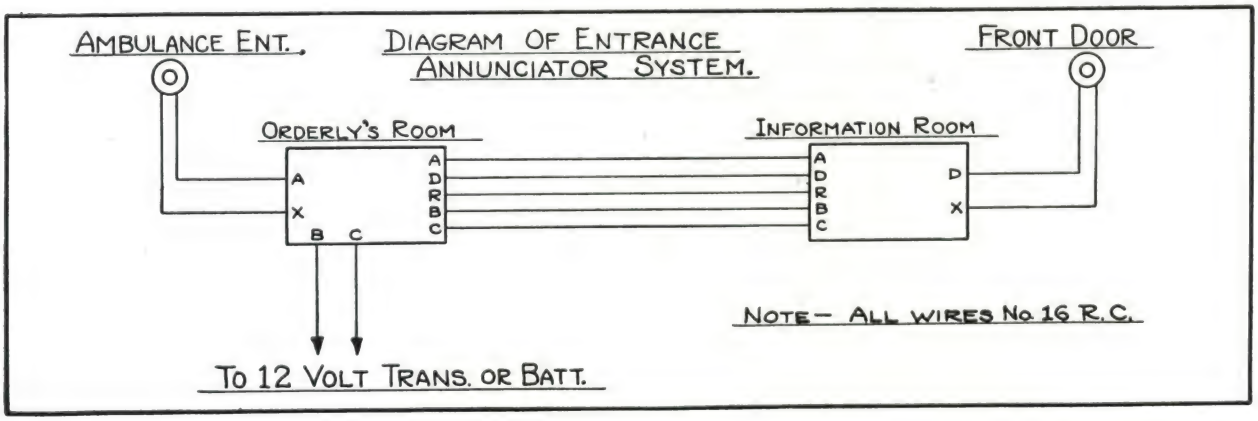
No. 9033W-A

Wiring

Run two No. 16 B&S rubber-covered wires from each push button to the terminals on each of the annunciators; two No. 14 B&S rubber-covered wires from transformer to one annunciator; and five No. 16 rubber-covered wires between each annunciator.

Current

Use 30-watt, approved, two-coil, heavy duty type transformer with entirely insulated secondary giving 12 volts, or tap off same current supply used for other systems.



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DOCTORS' PAGING SYSTEMS

With Silent and Audible Call

In every hospital it is desirable to locate the different doctors and members of the staff quickly. Not infrequently, especially in hospitals handling certain types of cases, it may even be a matter of life and death. To meet this need, Connecticut has developed several types of Doctors' Paging Systems to fulfil the requirements of every hospital and to suit the appropriation, be it large or small. Some systems use the silent call, others the audible call, and some both silent and audible calls.

Doctors' Paging System No. 90 for Large Hospitals

This system is designed for large hospitals where there are frequent calls for doctors or members of the staff. It consists of a code selector, contactor unit and as many annunciators as may be required. Three calls may be set up simultaneously by the operator at the selector keyboard and flashed alternately on each annunciator. This is accomplished by means of the motor-driven contactor unit which controls and regulates the period of illumination of each call.

No. 9043W Code Selector

No. 9043W

D

This unit as usually furnished is of the portable type for mounting on a table or shelf at the side of the telephone operator. It is supplied with 10 ft. of flexible brown cable which connects to a flush terminal cabinet. The selector cabinet is constructed of mahogany with hinged cover and heavy brass top plate containing all operating parts which are thoroughly insulated. The top is pitched at an angle of 30 degrees for ease in operating. This permits a full view of the entire keyboard.

Buttons are mounted in three horizontal rows and are engraved from 1 to 9 and 0. A switch, at the end of each row, starts the motor to flash the call when thrown to the left and cancels the call when thrown to the right. A switch in the lower right hand corner controls the audible signal in each annunciator. This is a momentary buzz that may be adjusted for volume and sounds after each third number has been flashed.

Pilot lights with engraved opals which are mounted above the keyboard denote the call being paged.

All metal trim has natural bronze finish. Dimensions of base, 17½x12 in.

Annunciators

These are made in several styles as shown on the next page to meet the requirements of mounting in any location. All have metal case finished in white enamel with nickel trim and are equipped with hinged door with flush locks and glass panels. The numerals are engraved on a special prepared glass surface. They are then sprayed with white enamel which makes the numerals hardly visible when there is no light behind them. The advantage of this method of forming the numerals is that there is no halation and the outlines are therefore sharp and distinct even when viewed from an angle. Numerals are arranged in two rows. The figures in one row are opposite the spaces in the other and are read in sequence when three numerals are lighted (i.e., 3 5 7).

No. 9045W D

As all calls are made up of a combination of the numerals 1 to 9 and 0, only 10 lamps are required. The maximum capacity is 175 calls using one, two or three digits. The lamps are placed in reflecting compartments which prevent the light shining through adjacent

Continued on next page

numbers. Standard 15-watt, 110-volt lamps are used.

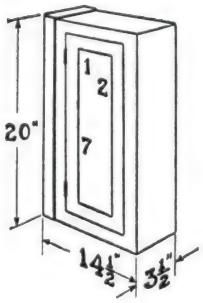
Provision is made for an audible signal which may be controlled by the operator at the keyboard or may be cut off at any annunciator by a toggle switch mounted on the bottom. Audible signals may be adjusted for tone to suit the location.

Double face wall and ceiling types are supplied with cast aluminum back plate fitted with supporting studs which slip in grooves in annunciator case and simplify hanging.

The number illustrated at the left shows the full size of indications furnished on standard paging annunciators. Special method of engraving on the glass panel results in clean-cut figures and eliminates diffusion. They are discernible at a distance when lighted and practically invisible when not lighted.

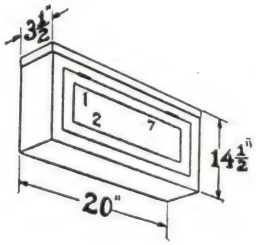
Actual Size of Numeral

Styles of Mounting Paging Annunciators



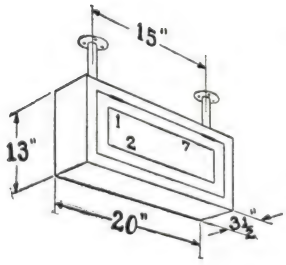
No. 9045W Annunciator

A double face annunciator with a bracket at the side for wall mounting for use in corridors.



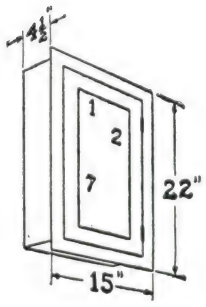
No. 9045WC Annunciator

A double face annunciator with bracket at the top for ceiling suspension for use in corridors.



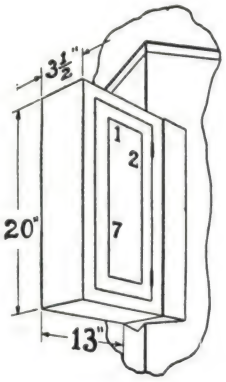
No. 9064W Annunciator

A double face annunciator with pipe support for use where the annunciator must be mounted away from the ceiling. Pipe support may be extended to bring the annunciator to the desired height.



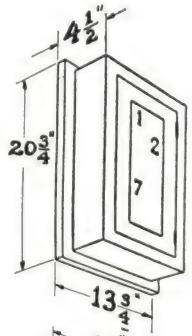
No. 9048W Annunciator

A single face annunciator for flush mounting in the wall. For use in offices, etc.



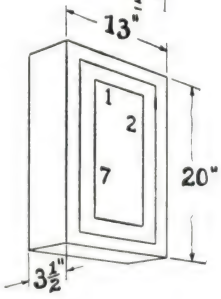
No. 9065W Annunciator

A double face annunciator with a special bracket at the side for corner mounting. For use at junctions of corridors where it may be seen in either direction.



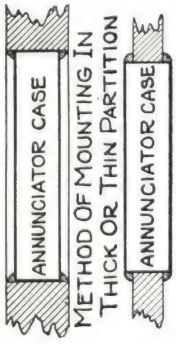
No. 9047W Annunciator

A single face annunciator similar to No. 9048W, but arranged for surface mounting.



No. 9046W Annunciator

A double face annunciator for partition mounting so that it may be seen from the corridor and also inside the room. For use in doctors' rooms, etc.



Double Face Annunciator with Two Sets of Lamps

When so specified, double face annunciators can be supplied with two sets of lamps so that the numbering will read from left to right on either side. Add "D" to catalogue number of annunciator with mounting desired, i.e., No. 9045WD.

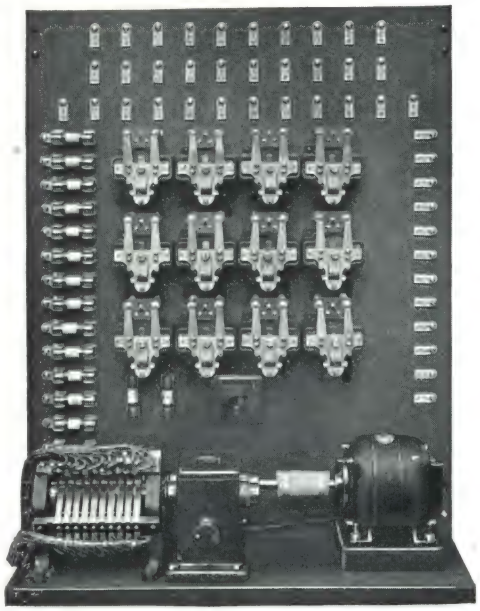
Continued on next page

No. 9044W Contactor Unit for Paging System No. 90

The Contactor Unit controls the operation of the system. It consists of an ebonite asbestos panel on which are mounted the necessary relays, fuses, power switch, transformer and all terminals. This panel is mounted and supported on a base of the same material. The motor driven flasher mechanism is mounted on the base in front of the panel where it is accessible for inspection. It consists of a fractional horsepower motor operating the cam shaft for closing the lamp circuits through a gear box. The cams operate, in sequence, through sets of contact springs which handle the current controlled by each row of buttons on the code selector.

When a call is set up by the operator, these springs close the circuit of the associated relays and flash the code on the various annunciators. When three calls are in operation simultaneously, the rotation of the cams cause circuits one, two and three to flash in succession and are repeated until reset individually by the operator. An additional contact for operating the audible signal is included in the spring assembly and arranged to sound once after every third call.

Unit is of rugged construction of selected material and with ordinary care will last indefinitely. Panel is enclosed in a heavy sheet steel cabinet with hinged door, glass front, provided with flush locks. Standard finish is black enamel. Dimensions, 24½ in. wide, 29 in. high, 15½ in. deep.



No. 9044W [D]

Typical Form Specification

System

This specification is to cover furnishing and installing an Automatic Alternate Call Three Code Doctors' Paging System with equipment located as shown on the plans, complete with all necessary Annunciators, Code Selector Unit, Contactor Unit, Conduit and Wires, making all connections, leaving the entire system ready for service.

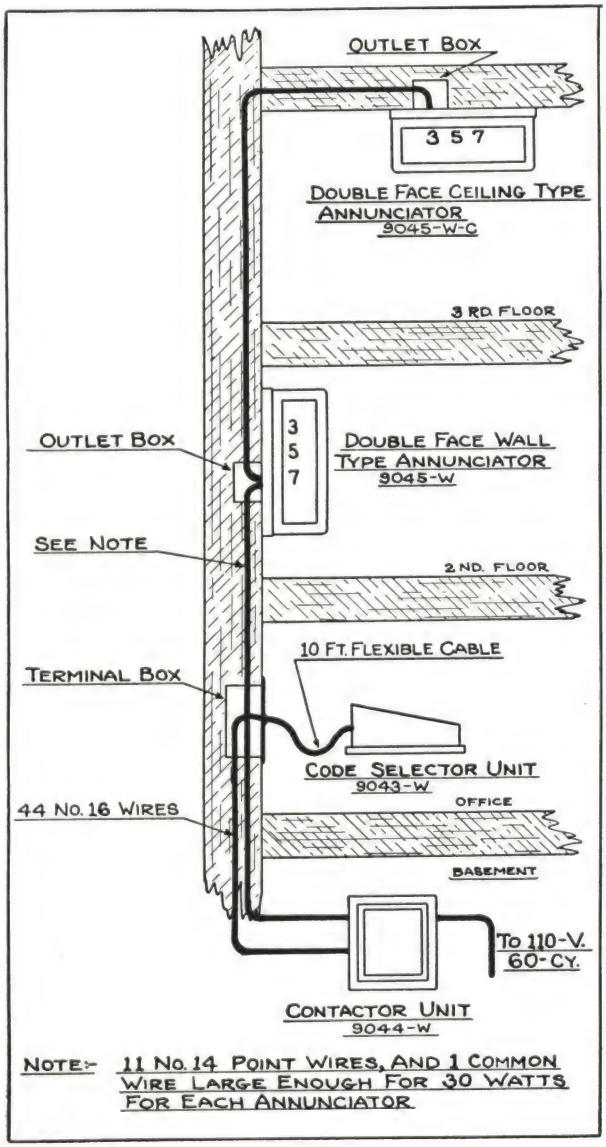
Operation

The operator desiring to locate a doctor, may do so by setting up a given code number (i.e., 246) in numerical sequence on the Code Selector, after which "Start" key is thrown to left or start position. This causes the motor driven flasher unit to operate which in turn flashes the doctor's code on all the annunciators of the system, also pilot lights on the Selector Unit; once to each revolution of the flasher.

Three codes may be set up on the Selector Keyboard at the one time and codes will be flashed on all the annunciators alternately.

In addition to the codes flashing on the annunciators, a momentary buzzer may be sounded as an audible signal in each annunciator when a buzzer key at the Code Selector is in "On" position.

Upon notification, the doctor calls the operator on the nearest telephone, after which the operator will reset the call by full pressure on the "Start" key to the right.



Equipment

Paging Annunciators—At locations as indicated on the plans, install one No. 9045W double face, 10-lamp, metal case Annunciator, equipped with adjustable buzzer and cut-off switch, white glass panel doors, marked 1 to 9 and 0 in two vertical staggered rows. Markings shall be engraved Gothic type figures, same to be discernible only when signal is indicated.

Types of Annunciators—

No. 9045W Double Face Annunciators, 10-lamp, Wall Mounting, or

No. 9045W-C Double Face Annunciators, 10-lamp, Ceiling Suspension Type, or

No. 9048W Single Face Flush Annunciators, or

No. 9046W Partition Mounting Type Annunciators, showing both sides, or

No. 9047W Single Face Surface Type Annunciators, or

No. 9064W Double Face Annunciators, Ceiling Suspension Type, with extension pipe supports, or

No. 9065W Double Face Annunciators, for Corner Mounting.

Code Selector Unit—At or near the telephone switchboard, or where directed by the Architect, install a portable desk type Code Selector, three call, complete with 10 ft. flexible cable for

Continued on next page

connection to terminals in a surface (or flush) steel cabinet having door and trim.

This unit shall consist of a neat, portable, wood case with metal face plate, having three sets of ten each selector buttons marked 1 to 9 and 0; a start and stop lever and an audible control switch; numeral markings for each button are to be engraved.

The Code Selector Unit shall also be provided with ten pilot lamps, which will indicate to the operator the code that is being flashed on the annunciators. An additional lamp (red) will indicate motor in operation.

No. 9043W Code Selector, Portable Desk Type, with 10 ft. flexible cable and Flush Terminal Cabinet.

Contactor Unit—At a point as indicated on the plans, install one Contactor Unit, complete with all necessary relays, transformer, motor driven three code flasher, switches, fuses and terminals, all to be complete and self-contained in a surface type steel cabinet with hinged door and lock.

No. 9044W Contactor Unit, complete.

Current Supply

The current for all outlying Doctors' Annunciators and Motor Driven Flasher shall be 110-volt, 60 cycle. The current for the operation of all relays, pilot lamps and operating buttons on the Code Selector shall be 18 volts, taken from the secondary side of a proper transformer located on the relay control panel, the primary of which will be connected to 110 volts, 60 cycle.

Wiring

All wires shall be installed according to the requirements of the National Electrical Code in rigid iron conduit; no splices to be made, runs to be continuous to junction or outlet boxes where screw or solder connection strips are to be provided; the low voltage side of system to test free and clear of grounds.

No wire smaller than No. 14 B&S "NEC" rubber-covered shall be used. Common feed wires to be of such size as to properly handle the full load of the system.

General

All apparatus is to be of the best quality as approved by the Architect and Engineer and shall be maintained without extra charge for a period of one year from date of acceptance.

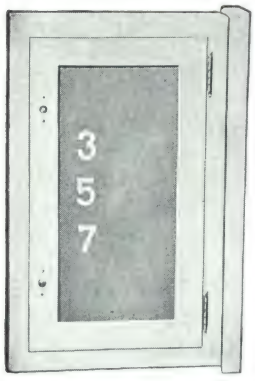
All numbers referred to are those of the CONNECTICUT TELEPHONE & ELECTRIC CORP., Meriden, Conn.

Doctors' Paging System No. 91

For Small Hospitals

This system is a modification of System No. 90 and permits but one call at a time. It is suited for small hospitals where the number of calls is less or to a hospital whose appropriation will not permit the more elaborate equipment. It consists of a selector keyboard and annunciators. The contactor unit is not required, the annunciators being wired direct to the keyboard.

Operation—Consists simply of throwing the toggle switches representing the doctor's number and the start switch. The lamps remain lighted until the start switch is reset. If the flashing feature, which attracts attention more quickly is desired, a simple flasher mechanism can be added at very little extra cost.



No. 9045W

Annunciators

These are No. 9045W Annunciators, the same as used in System No. 90, and have a maximum capacity of 175 codes using 1, 2 or 3 digits in combination. A maximum of 25 annunciators may be connected to this system. One common and 10 individual wires are required. All circuits are fused.

No. 9070W Selector Keyboard

This is of the flush type and is usually mounted in the wall near the telephone operator. Two vertical rows of five standard toggle switches are mounted on a heavy brass plate hinged to the frame, and provided with a flush lock. Numbers 1 to 9 and 0 are engraved over the switch corresponding to the digit it controls. A start and stop switch mounted below starts the call after it has been set up and checked. All connections are made direct to fused terminals in the outlet box and are readily accessible for testing. Furnished with outlet box of heavy gauge metal.

Standard finish of front is natural bronze, but it can be finished to match the wall or trim. Dimensions, 19½ in. high, 16½ in. wide, 4½ in. deep.

Wall opening, 17½ in. high x 14 in. wide.

We do not recommend the portable type of selector keyboard for this system because it is operated directly from the lighting circuit.

No. 9070W

Continued on next page

Doctors' Paging System No. 92

For Individual Calls

In large hospitals it is frequently necessary to summon a number of doctors and members of the staff at once for conferences, operations, etc. To do this by System No. 90, on which only three calls can be signalled at a time, would require too long For such service, system No. 92, on which any number of calls may be made simultaneously and maintained as long as desired has been designed. It comprises a keyboard and annunciators and may have the flashing feature added if desired.

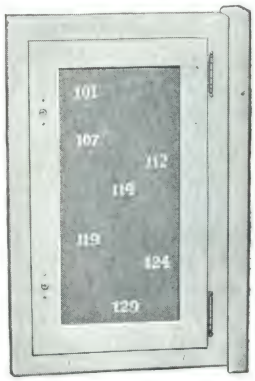
No. 9076W

No. 9076W Individual Call Keyboard

This is of the flush type and usually is mounted on the wall near the telephone operator. A heavy brass plate hinged to the frame carries an individual toggle switch for each call. Above each switch is engraved the number of the call it controls and also a bull's-eye pilot lamp which indicates at a glance what calls are being made. Keyboards are not carried in stock but are made up for specific installations. The flush type is recommended because the system operates directly from the lighting circuit. It requires one common wire and individual wires equal to the number of lamps in any annunciator. Each circuit is fused in the outlet box. Standard finish is natural bronze. In ordering specify the number of switches required. Supplied complete with heavy gauge metal outlet box.

No. 9077W Individual Lamp Annunciator

Similar in construction to the annunciators used in the preceding systems but has one lamp for each call. They are made for any style mounting as described on page 27. Standard finish is white enamel but annunciators can be finished to match walls or trim to order. In ordering specify number of lamps required, numbering desired and type of mounting.



No. 9077W

Doctors' Paging System No. 93

Audible Call

This system may be used wherever not more than thirty codes are required, where the musical tone of the chimes is not an objection, and where expense is an important item. Consists of a code transmitting machine and a series of bells or chimes. Operates direct from the 110-volt a-c. circuit through a heavy duty type relay and a transformer. Only low voltage is present in the transmitting machine. A single pair of wires connects the transmitting machine to all signals in multiple.

No. 9078W
Code Transmitting Machine

No. 9078W Code Transmitting Machine

This is of rugged construction with a simple mechanism. On the front is a dial on which the code numbers are engraved.

The operator, in paging a doctor, sets the dial for the individual wanted and presses the plunger down as far as it will go. The call is automatically sounded on all signals three times after the plunger is released. If the doctor does not answer, the call may be repeated by merely depressing the plunger again.

Finish is dark crackled enamel with nickel trim. Dimensions 6 in. wide, 4½ in. deep, 7½ in. high, including plunger.

No. 9079W Transformer

This is mounted in a steel cabinet installed preferably near the incoming electric service wires and supplies current to the system. A heavy duty type relay mounted in the same cabinet controls the signals.

No. 9079W
Transformer

BELL AND CHIME SIGNALS

No. 9058W
Soft Tone Bell

No. 9056W
Mellow Tone Bell

No. 9040W
Flush Type Sounder

No. 9042W
Surface Type Sounder

No. 9061W
Chime Signal

Continued on next page

Doctors' Paging System No. 94

Manual Call

This is the simplest and least expensive system for paging. It is similar to System No. 93 except that the code transmitting machine is replaced by a standard telegraph key on an ebony base. The signals are transmitted by hand, the operation merely "tapping out" the code on the key. The transformer relay unit and bell and chime signals are the same as described above.

No. 9041W Paging Key

Equipment

No. 9041W Paging Key, surface type.
No. 9056W Mellow Tone Bell, arranged for conduit mounting.
No. 9058W Soft Tone Bell, arranged for conduit mounting.
No. 9061W Chime Signal, arranged for conduit mounting.
No. 9040W Sounder, flush type.
No. 9042W Sounder, surface type.
No. 9079W Transformer, described above.

NURSES' OR MAIDS' LOCATION SYSTEM

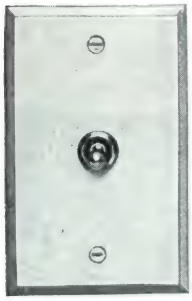
The system described on this page permits the supervisor or matron to check the movements of nurse or maid and tell by means of lamp annunciator which room they are in attendance.

No. 9086W

Operation

A nurse or maid, upon entering a room, operates a toggle switch, usually located inside room near the door, which lights pilot light in corridor outside the room, also indicates on lamp annunciator the room number. Annunciator is located at supervisor's or matron's station.

System operates on 12-volt current and a separate transformer of proper capacity is recommended where alternating current is available. Current may be obtained, however, by tapping off main feed wire for nurses' call system.



No. 9085W

No. 9085W Room Station

Consists of .060 brass flush plate, with toggle type switch. Fits standard single gang switch box or outlet box cover; extreme depth, 1⅜ in. Standard finish, white enamel, mat gold or polished nickel.

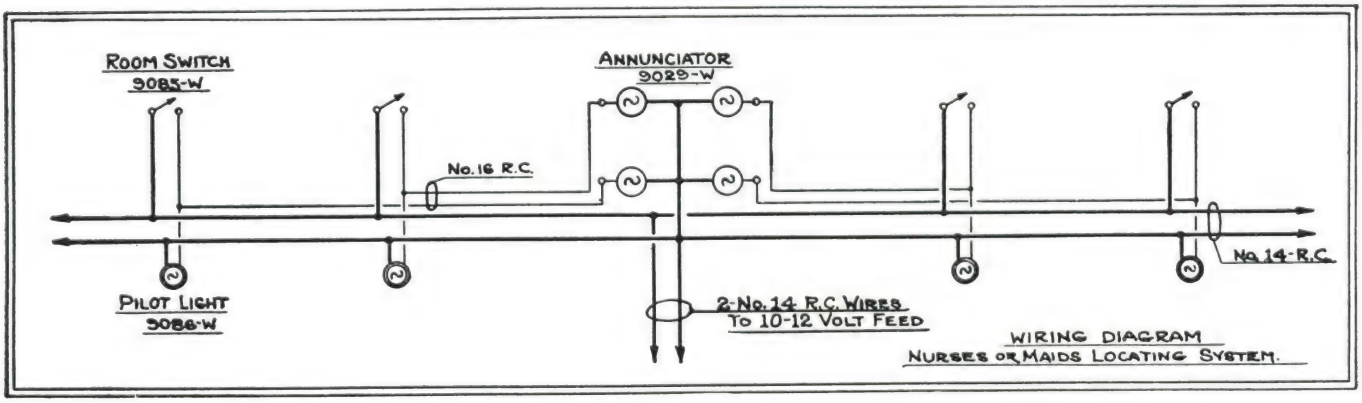
No. 9086W Room Pilot

Consists of .060 brass flush plate with bull's-eye signal. A sub-mounting plate with socket and 3-watt Tungsten filament lamp permits the installation of equipment before the final finish is put on walls. The finished plate can be screwed in place after room is finished and decorated. Fits standard single gang switch box or outlet box cover; extreme depth, 1⅝ in. Standard finish, white enamel, mat gold or polished nickel.

No. 9029W Flush Type Lamp Annunciator

Has metal trim with hinged door containing the glass front with engraved numbers. The lamp sockets are arranged in banks of five and mounted on iron frame which is integral with front. The frame swings outward for convenience in handling incoming wires; sockets are cabled to fixed terminal strips mounted in outlet box. Annunciator furnished complete with heavy gauge outlet box with standard knockouts.

No. 9029W



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INTERIOR TELEPHONE SYSTEMS FOR HOSPITALS

General Information

We have been manufacturing telephone apparatus since 1894 and can supply material in this line to fill the various needs, from complete telephone switchboard equipment to special interior systems. Systems described here are suggested for Hospitals; the instruments to be located at convenient points, in the corridors, at head nurse's desk, telephone switchboard, superintendent's office, nurses' home and other important locations. Any hospital having a special service requirement may consult our Engineering Department, which will be very glad to furnish complete data.

Diet Kitchen System 12A-O

Common Talking, Selective Ringing

For service between the main kitchen and diet kitchens, we suggest our System 12A-O. This is a common talking, selective ringing system, permitting the main kitchen to selectively call each diet kitchen. The diet kitchen phones are equipped with one button for calling back. Diet kitchens may communicate with each other by first calling main kitchen, which in turn calls the desired phone.

Main Kitchen Equipment

No. 5400W-8

No. 5400W Flush Phone—Consists of beveled brass plate with required number of calling buttons and card holders, double gong bell, standard transmitter and watchcase receiver. A metal outlet box with knockout at both ends is provided. Standard finish, black or mat gold. Other finishes special. Dimensions of 8-button phone illustrated, 6¼ in. wide x 12 in. high. Depth of outlet boxes 4½ in.

No. 520W Surface Type Phone—Similar in equipment, but furnished with long type receiver. Standard finish, black or golden oak. Dimensions of 8-button phone illustrated, including receiver, 9 in. wide x 12 in. high.

They are furnished in 4, 8, 12 and 16-button sizes.

No. 520W-8

Diet Kitchen Equipment

No. 600W Connectaphone for Diet Kitchen—Is elliptical in shape with body of dark brown bakelite, designed to harmonize with any style of modern architecture. Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism and single push button. Front plugs into moulded terminal strip mounted on steel back plate. Has slotted screw holes for alignment and fits standard outlet boxes and covers. All painting and decorating may be done before plugging in phone. Described in detail on pages 37 and 38.

No. 600W

House System

For service between main office or head nurse's station and various floors, the same system and equipment is applicable, but our standard desk or cradle phone is suggested for the center phone.

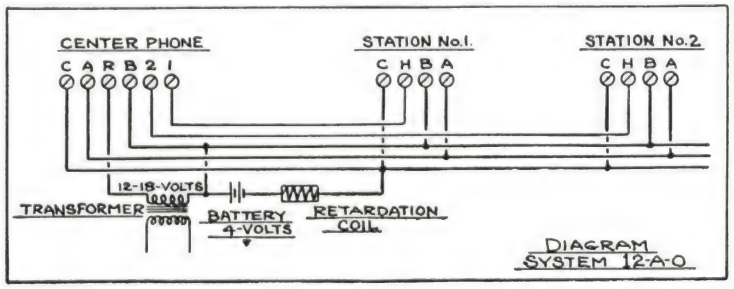
House System Equipment

No. 5210W Desk Phone—Furnished with standard transmitter and receiver, buttons in base engraved from 1 up, directory cardholders mounted on pedestal and 6-ft. cord and terminal block. Standard finish, black. Equipped with 4, 8 and 10 buttons.

No. 6000W Cradle Phone—Furnished with bakelite hand phone correctly designed and made of selected material, light in weight, and constructed to reflect the greatest amount of speech energy to the diaphragm. Buttons are mounted in base and supplied in 4, 6 and 8-button sizes. Furnished with 6-ft. cord and terminal block. Standard finish, black.

Our catalogue No. 401-B, describing other types of intercommunicating systems sent upon request.

No. 5210W-10



No. 6000W

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COMBINED NURSES' CALL AND EMERGENCY TELEPHONE SYSTEM

An Auxiliary to Nurses' Call

As an auxiliary to the regular Nurses' Call System, described on preceding pages, Connecticut has perfected an intercommunicating telephone system, using the same wiring as the Nurses' Call System, with the addition of one extra common wire looped to all bedside stations. This service is possible by means of the fifth contact on the station which is an exclusive feature with Connecticut and supplied on all wall stations.

A portable aluminum hand phone with 5-ft. cord and plug attached (same as used on nurses' calling button), inserts in receptacle at bedside station and call made in usual manner to supervisory or head nurse's station.

Is used for emergency service, usually at night when there are but few nurses on duty and enables assistance to be called without leaving patient. This is a common talking system, only one conversation may be carried on at one time.

When it is necessary to use the fifth contact on ward stations for special service on regular calling system, an extra receptacle is required on wall plate or an individual telephone receptacle placed in the ward. The maximum amount of service is therefore obtained at a minimum cost, as the only additional expense is that for phones, usually one or two per floor, depending on size of hospital.

Equipment for Nurses' Call and Emergency Telephone

No. 2500W Desk Phone

For nurse's station is furnished with standard transmitter and receiver, push button for calling back, and 6-ft. brown cord attached to terminal block. Finish, black with nickel trim.

No. 2500W

No. 6000W Cradle Phone

No. 6000W

May be used in place of desk type. Is equipped with bakelite hand phone, light in weight, attached to cradle by 6-ft. brown cord, push button, and 6-ft. cord to terminal block.

No. 649W

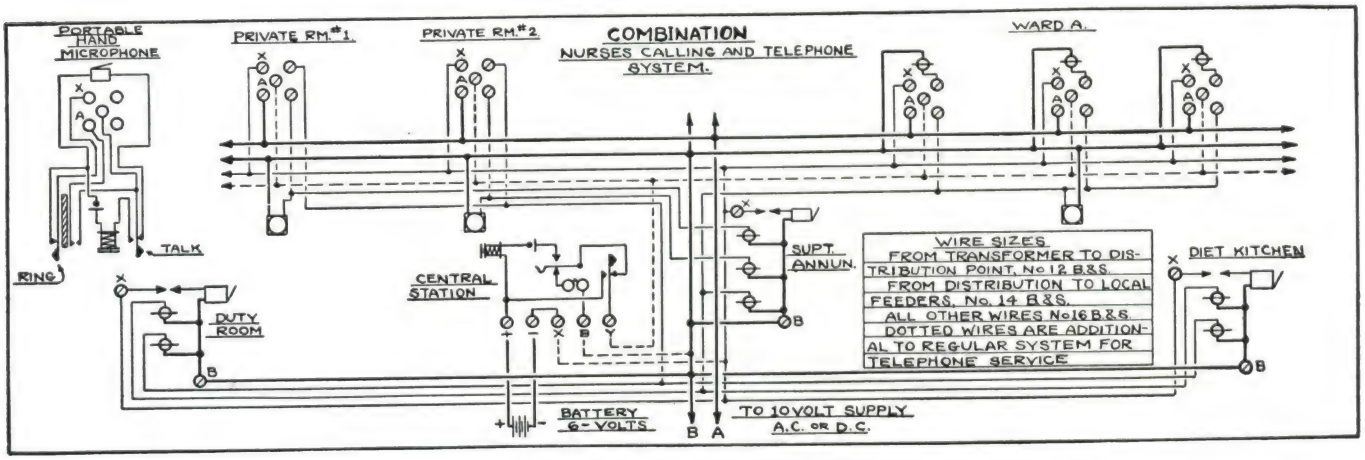
No. 649W Portable Aluminum Hand Phone

For calling only, is light in weight and equipped with calling button in handle, 5-ft. Tyrex rubber cord, and plug.

No. 648W Portable Aluminum Hand Phone

Similar to No. 649W, but equipped with buzzer, permitting nurse's station to call back. Has stationary hook for hanging up hand phone when not in service, keeping the nurse in attendance in direct touch with head nurse.

No. 648W



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NURSES' TELECALL SYSTEM

In order to meet the demand for a non-interfering Telephone and Nurses' Call System for service between the patient and duty station, Connecticut has perfected a system that fully covers all requirements and enables the nurse to serve the patient quickly and efficiently. This system combines both the visual and audible service.

The bedside equipment consists of the regular wall station with cord and locking type button with extra receptacle for telephone plug, and a separate cabinet type, loud speaking telephone of solid mahogany or oak, which is mounted on bedside table or bracket or support, as approved by architect. A sensitive transmitter and receiver is mounted behind perforated plate on face of cabinet, also a push button for signaling (or a short cord and pendant push button will be provided). Telephone cabinet is attached to wall station by 6-ft. Tyrex cord and plug. The plugs and jacks are of such construction that a sudden pull in any direction will separate the plug from the jack without injury to the cord connections and on the regular nurses' system will register call automatically.

A lightweight hand phone may be substituted in place of the loud speaking bedside phone. This type of instrument permits conversation to be carried on without disturbing other patients. Is fitted with locking type switch for signaling, "Press to Talk" button for closing talking circuit during conversation, and a 6-ft. rubber-covered cord and plug.

At the head nurse's desk or station is installed the standard type of flush lamp annunciator and in addition, a portable master telephone and answering set consisting of all necessary jacks, plug, soft tone buzzer and pilot lamp.

Operation

The patient needing attention presses button associated with bedside telephone, operating the amber pilot door lamp, master telephone signal, annunciator, pilot and section lamps and such buzzers as are connected at the time, also amber pilot lamp on master answering set. The nurse at this station inserts plug in jack corresponding to indicating lamp on annunciator and speaks to patient. The voice is heard clearly and distinctly and conversation may be carried on in a low tone several feet away from instrument. Receiver is so sensitive that patient is not required to make any special effort or change position to make known request. Upon completion of conversation, nurse disconnects plug and hangs up receiver. Signals remain lighted until call is cancelled at bedside.

Equipment for Nurses' Telecall

No. 8000W Portable Bedside Station—Consists of a mahogany or oak case with brass face plate finished dark bronze with perforated sound openings behind which sensitive transmitter and receiver are mounted. A push button for signaling is also mounted thereon or may be attached to short flexible cord. A 6-ft. cord and plug connects phone to wall station. This station may be built into bedside table or supplied with mounting brackets.

No. 8000W

No. 648W-T Portable Aluminum Hand Phone—Light in weight and equipped with locking type switch and "Press to Talk" button in handle, and a 6-ft. Tyrex rubber-covered cord and plug. A threaded aluminum ring clamps around receiver cap to prevent breakage; a ring for hanging up phone when not in use is attached to receiver case.

No. 8001W Portable Master Station—Consists of portable mahogany cabinet with jack for each room, operator's plug, soft tone buzzer with cut-out switch, pilot lamp and Type 2500W desk set. A No. 6000W cradle set will be supplied when specified. A 6-ft. flexible cable is attached to flush terminal box.

No. 9010W-T Private Room Wall Stations—Same as furnished on regular system, but equipped with extra telephone jack. Has two-gang plate and fits standard two-gang switch box or outlet box cover; extreme depth, 1⅜ in.

9010W-T

No. 9014W-T Ward Station—Same as furnished on regular system but equipped with extra telephone jack. Has two-gang plate and fits standard two-gang switch box or outlet box cover; extreme depth, 1⅝ in.

9014W-T

No. 9025W-T Corridor Lamp—Fitted with barrier with one amber light for telephone signal and one white light for nurses' call signal. Fits standard two-gang switch box or outlet box cover; extreme depth, 1⅝ in.

No. 9033W-T Duty Station—Same as described on Page 9, but equipped with amber lamp for telephone signal.

No. 9029W Annunciator—Same as described on Page 10 for regular service.

This system requires a 6-8 volt battery for talking, in addition to the transformer used in the Nurses' Call System.

No. 9025W-T

Continued on next page

"CONNECTICUT EQUIPPED"

Partial List of Hospitals Using Connecticut Nurses' Call, Doctors' Paging or Staff "In and Out" Systems

*Indicates equipment other than the above

Arizona

U. S. Veterans Hospital No. 50, Prescott
U. S. Veterans Hospital, Tucson

California

Mt. Zion Hospital, San Francisco
Santa Barbara Cottage Hospital, Santa Barbara
Ross Hospital, San Rafael
San Francisco Emergency Hospital, San Francisco
Western Pacific Railway Hospital, Portola
John McMillen Hospital, Calexico
Library Bldg., Los Angeles County Hospital, Los Angeles

Connecticut

Meriden Hospital, Meriden
*Nurses' Home, Meriden Hospital, Meriden
Bridgeport General Hospital, Bridgeport
Norwalk Hospital, Norwalk
New Britain General Hospital, New Britain
New Haven Orphan Asylum, New Haven
St. Raphael's Hospital, New Haven
Bristol Hospital, Bristol
New Haven Hospital (East and West Wards), New Haven
*Nurses' Home, New Haven Hospital, New Haven (Yale School of Nursing)
*Nurses' Home, Middlesex Hospital, Middletown
*Raleigh Filkin Memorial Hospital, New Haven
Manwaring Memorial Hospital, New London

District of Columbia

Garfield Hospital, Washington
Georgetown Hospital, Washington

Florida

Halifax District Hospital, Daytona Beach

Georgia

U. S. Veterans Hospital, Savannah
Central of Georgia Railway Co.'s Hospital, Savannah
Eggleston Memorial Hospital, Atlanta
Marietta Hospital, Marietta
State Insane Hospital, Milledgeville

Idaho

St. Luke's Hospital, Boise

Illinois

Swedish Covenant Hospital, Chicago
Chicago Lying-In Hospital, Chicago
Illinois Eye and Ear Infirmary, 115 S. Sangamon St., Chicago
*Nurses' Home, Illinois Research Hospital, Chicago
Ingalls Memorial Hospital, Harvey
Little Company of Mary Hospital, Chicago
Blessing Hospital, Quincy
Edgewater Hospital, Chicago
Mount Sinai Hospital, Chicago
Lakeview Hospital, Chicago
Bethany Old People's Home, Chicago
Garfield Park Hospital, Chicago
Illinois Central Hospital, Chicago
Michael Reese Hospital, Chicago
Berwyn Hospital, Berwyn
Greer Hospital, Vandalia
*University Hospital, Chicago
Edward Hines Hospital, Chicago
North Chicago Hospital, Chicago

Indiana

*Nurses' Home, Ball Memorial Hospital, Muncie
Ball Memorial Hospital, Muncie
St. Margaret's Hospital, Hammond
St. Anthony's Hospital, Michigan City
James Whitcomb Riley Hospital, Indianapolis
Methodist Episcopal Hospital, Indianapolis

Iowa

Mercy Hospital, Burlington

Kentucky

U. S. Veterans Hospital No. 97, Dawson Springs
Kentucky Baptist Hospital, Louisville
Kosair Crippled Children's Hospital, Louisville
Christian Church Widows' Home, Louisville
Masonic Widows' and Orphans' Hospital, Louisville
Harlan Hospital, Harlan

Louisiana

Monroe Clinic, Monroe
St. Francis Sanitarium, Monroe
French Hospital, New Orleans

Maine

Gardiner Hospital, Gardiner
Carey Hospital, Caribou
Central Maine General Hospital, Auburn
Portland Eye and Ear Infirmary, Portland

Maryland

Provident Hospital, Baltimore

Massachusetts

St. Luke's Hospital, New Bedford
Addison-Gilbert Hospital, Gloucester
Norwood Hospital, Norwood
Burbank Hospital, Fitchburg
Salem Hospital, Salem
Osteopathic Hospital, Jamaica Plain
Winchester Hospital, Boston
Melrose Hospital, Melrose
Ayer Hospital, Ayer
Masonic Hospital, Shrewsbury
*Nurses' Home, Massachusetts Women's Hospital, Roxbury
Boston City Hospital, 818 Harrison Ave., Boston
Newton Hospital, Newton

Ball Memorial Hospital, Muncie, Ind.
KIBELE & GARRARD, Architects, Muncie, Ind.
C. M. KIMBROUGH CO., Electrical Contractor, Muncie, Ind.

Michigan

Cottage Hospital, Grosse Pointe
Maybury Sanitarium, Northville
New Memorial Hospital, Saulte Ste. Marie
Wakefield Hospital, Wakefield
St. Francis Hospital, Escanaba
Oakland County Tuberculosis Sanitarium, Pontiac
Grace Hospital, Detroit
Florence Crittenton Home, Detroit
Women's Hospital, Detroit

Minnesota

Contagious Hospital, Ely
St. Luke's Hospital, Duluth
Nopeming Sanitarium, Nopeming
University of Minnesota Hospital, Minneapolis

Continued on next page

Missouri
Alexian Bros. Hospital, St. Louis

Nebraska
Lincoln City Hospital, Lincoln

New Hampshire
New Exeter Hospital, Exeter
New Hampshire Memorial Hospital, Concord
Portsmouth Hospital, Portsmouth
Nashua Memorial Hospital, Nashua
Hillsboro County Hospital, Nashua
Margaret Pillsbury Hospital, Concord

New Jersey
St. Peter's Hospital, New Brunswick
Overlook Hospital, Summit
Fair Oaks Sanitarium, Summit
Dover General Hospital, Dover
Municipal Colonies Hospital, Trenton

New York
Niagara Memorial Hospital, Niagara Falls
Onondaga General Hospital, Syracuse
Masonic Home, Utica
Moses Ludington Hospital, Ticonderoga
U. S. Veterans Hospital, Northport
Cortland County Hospital, Cortland
Albany Hospital Addition, Albany
Columbia Sanitarium, Philmont
United Hospital, Port Chester
Kingston City Hospital, Kingston
*Binghamton City Hospital, Binghamton
Parkway Sanitarium, New York
St. Peter's Hospital, Brooklyn
Borough Park Maternity Hospital, Brooklyn
New York Orthopedic Hospital, New York
Victory Memorial Hospital, Brooklyn
Knickerbocker Hospital, New York
St. Mark's Hospital, 11th St. and 2nd Ave., New York
Dr. Fitch's Hospital, Borough Bronx, New York
Mount Sinai Hospital, 101st St. near Madison Ave., New York
Benedict Memorial Hospital, Ballston Spa
Syracuse Psychiatric Hospital, Syracuse
Rockville Center Hospital, Rockville Center, L. I.

North Dakota
Dickinson Clinic, Dickinson

Ohio
Peoples Hospital, Akron
St. Alexis Hospital, Cleveland
Cleveland Clinic Hospital, Cleveland
City Tuberculosis Hospital, Cleveland
Women's Hospital, Cleveland
Charity Hospital, Cleveland
U. S. Marine Hospital, Cleveland
Pathological Laboratory, 2101 Adelbert Rd., Cleveland
Youngstown City Hospital, Youngstown

Ohio (Continued)
*Cincinnati Sanitarium, College Hill, Cincinnati
Salvation Army Hospital, Cleveland

Oklahoma
Morningside Hospital, Tulsa
Masonic Home, Guthrie

Pennsylvania
Northeastern Hospital of Philadelphia (Section of), Phila.
Northern Liberties Hospital, Philadelphia
University of Penn. Hospital, Philadelphia
*Nurses' Home, Frankford Hospital, Frankford, Phila.
Delaware County Hospital, Delaware County, Pa.
Titusville Hospital, Titusville
McKeesport Hospital, McKeesport
Good Samaritan Hospital, Lebanon
Memorial Hospital, Roxboro
Montefiore Hospital, Pittsburgh
Bryn Mawr Hospital, Bryn Mawr
St. Luke & Children's Homeopathic Hospital, Phila.
New Maternity Bldg., Lancaster General Hospital, Lancaster
Lewistown Hospital, Lewistown

Rhode Island
South County Cottage Hospital, Wakefield
Newport Hospital, Newport
*Nurses' Home, Homeopathic Hospital, Providence

South Carolina
State Hospital, Columbia

Texas
Women's Bldg., Southwestern University, Georgetown

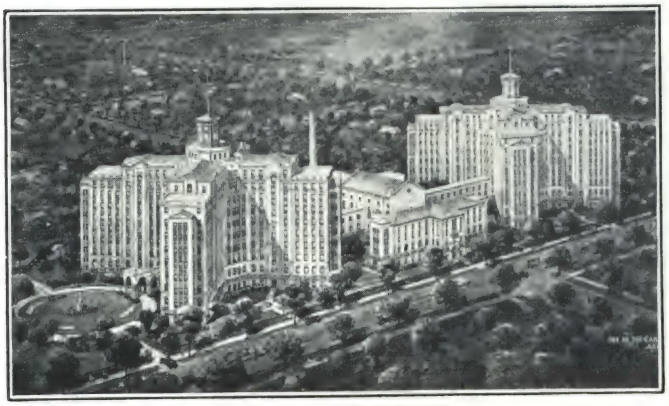
Washington
Yakima County Infirmary, Yakima
Centralia General Hospital, Centralia

West Virginia
State Tuberculosis Sanitarium, Hopemont, Preston County
Fairmont State Hospital No. 3, Fairmont
Chesapeake & Ohio R. R. Hospital, Huntington

Wisconsin
St. Catherine's Hospital, Kenosha

Canada
Royal Victoria Hospital, Montreal
Montreal Salvation Army Maternity Home, Montreal
Toronto General Hospital, Toronto
Toronto East General Hospital, Toronto
Lockwood Clinic, Toronto
Sacred Heart Hospital, Hull, Ontario
Weston Hospital for Consumptives, Weston, Toronto
St. Hyacinth Hospital, St. Hyacinth, P. Q.

Nova Scotia
Yarmouth Hospital, Yarmouth



Little Company of Mary Hospital, Chicago, Ill.
Jos. W. McCarthy, Architect, Chicago, Ill.
Post Electric Co., Electrical Contractor, Chicago, Ill.

Women's Hospital, Detroit, Mich.
Albert Kahn, Inc., Architects, Detroit, Mich.
John H. Busby Co., Inc., Electrical Contractor, Detroit, Mich.

Continued on next page

CONNECTAPHONE

A New Type Telephone for Apartment House, Hospital and Similar Use

Outstanding Features

The Connectaphone has revolutionized apartment house, school, hospital and other installations where an instrument of this type is required.

The Connectaphone is just what the name implies and has advantages that will be obvious to the owner, architect or builder who desires a modern, attractive and efficient telephone.

The body design of the Connectaphone has received the approval of several leading apartment and institutional architects and has outstanding features that will appeal at once to architects, engineers and contractors as an advance over previous commercial types.

The standard body of the Connectaphone is of dark brown bakelite, dull finish; elliptical in shape with pleasing lines designed to harmonize with any style of modern architecture. Overall dimensions are 9⅝x5½ in. Connectaphone can be furnished in any standard bakelite color at a special price.

Connectaphone is dustproof with built-in mouthpiece and is furnished with one, two or three buttons. By the improved construction, employing bus bars, all wiring and soldering in the telephone circuit are eliminated and as a result the Connectaphone is tamperproof.

By the interchange of one or two screws or bus bars, the circuit may be changed to conform to any of the standard circuits. Therefore, the Connectaphone permits the stocking of one type of instrument.

The Connectaphone
No. 600W

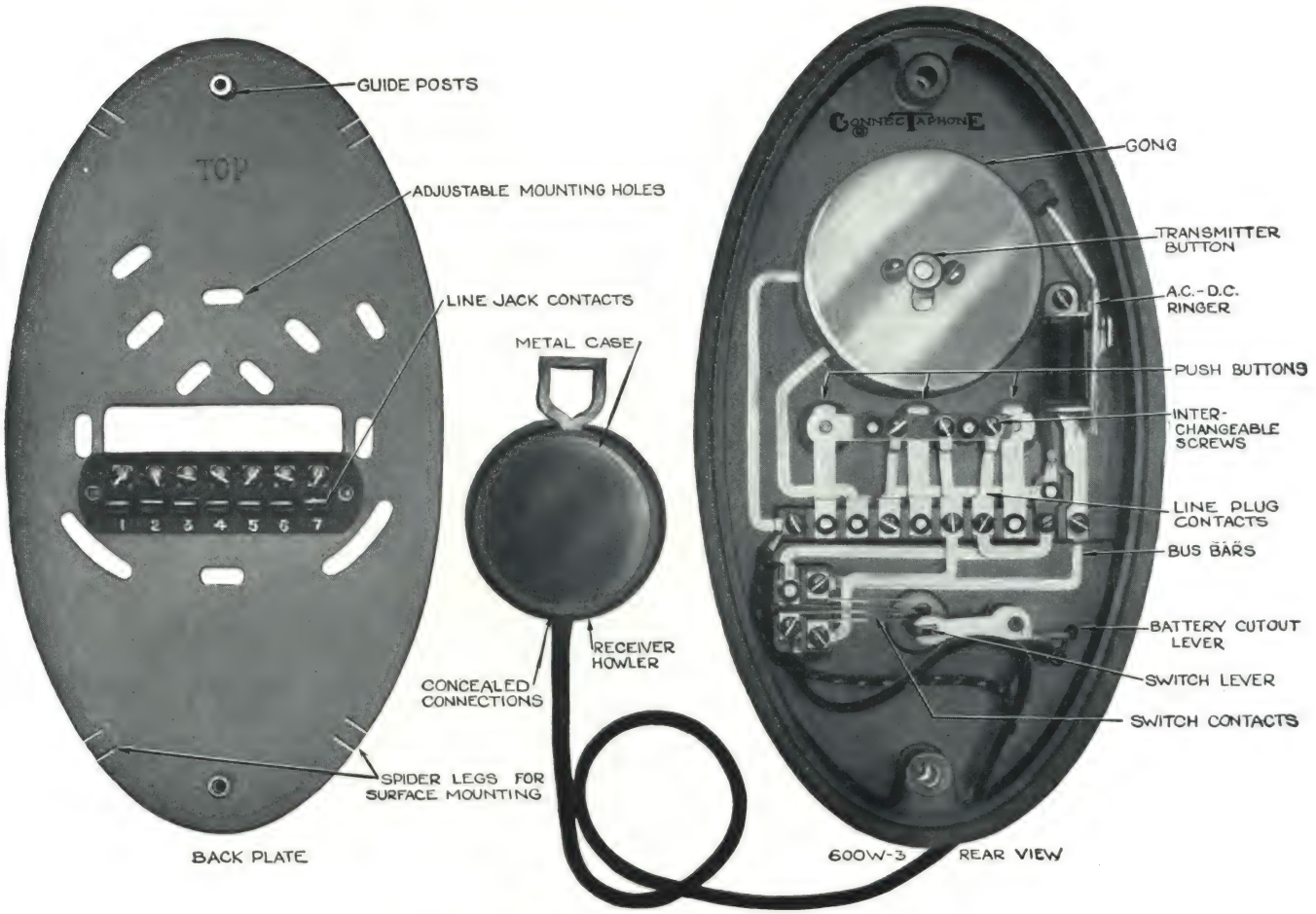
Receiver also serves as a distinctive telephone signal; provision is made for an enclosed special tone bell which can be used for hall or rear door.

A steel back plate which fits recess in body of the Connectaphone mounts over standard outlet boxes or covers; has slotted screw holes for alignment; a molded terminal strip of jack and plug type is mounted thereon which allows test for grounds, shorts or open circuits before the Connectaphone is "plugged in." This plug-in feature leaves the wall free of obstruction, permitting painting and decorating without marring the finish of the instrument. The Connectaphone is the last item to be installed after all other work is completed.

Construction

The Connectaphone is a very beautiful instrument and must be seen and used to be fully appreciated. Embodied in its assembly are all the essential refinements that go to make up a perfect telephone. Features desired by architect, engineer, contractor or owner to eliminate troubles, experienced in other instruments in the past, have been incorporated in its design.

Continued on next page



Interior Construction Details of the Connectaphone

The shape is elliptical—artistic in appearance—with body of brown bakelite. The finish is a pleasing combination of polished trim and satin mat effect. The mouthpiece is molded as an integral part of the body.

Receiver—distinctive in tone—serves as the telephone signal; transformer is used in place of ringing battery. When a-c. is not available, a battery and our No. 601W Interrupter are used.

The transmitter housing is completed by a heavy shell of bell-metal which is the gong for a concealed bell. This may be used for rear or hall door.

Receiver cord connections are concealed.

Body of bakelite—a dielectric material of high insulating characteristics—serves as a base for assembly of all component parts.

All connections are made with bus bars riveted in place to inserts molded in body. Removal of two screws or bus bars—colored for identification—adapts instrument for other circuits.

The Connectaphone is dustproof—all operating parts including receiver switch and bell are enclosed.

Accidentally leaving receiver off hook actuates an auxiliary lever inside Connectaphone preventing drain on battery.

Back plate is of heavy gauge steel rustproofed—with slotted screw holes for alignment—and mounts on any standard single gang box or cover, 4-in. square or round, or 3¼-in. hexagonal box.

Seven numbered terminals for line wires—of the plug and jack type—are on molded strip mounted on back plate.

There is no necessity for removing line wiring for testing for either grounds, shorts or open circuits.

Room decoration may be completed before "plugging in" the Connectaphone for final acceptance.

For surface mounting—with exposed wiring—provision for spider legs is cut in back plate.

Connectaphone is furnished with one, two or three buttons as required and covered by catalogue numbers 600W1 (one button), 600W2 (two button), 600W3 (three button). Standard markings, "Door," "Janitor" are molded on non-turnable bakelite buttons.

As the extreme projection from face of wall is no greater than standard flush type telephones, the Connectaphone may be used where either surface or flush type is specified. Overall dimensions are 9⅝ in. high, 5½ in. wide, 1⅜ in. deep—receiver extends 1⅞ in. from face of wall.

Connectaphone will be specially boxed with diagram of system when shipped in quantities to a job; otherwise two in a carton complete with diagram of circuit. As they are *interchangeable* for standard systems, stocking for counter delivery is now possible.

Continued on next page

APARTMENT HOUSE TELEPHONE SYSTEMS

General

In most classes of apartment houses, the service required is for communication between vestibule, suites, janitor and tradesmen, and for the operation of door openers at entrances.

When desired, registration of calls can be made on janitor's unit to indicate their origin.

Vestibule telephones are of the cordless, armored cord receiver and swivel arm type and are furnished separately or grouped with mail boxes.

Suite telephones are furnished in artistically designed bakelite or steel cases of the surface type or flush type if desired. The source of current supply may be batteries for talking and ringing, battery for talking and transformer for ringing, or a battery eliminator.

Where attendant service is required in main halls to announce callers, notify tenants when car is waiting and furnish communication between apartments, it is necessary to have a switchboard or annunciator with an operator.

Vestibule Telephones

No. 84W Armored Cord Type

Consists of beveled brass plate with required number of calling buttons and card holders, transmitter with mouthpiece and watchcase type receiver. The cord is encased in flexible brass tubing attached to face plate by a concealed fastening. Cap is reinforced to pervent breakage. Metal outlet box is provided.

No. 84W-16

No. 87W Swivel Arm Type

Meets similar requirements as No. 84W with the exception that it is furnished with a swivel arm. This arm unit, including the receiver, transmitter and contact springs, is self-contained and accessible without removing face plate.

No. 86W Cordless Type

Is designed to eliminate theft of receiver and cords, also possible bending and breaking of hook switch.

No. 87W-12

Is flush, the only fittings on face of plate being the card holders and buttons.

Combination transmitter and receiver openings are confined to same space at top of face plate.

Is modern in every respect and gives perfect service.

Metal outlet box is provided.

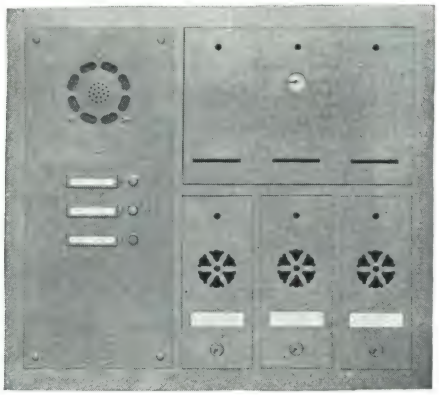
No. 86W-6

Style	Call Buttons	Overall, in.		Wall opening, in.		Button limit on 5-in. plate	Button limit on 7-in. plate
		Width	Height	Width	Height		
84W3	3	5	16½	4½	15¼	3 to 14	15 to 28
86W3	3	5	16½	4½	15¼	3 to 16	17 to 28
87W3	3	5	16½	4½	15¼	3 to 16	17 to 28

Numeral appearing after "W" denotes number of buttons; minimum sizes only are listed. For button capacity over 28 and up to 48 buttons, add 5 in. to width of phone. Depth of box in wall, 4 in.

Mail Boxes

Connecticut mail boxes are approved by the U. S. Post Office Department. These boxes have solid brass fronts and are furnished in gangs of three, four, five, six, seven and eight units. The master door opens to a horizontal position. The lower or tenants' doors are perforated to disclose mail, and when fully opened remain stationary in an upward position to give plenty of clearance. Are fitted with cylinder locks and are provided with calling card and telegram slot. Installation is made with ease. No bolts or screws are exposed.



No. 686W-3-3

No. 686W-3-3 Combined Box and Telephone

Consists of a No. 86W-3 Cordless Type Telephone built in with three mail boxes. Telephone occupies the space of two boxes. Any other vestibule type telephone may be combined with mail boxes.

Additional button capacities are provided on extra "built-in" plates, each occupying the space of two boxes and in combination with another gang of mail boxes.

DIMENSIONS OF MAIL BOXES ONLY, INCHES

Single row mounting					Double row mounting				
No. of Units	Wall opening		Overall dim.		No. of Units	Wall opening		Overall dim.	
	Width	Height	Width	Height		Width	Height	Width	Height
3	10½	15¼	11⅝	16½	8	13⅞	31¾	15	33
4	13⅞	15¼	15	16½	10	17¼	31¾	18⅜	33
5	17¼	15¼	18⅜	16½	12	20⅝	31¾	21¾	33
6	20⅝	15¼	21¾	16½	14	24	31¾	25⅛	33
7	24	15¼	25⅛	16½	16	27⅜	31¾	28½	33
8	27⅜	15¼	28½	16½	18	32¼	31¾	33⅜	33
9	32¼	15¼	33⅜	16½	20	35⅝	31¾	36¾	33
10	35⅝	15¼	36¾	16½	22	39	31¾	40⅛	33
11	39	15¼	40⅛	16½	24	42⅜	31¾	43½	33
12	42¾	15¼	43½	16½	26	45¾	31¾	46⅞	33
13	45¾	15¼	46⅞	16½	28	49⅛	31¾	50¼	33
14	49⅛	15¼	50¼	16½	30	52½	31¾	53⅝	33
15	52½	15¼	53⅝	16½	32	55⅞	31¾	57	33
16	55⅞	15¼	57	16½	34	60¾	31¾	61⅞	33
17	60¾	15¼	61⅞	16½	36	64⅛	31¾	65¼	33
18	64⅛	15¼	65¼	16½	38	67½	31¾	68⅝	33
19	67½	15¼	68⅝	16½	40	70⅞	31¾	72	33
20	70⅞	15¼	72	16½	42	74¼	31¾	75⅜	33

Top of wall opening, 62 in. from floor.
Mail box is 4¼ in. deep. Make wall opening 4⅜ in. deep.
Furnished in 3, 4, 5, 6, 7, 8 units to a gang.

Suite Telephones

No. 600W-2

No. 600W Connectaphone for Suites

Is elliptical in shape with body of dark brown or black bakelite, designed to harmonize with any style of modern architecture. Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism and one to three push buttons. The front plugs into molded terminal strip mounted on steel back plate. Back arranged with elongated mounting holes for alignment and fits standard outlet boxes and covers. All painting and decorating may be done before plugging in phone.

No. 600WL Connectaphone with Pilot Lamp

Is similar to No. 600W Connectaphone with the exception that it contains a lamp with bull's-eye jewel in addition to the two push buttons. Lamp illuminates only when door opener button is depressed and vestibule door is opened.

No. 600WL-2

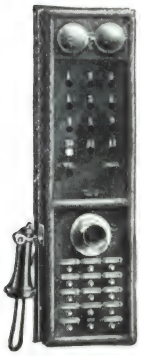
No. 41W Surface Wall Type

Consists of a hinged metal case, standard transmitter, long distance type receiver, double gong bell, and one button for door opener or calling janitor; extra buttons supplied when ordered. Instrument connections are wired to a terminal strip mounted on back. Drilled for single gang box mounting. Finish, dull black.

No. 41W

Janitors' Equipment and Telephone

No. 7000W Type D Telephone Annunciator



No. 7000W-14

Is a surface wall instrument, complete with a call button for each suite, annunciator drops to indicate and register calls made during janitor's absence, and transmitter and receiver. Also button for electrically resetting drops and button for operating door opener. All outgoing wiring in hinged front is cabled to terminals on face of backboard. Annuciator may be sectionalized where apartment buildings have several entrances. Standard finish, golden oak with nickel trim.

No. 7500W Type T Telephone Annunciator

This instrument is equipped with a drop and jack for each suite telephone, and when so specified, with one or more pairs of cross-connecting cords which permit communication between any two stations. Drops are electrically reset by buttons mounted on jack panel. Indications are marked in gold on black background on front of annunciator. Outgoing wiring in hinged front is cabled to terminals on face of backboard. Transmitter and receiver may be mounted on case or can be furnished as hand microphone or desk set. Standard finish, golden oak with nickel trim.

No. 332W Janitor's Telephone

Consists of wood case, containing a call button for each suite, and a button for operating door opener. Furnished with standard transmitter, long distance type receiver and double gong bell. Finish, golden oak.

No. 332W-10

No. 7500W-70

If flush mounting telephone is desired, specify No. 333W having brass face plate.

Tradesman's Telephone and Floor Type Switchboards

No. 330W Tradesman's Telephone

Similar to No. 332W, but is furnished less bells. Is located at the dumbwaiter or rear entrance of apartment building and is provided with buttons for calling any of the suites or janitor. Finish, golden oak.

If flush mounting telephone is desired, specify No. 331W having brass face plate.

For non-interfering systems, specify 3502W for surface or 3504W for flush telephones.

No. 330W-6

No. 9350W Floor Type Switchboard

Is of the common battery, series, lamp signal type, completely equipped with double supervisory signals, operator's set, night alarm, ringing and listening keys.

Ordinarily furnished with one cord pair for each 10 lines. Line terminals are mounted on back of cabinet. Finish, golden oak.

If desk type switchboard is desired, specify No. 9450W.

If wall type switchboard is desired, specify No. 9550W.

Suite telephones where used with switchboards do not require push buttons.

No. 9350W

Continued on next page

INTERCOMMUNICATING TELEPHONE SYSTEMS

Common Talking—Selective Ringing

General

The common talking and selective ringing system is for use only where no more than one conversation is to be carried on simultaneously. The ringing of these telephones is selective and any instrument may be called by depressing the corresponding button. If desired to call all or a group of stations for carrying on a conversation with several persons, all stations can be called simultaneously by means of a general call button. Furnished in 4, 8, 12 and 16-button sizes.

Station Equipment

No. 520W Surface Type Telephone

Consists of an oak case, with required number of calling buttons and card holders, double gong bell, standard transmitter and long distance type receiver. Standard finish, black or golden oak. Dimensions of 8-button phone illustrated, including receiver, 9 in. wide by 12 in. high.

May also be furnished with watchcase receiver.

No. 520W-8

No. 5200W and No. 2150W-8

No. 5200W Desk Telephone

Furnished complete with standard transmitter receiver, buzzer and terminal block connected by a 6-ft. brown cord. No. 2150W Button Block is provided with necessary number of push buttons. Standard finish of instrument, black with nickel trimmings. Block finished in mahogany.

No. 6008W Cradle Set

Furnished with bakelite hand phone correctly designed and made of selected material, light in weight, and constructed to reflect the greatest amount of speech energy to the diaphragm. Buttons are mounted in base and supplied in 4,6 and 8-button sizes. Furnished with 6-ft. cord and terminal block. Standard finish, black.

No. 6008W-8

No. 5400W-8

No. 5400W Flush Type Telephone

Consists of a beveled brass plate with required number of calling buttons and card holders, double gong bell, standard transmitter and watchcase receiver. A metal outlet box with knockout at both ends is provided. Standard finish, black or mat gold. Other finishes special. Dimensions of 8-button phone illustrated, 6¼ in. wide by 12 in. high. Depth of outlet box, 4½ in.

If flush phone is desired having hand microphone, specify No. 6250W Telephone.

No. 62W Surface Wall Telephone

Is furnished with heavy stamped steel case, finished in dull black baked enamel with polished nickel trimmings. Is equipped with standard transmitter and receiver and is made up only in 5-button size with cardholder indications. Drilled to fit on single gang outlet box.

No. 62W

No. 600W-2

No. 600W Connectaphone

Is elliptical in shape with body of dark brown or black bakelite, designed to harmonize with any style of modern architecture. Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism and one to three push buttons. The front plugs into molded terminal strip mounted on steel back plate. Back arranged with elongated mounting holes for alignment and fits standard outlet boxes and covers. All painting and decorating may be done before plugging in phone. Is limited to 4-station system.

No. 600WHM Connectaphone with Hand Phone

Is similar to 600W Connectaphone with the exception that it contains a cradle and a bakelite hand phone instead of open lever switch and watchcase receiver. Hand phone is correctly designed and made of selected material, light in weight, and constructed to reflect the greatest amount of speech energy to the diaphragm. Furnished with 6-ft. cord and terminal block. Finished dark brown or black. Is limited to 4-station system.

No. 600WHM

Continued on next page

INTERCOMMUNICATING TELEPHONE SYSTEMS

Selective Talking—Selective Ringing

General

The selective talking and selective ringing system is for use where more than one conversation is to be carried on simultaneously. These systems are of two types, common return and metallic circuit, and consist of a push button automatic telephone of the wall or desk type located at points to be served, each equipped with as many calling buttons as there are instruments. While the metallic circuit system insures against cross-talk or induction, the common return system will meet all ordinary conditions. Furnished in 8, 12, 16, 20 and 24-button sizes.

Station Equipment

No. 3501W Surface Wall Telephone

Is for common return service. Consists of wood case with required number of calling buttons and card holders, standard transmitter and long distance type receiver and double gong bell. Standard finish, golden oak, dark trim. Dimensions of telephone illustrated, including receiver, are 9 in. wide by 12 in. high.

No. 3501W-8

No. 3503W Surface Wall Telephone

Similar to No. 3501W but is for metallic circuit.

No. 3801W Desk Telephone and Button Box

Consists of a portable desk telephone connected by 6-ft. flexible brown cord to the automatic button box. Button box may be mounted on wall or used on desk. Cable connections are made directly to contact springs by machine screws, eliminating soldered connections. When so specified a 6-ft. flexible brown cable and terminal block may be furnished connected directly to button box. Finish of desk stand, black and nickel; button box, golden oak. Dimensions of button box illustrated are 6¼ in. wide by 8½ in. long.

No. 3803W Desk Telephone and Button Box

Similar to No. 3801W but is for metallic circuit.

Button boxes may also be supplied with cradle set in lieu of desk set if desired.

No. 3801W-8

No. 5901W-8

No. 5901W Flush Telephone

Consists of heavy beveled brass plate with required number of automatic buttons and cardholders, double gong bell, standard transmitter and watchcase receiver. Furnished with metal outlet box. Mechanism may be installed previously to face plate.

No. 5903W Flush Telephone

Similar to No. 5901W but is for metallic circuit.

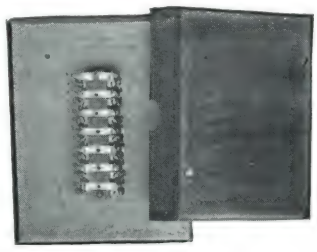
Style No.	No. of buttons	System No.	Wall opening height, in.	Plate dimensions, in.	
				Width	Height
5901W-8	8	1	10¾	6¼	12
5901W-12	12	1	12 1/16	6¼	13⅜
5901W-16	16	1	15⅛	6¼	16⅛
5901W-20	20	1	15⅛	6¼	16⅛
5903W-8	8	3	10¾	6¼	12
5903W-12	12	3	12 1/16	6¼	13⅜
5903W-16	16	3	15⅛	6¼	16⅛
5903W-20	20	3	15⅛	6¼	16⅛
5903W-24	24	3	16⅛	6¼	17¼

Outlet boxes are 3¾ in. wide by 4⅝ in. deep. The above phones may be finished special. A sample of finish should accompany all such orders.

No. 107W Terminal Junction Box

Contains two-way connector strips and is designed for use in places where splices in telephone cable, bell, or annunciator wiring occur. Allows connections to be inspected and circuits opened for testing purposes. Case is of wood. Standard sizes in multiples of seven connectors.

Terminal Junction Boxes are also furnished with four-way connectors. Steel cabinets furnished in different sizes to meet specifications and may be either of the flush or surface type.



No. 107W-14

ASSOCIATE SYSTEMS

Our Catalogue No. 405, covering details, typical specifications and complete information on Connecticut Fire Alarm Systems and Connecticut Tank Alarm Systems, sent on request.

Our Catalogue No. 406, covering details typical specifications and complete information on Connecticut Electric Time Systems, Program Systems, Watchman's Clock Systems, sent upon request.

Continued on next page

SCHOOL TELEPHONE SYSTEM

General

This system is for use in schools where communication is desired between the office of the school superintendent or principal and the classrooms, practically without regard to size, although a switchboard system is recommended when system goes beyond 50 stations.

An ideal installation consists of a centerphone calling station and annunciator in principal's office, together with as many outlying stations as necessary.

With this equipment, centerphone can call outlying stations selectively by means of push buttons mounted on portable pad or flush wall plate. Outlying stations can call central by depressing button on telephone. Outlying stations may converse only through centerphone. Calls are recorded on the annunciator during absence of principal or attendant and may be answered upon their return. Annunciator drops are reset from button pad. Simultaneous ringing from desk pad can be furnished when specified.

Classroom Telephones

No. 128W Dust and Chalkproof Telephone

Is of the semiflush type and strictly a high grade, all metal case instrument with hinged front. Is equipped with adjustable transmitter, dustproof hook, metal watchcase receiver with protected cap, push button, buzzer and induction coil; receiver cord enters through dustproof rubber gasket. Outgoing wiring from hinged front is cabled to two-way terminals in outlet box; terminal strip contains spare terminals as a local distributing point for other low voltage circuits in same conduit. Mounting frame is adjustable on outlet box. Finish baked black enamel. Dimensions of instrument are 7⅛ in. wide, 9⅞ in. high.

No. 128W

May be adapted for surface mounting by using hard wood ebonized mat.

No. 600W Connectaphone for Classrooms

Is elliptical in shape with body of dark brown or black bakelite, designed to harmonize with any style of modern architecture. Equipped with built-in mouthpiece, watchcase receiver, concealed bell, enclosed hook switch mechanism and single push button. The front plugs into molded terminal strip mounted on steel back plate. Back arranged with elongated mounting holes for alignment and fits standard outlet boxes and covers. All painting and decorating may be done before plugging in phone.

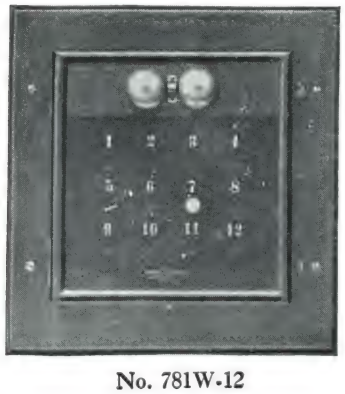
No. 600W-1

Principal's Equipment

No. 781W Flush Annunciator

Is furnished mounted on door of distribution cabinet. Equipped with electric reset drops and bell. Line wiring from hinged front is cabled to two-way connectors mounted on terminal strips and marked for identification. Button pad cable of proper length may also terminate in this cabinet, eliminating an intermediate connection box.

This simplifies installation and greatly assists in locating trouble. Cabinet may be used as distribution center for other low voltage work, having capacity for extra connectors which will be furnished when specified.



No. 781W-12

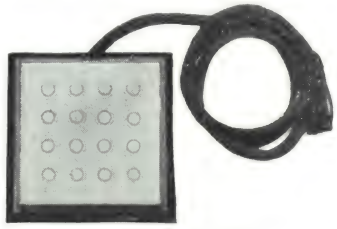
Outlet box furnished. Cabinet finished in golden oak. Special finishes per specifications.

Style No.	No. of drops	Wall opening, in.	
		Width	Height
781W-10	10	17¾	14¼
781W-16	16	17¾	19¼
781W-20	20	17¾	19¼
781W-24	25	17¾	19¼
781W-30	30	17¾	23¼
781W-40	40	17¾	23¼
781W-54	54	17¾	27¼

Depth of box in wall, 4½ in. Add 1¾ in. to width and 2¼ in. to height for outside dimensions.

No. 2202W Portable Button Pad

Consists of beveled brass plate, finished black nickel with necessary self-contained white center calling and reset buttons and when so specified, general call buttons, for ringing all bells simultaneously. Button indications are engraved on plate and filled white. Plate is mounted on ebony finished mat with weighted felt base. Regularly furnished with 6-ft. brown cord, which connects button pad to terminal block, but longer cord may be furnished for connection directly to annunciator through a flush wall plate.



No. 2202W-16

No. 6000W Cradle Telephone

Furnished with bakelite hand phone correctly designed and made of selected material, light in weight, and constructed to reflect the greatest amount of speech energy to the diaphragm. Furnished with 6-ft. cord and terminal block. Standard finish, black.

No. 6000W

Switchboard System

For the class of service required in the larger schools and colleges, it is advisable to install a switchboard with an operator in attendance. Switchboard equipment is described on page 40. For outlying stations, instruments are similar to those described under school telephone system, but require no push buttons as lifting receiver off hook operates the lamp signal at switchboard.

Continued on next page

SIGNALING EQUIPMENT FOR BANKS, OFFICES AND RESIDENCES

Button Pads and Push Buttons

No. 2109W Bakelite Desk Button Pad

Consists of bakelite case to match oak or mahogany with push buttons having self-cleaning contact springs of phosphor bronze. Equipped with non-slip rubber base and 6-ft. flexible cord. Furnished in sizes up to 6 buttons.

No. 2109W

No. 2201W-12

No. 2201W Flush Button Plate

Similar to No. 2200W but is arranged for flush mounting. Twelve buttons and over are mounted in double row.

No. 2200W Portable Button Pad

Consists of heavy solid brass plate mounted on mat with felt covered base. Name cards are inserted from the side and are held in place by bronze spring protected by transparent celluloid. Is supplied with 6-ft. flexible brown cord attached. Standard finish mahogany with nickel trim.

No. 2200W-6

No. 2108W Bakelite Push Button Base

Consists of a circular bakelite case in black, mahogany or walnut finish. Very attractive in appearance. Equipped with push buttons having self-cleaning contact springs, non-slip rubber base and 6-ft. flexible cord. Furnished in sizes up to 8 buttons.

No. 2108W

Annunciators

No. 760W Type S Surface Annunciator

Is equipped with electric reset drops and double gong bell. Line connections are mounted on back board properly marked. Indications on annunicator front are gold on black background. Standard finish golden oak. If buzzer is desired in lieu of bell specify No. 780W Annunciator.

No. 760W-16

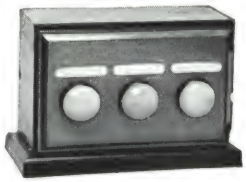
No. 770W-4

No. 770W Type G Portable Desk Target Annunciator

Is equipped with electric reset drops, cardholders, and felt-covered base with 6-ft. brown cord connected to terminal block. Standard finish mahogany.

No. 771W Portable Desk Lamp Annunciator

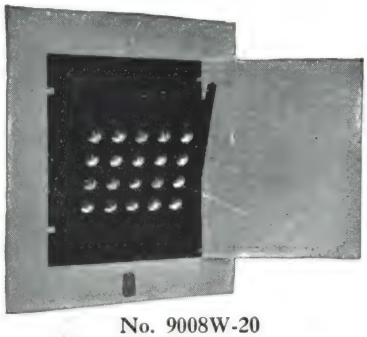
Is equipped with Mazda lamps, felt-covered base and 6-ft. cord connected with terminal block. Hinged front permits easy replacement of lamps. Is arranged with cardholders. Standard finish mahogany.



No. 771W-3

No. 9008W Flush Lamp Annunciator

Contains circuit-closing relay for each lamp. Is equipped with Mazda lamps and candelabra base sockets. Sockets are fitted with tension spring to prevent lamps jarring loose. Indications are on white glass panel in Gothic letters or numbers as specified and show only when illuminated. Fitted with buzzer. Finish statuary bronze. Depth of outlet box 4½ in.

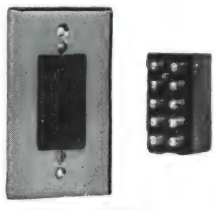


No. 9008W-20

Style No.	Wall opening, in.		Overall, in.	
	Width	Ht.	Width	Ht.
9008W-10	17¾	14¼	19½	16½
9008W-15	17¾	18¼	19½	20
9008W-20	17¾	22¼	19½	23½
9008W-25	17¾	25¼	19½	27
9008W-30	26¼	18¼	28¼	20
9008W-40	26¼	22¼	28¼	23½
9008W-50	26¼	25¼	28¼	27

No. 525W Flush Separable Connector

This connector is used on desk telephone and button pad cords to disconnect apparatus from line receptacle. Eliminates splices as connections are made by screw terminals. Consists of receptacle with ten single contact nickel silver spring jacks assembled on bakelite mounting, flush brass switch plate and plug with ten single contact prongs to fit into jack. Furnished in gangs of two or more units of ten connectors.



No. 525W

No. 526W Conduit Type Separable Connector

Is similar to No. 525W except that it is arranged to mount on end of ¾-in. kick pipe projecting from floor, less nipple and coupling. Standard finish black. For solid bronze case specify No. 526W-B.

For Other Signal Apparatus Consult Section Covering Hospital Signal Systems

CONNECTICUT

ESTABLISHED 1904

SCHWARZE ELECTRIC CO.

Schwarze Specialized and General Service Sound Signals and Accessories

ADRIAN, MICH.

OFFICES IN PRINCIPAL CITIES

Products

BELLS, BUZZERS, HORNS, SIRENS, KODE-KALL.

Pioneer manufacturers of non-arcing, polarized, non-contact, plunger type alternating-current bells and buzzers.

Characteristics

Accessible, simplified, rugged construction; symmetrical design; labor-saving installation; integral conduit connections; low current consumption; low initial cost; weatherproof; long-lasting, dependable performance.

Standard finish, black. Optional finish, red, for fire alarm use.

Applications and Uses

Schools, institutions, hospitals, public buildings, office buildings, industrial plants, mines, railroads, shipping.

Fire, sprinkler, burglar, hold-up, switchboard, powerhouse and engine room alarm systems; code paging and program clock systems; traffic control; special signaling systems.

Indoors and out, light and heavy duty.

Installation Data

Installation data, roughing-in dimensions, resistance tables and current requirements furnished on request.

Famous "Cyclone" Vibrating Bells

Up to 14-in. gong diameter. Weatherproof, loud ringing. For class rooms, corridors, yard use and general service.

No. 700 Series—For A. C. No contacts. Polarized. For use on transformer or high voltage, 25 or 60-cycles.

No. 6F—For D. C., 6 volts and higher.

No. 700 Series

No. 6F

Single Stroke Heavy Duty Bells

Plunger type, 6 volts and higher. No contacts. Weatherproof.

No. 37A—For A. C.

No. 37D—For D. C.

Sizes up to 12 in. For code signaling, announcement, fire-alarm.

No. 26—3-in. cast bell metal gong. For alternating current or direct current, 6 volts and higher. Mellow and distinct. For call signals. Concealed terminals, standard.

No. 37

No. 26

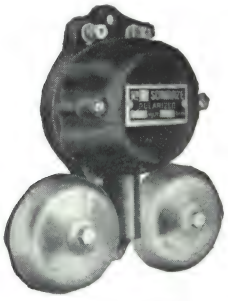
Double Gongs

Ideal for class rooms, corridors and general service.

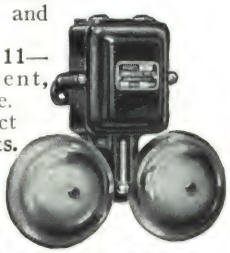
Nos. 9 and 11—Alternating current, high or low voltage.

No. 35—Direct current up to 40 volts.

Nos. 22 and 23—Up to 220 volts. Gongs up to 16-in. For general fire alarm use, direct current only.



Nos. 9 and 11



No. 35

Heavy Duty Buzzers

For all signaling uses—mechanisms insulated from frame, any voltage.

No. 16—Non-contact, polarized.

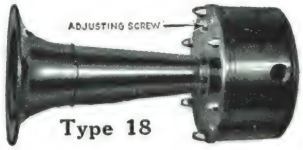
No. 11—Ideal for elevators and general service.

No. 16 for A. C.
No. 36 for D. C.

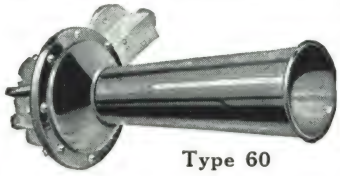
No. 11ED for D. C.
No. 11EA for A. C.

Type 18 Horn for Series Installation

For alternating current only. Non-contact, non-sparking for series or multiple installation, for ½-in. conduit or outlet box mounting. Outside adjustment.



Type 18



Type 60

Type 60 Giant Vibrator

For alternating current only—½-in. conduit connection integral with terminal box. A powerful, penetrating, far-reaching signal—an ideal alarm call.

No. 3 Series All-purpose Horns

For all signaling conditions. For alternating current or direct current, any voltage. Megaphone, 2-way and 3-way types. Multiple installation. Ideal for code signaling.

No. 3 Megaphone

No. 3 Weatherproof

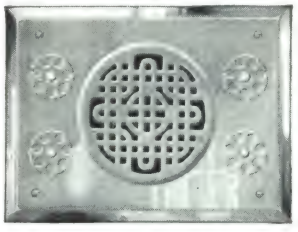
No. 3 Two-Way

Weatherproof Siren

Type 50 Siren

For alternating current or direct current up to 220 volts. Standard finish, red enamel. Universal, tilting bracket. For fire, riot, starting, dismissal or any emergency signaling purpose. Powerful, penetrating, weatherproof.

Concealed Bell-buzzer Sets



Steel cabinets with decorative grille. Insect-proof screen. French gray enamel finish. Sets flush with plaster. Inside wiring connections.

No. 322—6⅝x6⅝x3 in. with bell and buzzer.

No. 332—9¾x6⅝x3 in. with 2 bells, 1 buzzer. Also DeLuxe combination bell-buzzer **No. 333** for surface mounting.

Accessories

Manual trips; protective, screened housings; full gong guards; hanger plates; woodmats; breakglass stations, etc.

EDWARDS AND COMPANY, INC.

Electrical Signaling Apparatus

140th and Exterior Streets, NEW YORK, N. Y.

ATLANTA, GA. BALTIMORE, MD. BOSTON, MASS. CALGARY, ALT. CHICAGO, ILL. COLUMBUS, OHIO DALLAS, TEX. MONTREAL, QUE. DENVER, COLO. DETROIT, MICH. KANSAS CITY, MO. SEATTLE, WASH. TORONTO, ONT. LOS ANGELES, CAL. MINNEAPOLIS, MINN. NEW ORLEANS, LA. SAN FRANCISCO, CAL. WINNIPEG, MAN. PHILADELPHIA, PA. PITTSBURGH, PA. ST. LOUIS, MO. VANCOUVER, B. C.

EXPORT DEPARTMENT—77 Warren Street, NEW YORK, N. Y.

Products

ELECTRIC SIGNALING SYSTEMS, which include:

Annunciators, Bells, Buzzers, Push Buttons, Door Openers, Transformers, Fire Alarm Systems, Hold-up Alarm Systems, Burglar Alarm Systems, Calling Systems and all Visible and Audible Electric Signals, Standpipe Alarm Systems, Sprinkler Alarm Systems, Hospital Signaling Systems, Telephone Systems.

1872 EDWARDS

TRADE-MARK

Detailed Descriptions

Believing the architect is assisted best by clear, concise information, all superfluous descriptive matter is omitted from this and following pages.

Detailed bulletins will be furnished on request.

The fifty-nine years' experience and reputation of this Company is positive assurance of the utmost quality, efficiency and guarantee.

FIRE ALARM SYSTEMS

General

All systems described below are listed as standard by the Fire Underwriters, which is positive assurance of highest protective value. Fire alarm systems are only 50% efficient if they do not locate the fire by coded alarms. This is almost an essential in schools, hospitals, etc., where those in authority must know the fire location to avoid panics. The Underwriters list none but closed circuit systems.

Stations should be located at natural paths of exit (stairs, not elevators), at least two per floor. Gongs must be sufficient in size and number to be heard from any location.

Lighting circuits, alternating or direct current, are used as source of energy. If the district is such that lighting circuit is not dependable, storage battery is used.

Systems

Coded Closed Circuit Systems

For Industrial Plants, Apartments, Schools, etc.—This type gives maximum protection since the complete system is supervised by a small, continuous flow of current at all times. Any interruptions due to failure of the system current supply, grounds, or line breakage causes a trouble bell of distinctive tone (usually a cow gong as shown on opposite page) to ring continuously. Code type stations are used and operation of any station causes single stroke bells to sound a general coded alarm of fire, giving location of station operated.

The most common practice is to operate the system directly from the lighting circuit but battery operated systems can be provided. Battery operated systems use electro-mechanical bells to reduce the current consumption. Statistics over the past few years have shown that there is less trouble and less chance of failure with systems operated from the lighting circuit than with battery operated systems. The batteries must be watched and cared for by some thoroughly competent person. Charging apparatus must be provided.

Systems—***E. M. B.*** for battery operation.
Systems—***S.S.*** for operation on 110-volt, d-c.
Systems—***S.S.A.*** for operation on 110-volt, a-c.

Pre-Signal Coded Closed Circuit Systems

For Hospitals, Hotels, Institutions, etc.—A pre-signal fire alarm system is one in which two separate operating and wiring systems are combined as one having the same stations, alarm bells and control panel common to both. It is recommended for use where it is not advisable to sound a general alarm of fire until an investigation has been made and such action is deemed necessary. This system is designed for use only where a sufficient number of building employees are available to respond promptly to a pre-signal alarm at all times.

Any person may turn in an alarm from any station. The operation of a station causes the code number of that station only to sound four times on those bells which comprise the pre-signal or first group. These bells are located in emergency elevator shafts, the chief engineer's office, building officials' office, etc. As each station is coded differently the source of the alarm is clearly designated. The fire must be investigated immediately and, if it is serious, a general alarm can be turned in from any station by an authorized person possessing a key. The key is inserted in a station, turned to the position marked "Gen. Alarm" and the station operates in the usual way which causes a general coded alarm to sound on all bells including both the pre-signal alarm and the general alarm groups. As many "Gen. Alarm" keys as necessary are furnished by the manufacturer.

The entire system, including stations, bells, control panel and wiring, is supervised at all times by a very small continuous flow of current. Any interruption due to failure of the system current supply, ground or line breakage, causes a trouble bell of distinctive tone (usually a cow gong as shown on opposite page) to ring continuously.

Double Supervision may be provided for on both Coded Closed Circuit Systems and Pre-signal Coded Closed Circuit Systems. When double supervision is specified, two trouble bells are furnished operating from separate sources of current. Failure of current supply for the first trouble bell causes the second trouble bell to operate from the main source of current that operates the station's boxes and gongs.

Connection of local systems to the city system is not generally recommended by fire alarm authorities, but can be provided for, if required, by the addition of contacts on one of the control panel relays. Additional binding posts are supplied for connection to the auxiliarized station so that the operation of any local station automatically operates the city station.

Systems—***P.E.M.B.*** for battery operation.
Systems—***P.S.S.*** for operation on 110-volt, d-c.
Systems—***P.S.S.A.*** for operation on 110-volt, a-c.

Continued on next page

Standpipe Fire Line Signal and Telephone Systems

As required under the provisions of Rules Number 49 and 53, Standpipe Line Fire Rules of the Board of Standards and Appeals of the City of New York.

A bulletin illustrating and describing approved Edwards Fire Line Signal and Telephone Equipment necessary for installation in all new buildings erected in the City of New York requiring variable speed control of fire pump motors will be sent you immediately upon request.

Open Circuit System

For use in Small Factories, Office Buildings and wherever protection is required at minimum expense—

This system consists of simple break glass stations and standard vibrating bells. Various types of bells are adaptable to fire alarm systems, the choice depending on the type and quality of bell desired and the operating current to be used.

If open circuit systems, the operation of a station causes the bell to sound continuously until the system is turned off, and thereby gives a general alarm of fire only. These systems must be tested regularly. A fire alarm annunciator may be used to show the location of the station operated; but if this feature is desired, the closed circuit coded alarm system is much more efficient and very little higher in price when the cost of the annunciator and necessary wiring for it is considered.

Systems—*V.O.B.* for battery operation; ***V.O.T.*** for transformer operation; ***V.O.D.*** for operation on 110-volt, d-c; ***V.O.A.*** for operation on 110-volt, a-c.

Apparatus

Coded Signal Stations

The mechanical movement is simple in design; gear wheels are cut, not stamped. Separable conduit attachment. Code signal sounded four times at each operation. When lever is released it automatically disengages so that successive pulling cannot interfere with proper operation. No winding necessary. Cover of box provided with spring hinges. Silent or bell tests may be made using key supplied with station.

Standard finish: Red enamel with raised aluminum tipped letters.

No. 1275 or 1275DO

No. 1276 or 1276DO

No. 1275-2 or 1275-2DO

No. 1276-2 or 1276-2DO

For General Alarm—No. 1275 for surface conduit; No. 1276 for concealed conduit. No. 1275-2 and No. 1276-2 same as No. 1275 and No. 1276 respectively only of the break glass, open door and pull lever type.

For Pre-Signal Alarm—No. 1275DO; No. 1275-2DO and No. 1276DO; No. 1726-2DO. Same as corresponding number of general alarm stations only that pre-signal alarm is sounded four times at predetermined places only by first operation. After investigation of the pre-signal alarm, a general alarm can be sounded by inserting key, turning to position marked "Gen. Alarm" and pulling lever. As many "Gen. Alarm" keys as are necessary are furnished.

No. 2240

Non-Code Signal Stations

Made in a variety of styles and types depending upon the requirements of the system and service intended. No. 2240 shown at the left is for concealed conduit mounting; made for 110-volt, alternating current, direct current or battery operated systems. Standard finish, red enamel.

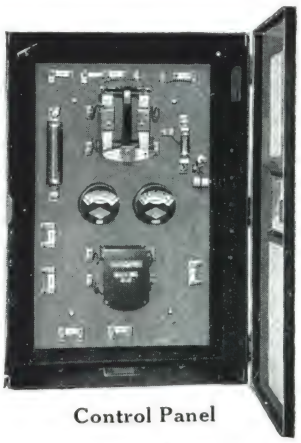
Control Panels

All instruments, connections, etc., mounted on a panel of suitable insulating material which is enclosed in heavy steel cabinet of sufficient size to allow easy wiring. Door is secured with lock and has glass panel for observation of meters. Trouble bells is standard equipment. Knockouts provided on two sides and bottom of case for conduit. Standard control panels are 60 cycles. Can be made for any frequency.

Type S.S. or P.S.S. Control Panel—For operation directly from d-c lighting service mains.

Type S.S.A. or P.S.S.A. Control Panel—For operation directly from a-c lighting service mains.

Type E.M.B. Control Panel—For operation on primary battery.



Control Panel

Bells

Alarm Bells—For transmission of coded signals. Solenoid single stroke. Entire mechanism is under the gong. For surface conduit a separable box having knockouts on all sides is supplied. The same box can be installed flush and the bell mounted on an extension cover provided for that purpose.

No. 23F—d-c type for S.S. system or P.S.S. system.

No. 24F—a-c type for S.S.A. system or P.S.S.A. system.

Electro mechanical type. Operated by strong spring mechanism which is released by small flow of current. Mechanism will permit 500 blows per single winding.

No. 1331 Conduit type for EMB and PEMB Systems. Made in sizes with 6, 8, 10 and 12-inch gongs.

Trouble Bell—Weather, bug and dustproof. Has conduit attachment. Patented plunger type movement and carbon contacts. A reliable, rugged bell for alarm service. Finish is red enamel with gong of gun metal.

No. 1001T—For S.S. or S.S.A. systems, P.S.S. or P.S.S.A. systems.

No. 1001T Trouble Bell

No. 23F (d-c)
No. 24F (a-c)

Code Ringing Bell for Battery Systems

No. 1331, conduit type. Sizes, 6, 8, 10, 12 in.

Continued on next page

TELEPHONE SYSTEMS

Apartment House Systems

For communication between entrance, vestibule, apartments, janitor, tradesmen, etc. Vestibule telephones can be furnished built into mail box group or for mounting apart from mail boxes.

Vestibule telephone units can be equipped with concealed cordless loud speaking receivers or armored cord watchcase receivers. Standard finishes: satin, brass or black.

Apartment telephones are furnished in steel cases with enclosed bells in surface or flush mounting types.

Standard finish: dull black.

Janitors' telephones can be furnished with or without annunciator drops to register calls from vestibule or apartments.

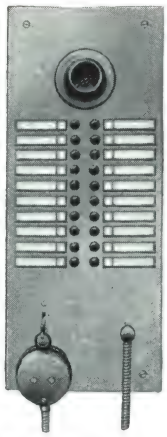
Types of Service

Three general types of service are available in apartment house systems as follows:

(1) Common Talking—For buildings where there is a single street entrance and the vestibule and all apartment telephones are connected to a common talking circuit.

(2) Sectional Talking—For buildings having two or more street entrances or where a group of buildings have a central janitor service. Each entrance vestibule telephone, with its associated apartment and tradesmen's telephones, are connected to common talking circuits, so that a conversation from one vestibule to one of its associated apartments will not interfere with a conversation simultaneously taking place from another vestibule to one of its associated apartments. The janitor may communicate with all vestibules and apartments.

(3) Selective Talking—Used generally where an attendant is maintained to operate a telephone switchboard, through which intercommunication is established between all apartment or other substation telephones.



No. 321. Telephone and Call Button Vestibule Unit with Armored Cord Receiver

No. 396. Mail Box and Telephone Combination with Cordless Loudspeaking Receiver

No. 397. Mail Box and Telephone Combination with Armored Cord and Watchcase Receiver can be furnished

No. 322. Telephone and Call Button Vestible Unit with Cordless Loudspeaking Receiver

No. 3322 or 3353; No. 3332 or 3362; No. 3342 or 3372—Apartment telephones, wall mounting types. Furnished in surface and flush mounting types having well proportioned steel cases, hinged doors, raised metal mouthpiece, raised center call buttons, enclosed adjustable bells and bakelite terminal strips. The complete interior assembly is mounted on a sub-plate which is readily removable from the case for inspection and test, without dismounting the set from the wall. All units, including switchhook, bell, receiver and transmitter, completely insulated from the case.

Standard finish: dull black.

3322, 3332 and 3342—For systems using armored cord vestibule telephones.

3352, 3362 and 3372—For systems using cordless loud speaking vestibule equipment.

No. 3562 or 3582; No. 3572 or 3592—Desk mounting types. Base of the stands are equipped with raised center buttons and 6-ft. flexible cord leading to a surface mounting wall box containing the bell and terminal strip.

Standard finish: dull black.

3562 and 3572—For systems with armored cord vestibule telephone.

3582 and 3592—For systems using cordless loud speaking vestibule equipment.

No. 3451 or 3452—Surface wall type telephone for tradesmen's calling service. For installation at dumbwaiters, rear entrances, etc.

Standard finish: dull black.

3451—For systems with armored cord vestibule telephone.

3452—For systems with cordless loud speaking vestibule equipment.

Write for Edwards' Apartment Telephone Systems Catalog No. 200 for additional service and wiring information, or call our nearest branch office.

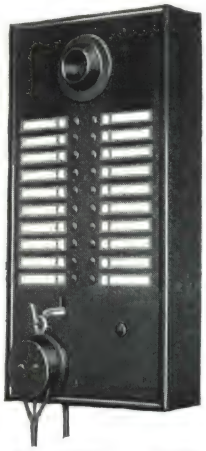
No. 3322 or 3352

No. 3332 or 3362

No. 3342 or 3372

No. 3572 or 3592

No. 3562 or 3582



No. 3451 or 3452

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Intercommunicating Systems

For Factories, Hotels, Hospitals, Institutions, Residences, Clubs, etc.

No. 3601

System No. 4—*Selective Ringing, Common Talking*—For use where conversations between stations may be limited to one at a time. Pressing the button opposite the name of the station desired rings that station only.

Telephones can be surface or flush wall mounting type, or desk stand ype with buttons in base.

System No. 5—*Selective Ringing, Selective Talking*—For use where several conversations may take place simultaneously. Operation similar to system No. 4 above.

No. 360

Number of buttons	Catalogue numbers				
	Surface wall type	Flush wall type	Pedestal desk type	Cradle desk type	Handset type
4	360–4	3601–4	362–4	365–4	364–4
8	360–8	3601–8	362–8	365–8	364–8
12	360–12	3601–12			364–12

No. 365

No. 362

No. 364

Central Station and Private Exchange Switchboard Systems

Central Station Systems 6A and 6B—*Common Talking*—Each is a system of central and outlying telephones particularly adapted for use in schools, banks, hotels, etc., where the majority of conversations emanate from a central station.

The central, or master station, can selectively call any of the outlying stations. Outlying stations can call the master station only. When desired, the outlying stations may talk to each other by first calling the central station. The latter will then call the station desired. Only one conversation may be held on the system at a time. System 6B is equipped with an annunciator to register calls when central is unattended. System 6A is not equipped with an annunciator.

No. 3890 Central Station Annunciator System No. 6C

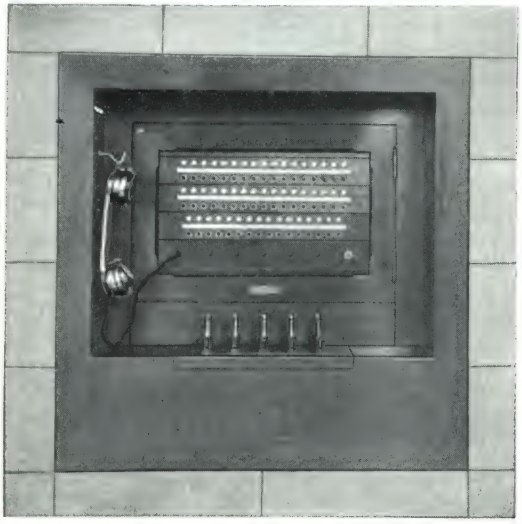
Master Annunciator Telephone System No. 6C—This system comprises a combination central telephone annunciator, usually located in the office or entrance hall, and outlying station telephones in apartments, guest rooms and similar locations. The annunciator is equipped with an electrically reset signal and line jack for each outlying station, a single operator's answering and calling cord and plug and ringing button.

Calls to outlying stations are made by inserting the plug in the line jack of the desired station and pressing the ringing button. Calls from outlying stations to the annunciator are made by pressing a button on the outlying station telephone which signals the operator by operation of the associated drop on the annunciator and the sounding of a buzzer. The signal drop remains visible until restored by means of a reset button. Annunciators are furnished in capacities ranging from 16 to 100 stations.

Private Exchange System No. 50—*Selective Ringing, Selective Talking*—A complete private exchange telephone system providing intercommunication between any number of outlying station telephones through a lamp signal switchboard. Switchboards furnished in various types in capacities ranging from 20 to 200 lines.

Write for Edwards Telephone System Catalogue No. 200 Additional information or call our nearest branch office.

No. 3853. Desk Mounting Type System No. 50



No. 3851. Flush Wall Type System No. 50

No. 3852. Floor Mounting Type System No. 50

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HOSPITAL SIGNALING SYSTEMS

General

The selection, makeup and arrangements of hospital signaling systems and equipment is a complex problem. Every hospital has characteristics peculiar to itself. An arrangement of equipment which may be suitable for one institution will fall far short of requirements in another.

Our experienced engineering department is at the service of architects, engineers or those desiring assistance, in the selection of units, arrangement or wiring diagrams best suited to any particular condition.

Systems and Equipment

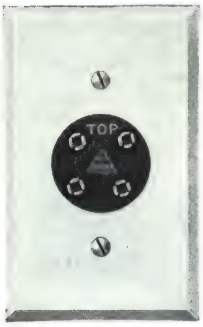
Edwards Systems comprising complete equipment embrace: nurses' call; doctors' paging; doctors' "in and out"; maids' or nurses' location; door bell and ambulance entrance; telephones; nurses' home return call; watchman's time detector; fire alarm and tank alarm.

All Edwards devices are designed to give *positive* and efficient service, are thoroughly tested before leaving the factory, are designed for simplest possible installation and are unconditionally guaranteed.

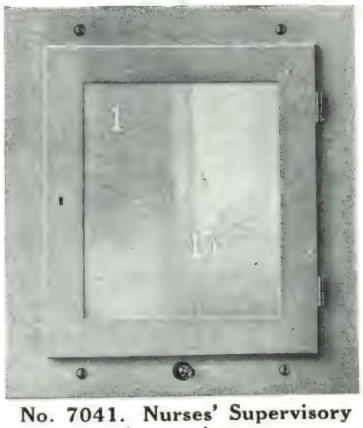
Nurses' Call Equipment

Private Rooms Only—Pressing patient's button lights lamp over door in corridor, also lights lamp and momentarily sounds buzzer in duty and supervisory stations as desired. Nurse resets call at bedside, extinguishing all signals controlled by that station.

Emergency Feature—With this addition a nurse may summon assistance by pressing an emergency locking button at calling station, which lights red lamp over room door in corridor, lights red lamp and rings bell in duty and supervisory stations as desired. Call is reset at calling station in room calling.



No. 7001. Calling Station, Single Cord Serves One Bed

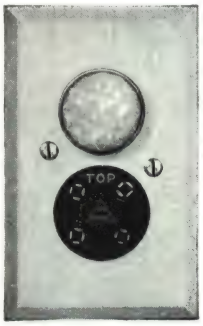


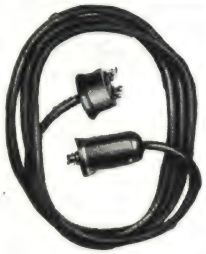
No. 7041. Nurses' Supervisory Annunciator

Private Rooms and Wards—Combines private room and ward calling stations within one system. Pressing patient's button in a ward lights ward lamp, lights lamp over door in corridor, lights lamp and momentarily sounds buzzer in duty and supervisory stations as desired. Call is reset at patient's bedside, cuts out all signals controlled by that station if no other call has been sent in from that ward.

Private room station is same operation as for private rooms only.

Emergency Feature—Same as for private rooms only.

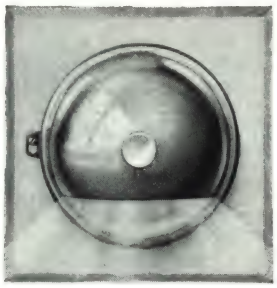




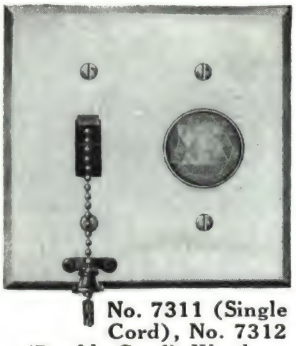
No. 7011. Ward Calling Station, Single Cord Serves One Bed

No. 7035. Bullseye Type Lamp and Buzzer Station with Switch

No. 7031. Dome Corridor Station



No. 7091. Adjustable, Double, Metal Dome Type Night Light



No. 7311 (Single Cord), No. 7312 (Double Cord) Ward Calling Station

No. 7173. Selector Keyboard with Pilot Lamps. Flush Mounting with Hinged Door

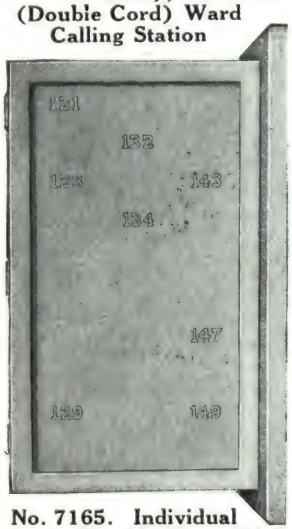
Doctors' Paging Equipment

Flashing, Lamp Type, 3-Circuit—Telephone operator pages doctor by setting up a code on a selector board. Code flashes on all 10-lamp annunciators in the system. Doctor responds by nearest telephone. Three doctors may be paged at the same time, thus making this the ideal system for large hospitals.

Number of codes possible—120. System operates on 110 volts, d-c. or a-c.

Non-flashing, Lamp Type, 1-Circuit—Telephone operator pages doctor by setting up code on keyboard which lights lamp in all annunciators, no flasher supplied. Only one code can be shown at a time; 10-lamp annunciators are used. Doctor responds by nearest telephone. Number of codes possible—120. System operates on 110-volt a-c. or d-c.

Non-flashing, Individual Lamp Type—Operator pages doctor by operating switch on keyboard, thus lighting individual lamp. System non-flashing. System operates on 110-volt d-c. or a-c.



No. 7165. Individual Code, Double Face, Wall Mounting Annunciator

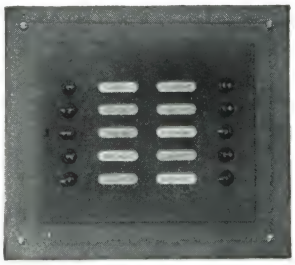
Continued on next page

No. 7403. Electric Reset "In" and "Out" Annunciator
Located in telephone operator's office

Doctors' "In" and "Out" Equipment

Push-Button — Annunciator Type — Doctor registers himself "in" by pressing "In" button on push button-plate at entrance or cloak room. "In" signal registers on annunciator in telephone operator's office (see No. 7403). Doctor registers "out" by pressing "Out" button on button-plate at entrance or cloak room. "Out" signal resets annunciator. Low voltage operation. Multiple button boards or annunciators may be used.

Lamp Annunciator Type—Service the same as annunciator type above, except using indirect lamp type master annunciator with key switches and recessed card holders at entrance or cloak room (see No. 7460) and lamp type sub-annunciator with recessed card holders at telephone switchboard. Capacity as required. Low voltage operation. Specify finish of annunciators desired.



No. 7460. Flush "In" and "Out" Master Annunciator with Recessed Lamps and Switches
Located at main entrance or cloak room

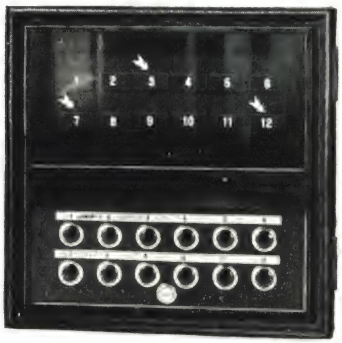
Nurses' Home Return Call Equipment

An efficient means of signaling between the main desk and the nurses' rooms. Attendant at main desk, by pressing room button on return call annunciator (see No. 415), sounds a buzzer in nurses' room station (see No. 137). Call is acknowledged by pressing buttom in room station which indicates on annunciator. Room stations may be provided with visual signal indicating call from office during nurses' absence.

Maids' or Nurses' Location Equipment

This system is designed to permit the supervisor to see at a glance, by means of visual signals, in which room or rooms, a nurse or maid is in attendance.

A nurse upon entering a room operates a swich (see No. 7305) which lights a lamp station located just outside the door in the corridor (see No. 7036). The system is generally so arranged that an additional signal is transmitted to a centrally located annunciator.



No. 415. Electric Reset, Return Call Annunciator

No. 137. Flush Type Room Station

No. 7305. Wall Toggle Switch

No. 7036. Room Location Station

Edwards Tank Sentinel

A closed circuit supervised audible and visible alarm for use in connection with gravity or pressure type water supply tanks. Operates directly on alternating or direct-current lighting service mains.

Equipment—Control Panel, Alarm Bell, Trouble Bell, Gravity Tank Switch and Ball Float, and Pressure Tank Gauge and Switch.

Operation—When supervisory current is flowing in the system and the water level in the tank is at its normal height, three designating relays on the Control Panel are energized and the control switch thrown to the "low" or normal position. Should the water in the tank reach the "low" level, the tank switch operates opening the circuit to the *low* relay which becomes de-energized and exposes the designation *low*. This also closes a circuit lighting a red lamp and ringing the trouble bell which continues to sound until the control switch is thrown to the up or "high" position. Red lamp and relay designation continue to indicate that the tank is "low" until pump is started and water reaches the normal level when the lamp is extinguished and the *low* relay restored. Relay indications marked *high* and *tank trouble* operate similarly to indicate any deviation from normal conditions in the system.

Standpipe Alarm Control Panel

Intercommunicating Telephone System

Edwards Intercommunicating Telephone System No. 6A described on the second preceding page is particularly adapted for hospital service between the main and diet kitchens, supervisor's and nurse's stations, etc.

Fire Alarm Systems

The Pre-signal type described on our first page has been designed to meet conditions peculiar to hospitals where it is essential to allow for a prelminary alarm at certain places and permitting investigation by the operating staff before a general alarm is given.

"Modern Hospital Signaling," Bulletin No. 16

We believe this is the most usable, the most valuable and the most complete bulletin in the entire field of hospital signaling.

Favorable comment from architects who are using "Modern Hospital Signaling" assure us of the usefulness of the information it contains. Edwards' fifty-nine years experience in the manufacture of electric signaling devices guarantees the quality of each device to be the best. If every device is Edwards' the entire system is guaranteed. For anyone engaged in planning a hospital this bulletin will be an invaluable aid in choosing an efficient signaling system.

THE HOLTZER-CABOT ELECTRIC CO.

Manufacturers of Electric Signaling and Protective Systems

EXECUTIVE OFFICES AND FACTORY
125 Amory Street, BOSTON, MASS.

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*Agencies. All Other Offices Listed Are Strictly Company Maintained and Operated with Sales Engineers in Charge to Render Complete Engineering Service

The Company and Its Facilities

From a small beginning in 1875, the growth of The Holtzer-Cabot Electric Co. has been steady and solid.

Today the Holtzer-Cabot plant is a modern factory of about 150,000 sq. ft. of floor space, equipped with the latest machinery and equipment.

In the field of low voltage signaling systems, Holtzer-Cabot have long been pioneers.

In this catalogue are described electrical signaling systems and equipment of all types for every kind of service.

The company also manufactures a complete line of standard and special fractional horsepower motors for labor-saving devices.

Executive Offices and Factory

Advisory Engineering Service

In any catalogue it is only possible to show typical systems. Service requirements and other conditions frequently require modifications. Our engineering staff will gladly co-operate in planning a system to fully meet their requirements. This service is rendered without obligation.

In addition to co-operating with architects, engineers, and owners in planning installations Holtzer-Cabot service also includes furnishing of complete information to contractors during installation and supervision and inspection of completed system so that completely satisfactory operation is assured with the finished job.

Guarantee

We guarantee all materials and apparatus to be in strict accord with specification requirements, and free from all electrical and mechanical defects to the complete satisfaction of our clients.

We reserve the right to authorize and direct any charge for labor involved in the replacement of materials and unless so authorized by us, no charge will be accepted.

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INTERCOMMUNICATING TELEPHONE SYSTEMS

SYSTEM "A"—SELECTIVE RINGING, COMMON TALKING

Standard Capacity: 6 and 12 Buttons

Nature of Service

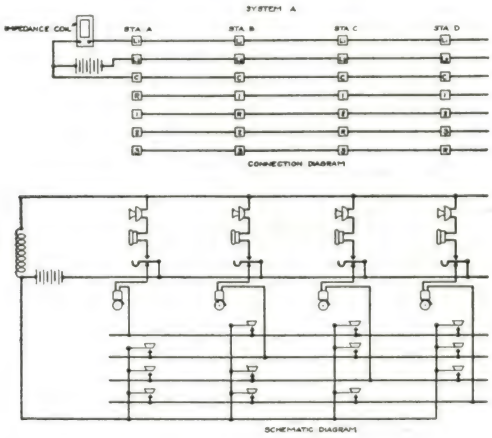
Selective ringing, common talking systems, whereby only one conversation can be carried on at a time.

Any one station can call and talk with any other station in the system.

Wiring

This system requires one wire for each telephone plus three common wires for the talking and ringing circuits. The total number of wires must be run to all telephones. For this reason cables are recommended. They are especially made for this purpose—two types being furnished.

The painted-braid cable should be used in dry buildings, and the leaded cable should be specified for all outdoor locations or where the cable may be subject



to moisture or corrosive fumes. In all cases where iron conduit is used for the cable runs, the leaded cable should be installed to avoid the effects of condensation in the pipes.

DETAILS OF STANDARD CABLES

No.	Capacity	No. of pairs No. 18 B. & S.	No. of singles No. 22 B. & S.
148141	6-button system	2	6
148142	12-button system	2	12

Current Supply

One centrally located battery or battery eliminator of 10 to 12 volts as described in page 8 is necessary for supplying current for both talking and ringing.

The voltage mentioned is sufficient for systems up to 1000 ft. In greater distances the voltage must be increased proportionately. A transformer cannot be used.

No. 148974. 6-button
No. 148974B. 12-button
Specify if cable between block and outlet box is required

Telephones

Cradle Telephones—Consists of a metal base with fixed bracket for holding a solid molded black bakelite hand set. The weight of the hand set when in place keeps the plunger switch depressed. Finish is black, and the buzzer is in the base.

A separate button block is furnished. There is a 5-ft. cable between the instrument and terminal block. Cable between button block and terminal block or outlet box will be furnished at an extra charge.

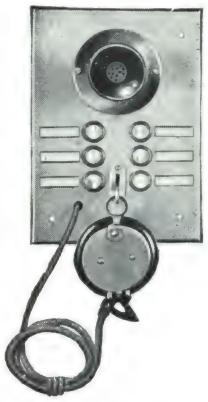
Desk Telephone—This is equipped with a standard transmitter and a long-type receiver. A separate button block is furnished. Also a 5-ft. cable between instrument and terminal block or outlet box furnished at an extra charge. Buzzer is in the base.

No. 148982A. 6-button
No. 148982B. 12-button
Specify if cable between button block and outlet box is required

Wall Telephones—The metal case is provided with a hinged front giving easy access to the front. Finish is black. Long type receiver can be furnished at an extra charge.

Flush Type Telephone—Furnished complete with metal outlet box. Front plate is of solid brass and is equipped with transmitter, watch case receiver with cord and concealed buzzer. All current-carrying parts are insulated from the plate. Finish is black. Outlet box is 1 in. less each way than mounting space. All outlet boxes are 4¼ in. deep.

No. 148162A. 6-button
No. 148962B. 12-button
Specify if long type receiver is preferred



No. 148952A. 6-button
No. 148952B. 12-button

List Number	Type of telephone	No. of buttons	No. of stations	Dimensions, in. High	Dimensions, in. Wide
*148974A	Cradle	6	7	4 15/16*	2 7/8*
*148974B	Cradle	12	13	4 15/16*	5 3/16*
*148982A	Desk	6	7	4 15/16*	2 7/8*
*148982B	Desk	12	13	4 15/16*	5 3/16*
148962A	Wall	6	7	8 1/2	5 3/4
148962B	Wall	12	13	10 1/8	5 3/4
148952A	Flush	6	7	8	5 1/2
148952B	Flush	12	13	9 5/8	5 1/2

*Dimensions of button block.

Impedance Coil

One impedance coil is required for each system, whether partially or fully equipped. The coil is mounted on a wooden block, with terminals. Mounting space, 2½x4½ in.

Continued on next page

SYSTEM "C"—PRINCIPAL'S SCHOOL TELEPHONE SYSTEM

Standard Capacity: 12, 16, 20 and 30 Stations

(Larger Systems Can Be Arranged as Desired)

Especially Recommended for School Buildings

Nature of Service

This is a master telephone system with the addition of an indicating annunciator. The system is particularly suitable for school service.

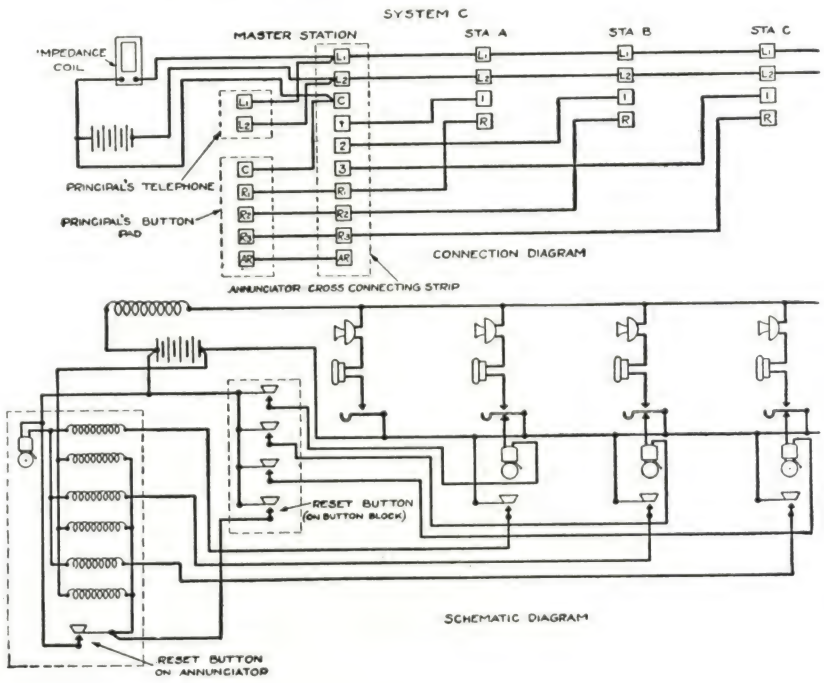
A call from one (or more) of the various classrooms is registered on the annunciator in addition to ringing the buzzer in the office. Thus, in the temporary absence of the superintendent or principal, the annunciator preserves a record of the source of the call until reset electrically from the push-button pad on the superintendent's desk.

Wiring

For this system the use of individual wires is recommended instead of cable so as to facilitate the branching off of the various circuits to the several rooms. Two No. 16 B&S rubber-covered and braided wires must be used as common wires to all the classrooms, and two individual No. 18 B&S rubber-covered and braided wires must be run individually from each classroom to the principal's indicating annunciator.

The Battery System

One centrally located battery or battery eliminator, see page 8, of 10 or 12 volts is necessary for supplying current for both talking and ringing on this system. The exact voltage that is necessary depends on the length of the cable lines. The voltage mentioned is usually sufficient for systems that include less than 1,000 ft. of cable. The number of cells should be proportionately increased to compensate for the drop in voltage resulting from the added resistance of the circuits. Transformer cannot be used on this system.

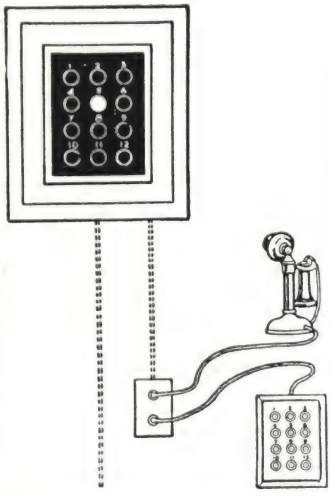


Principal's Indicating Annunciator

The principal's annunciator is of the electrical reset type. The annunciator proper is mounted on the hinged door of a connection cabinet front as shown in cut. The cabinet front is included in the price of the annunciator together with outlet box and special connector strip as required. The connector strip is provided with sufficient terminals for annunciator button block and principal's telephone, etc. The annunciator is furnished with a cardholder type front mounted behind a glass, and plain numeral markings are furnished as standard.

No. 150022

The usual method of installing the principal's equipment is as follows: the annunciator is placed on a wall immediately over the location of the principal's desk and approximately six to eight feet from the floor. From the bottom of the box a short length of conduit is run to a single-gang outlet box, located about 30 in. from the floor. The cable from the button block and telephone is brought into this box through a bushed hole and is carried up through the conduit and connected to the terminals on the connector panel.



List No.	Description, drop	Dimensions of outlet box, in.		
		High	Wide	Deep
150022	12	16 5/8	18 5/8	4 1/4
150022	16	18 5/8	18 5/8	4 1/4
150022	20	18 5/8	20 5/8	4 1/4
150022	30	20 5/8	22 5/8	4 1/4

For overall dimensions of trim add 2 in. to dimensions of outlet box. All outlet boxes 4 1/4 in. deep.

Continued on next page

Principal's Telephone Equipment

Cradle Telephone—The cradle phone consists of a metal base with fixed bracket for holding a solid

No. 148972

molded black bakelite hand set. The weight of the hand set when in place keeps the plunger switch depressed. The buzzer is included in the principal's annunciator.

Desk Telephones—The desk telephone used with this system is equipped with a transmitter, long-type

No. 1481109

receiver, and 6 ft. of brown desk cord. The buzzer is located in the annunciator.

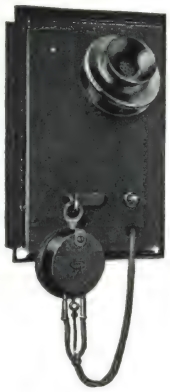
Push Button Pads—The push button pad, which is part of the equipment of the principal's telephone, consists of a wood mat with a felt-covered base and contains the necessary number of push buttons and

No. 150055

directory plates. A brown silk-covered cable, 6 ft. in length, is furnished. Finish of the wood mat is ebony. Each button pad must allow for one button to reset annunciator.

DIMENSIONS, NO. 150055

No. of buttons	List No. 150055	
	High	Wide
12	5⅝	6¾
16	6¾	6¾
20	6¾	7⅞
25	7⅞	7⅞
30	7⅞	9



No. 148015

Classroom Telephones

Dustproof Wall Telephones—This is a special telephone so designed as to be dust and chalk proof. The transmitter is mounted on an adjustable arm. The switch hook passes through front plate. The front is hinged and gasketed all around. A special outlet box equipped with 4-way connectors is furnished and included in price. This instrument has been specially designed to meet the severe conditions of classroom service and therefore is more suitable than the standard types of telephones. For surface mounting a special mat is provided. The finish is black. Outlet box—5⅞ in. wide, 9⅛ in. high, 3⅝ in. deep. Telephone—$7\frac{7}{16}$x10¼ in.

Cradle Telephone—The cradle telephone consists of a metal base with fixed bracket for holding a solid molded black bakelite hand set. The weight of the

No. 148971

hand set when in place keeps the plunger switch depressed. A 5-ft. cable is furnished between the instrument and terminal block. Calling button is mounted in base.

Desk Telephone—The desk telephone is equipped with standard transmitter and long type receiver.

The push button is mounted in base of telephone.

A 5-ft. cable is furnished between the instrument and terminal block.

No. 1481119

No. 148969

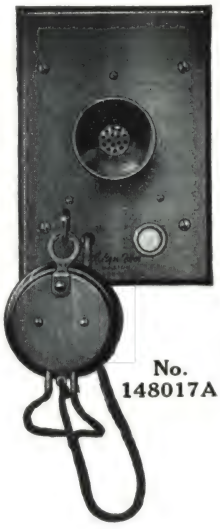
Wall Telephone — The surface type wall telephone consists of a compact pressed-steel wall case, finished in durable black enamel with nickel trim.

Long type receiver can be furnished at an extra charge.

Dimensions 7¼ in. high, 5¾ in. wide.

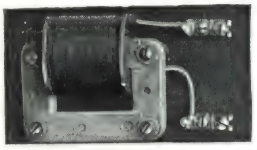
Continued on next page

Flush Telephone—Consists of a brass plate finished in dull black and equipped with transmitter, receiver with buzzer, switch mechanism, and terminal block mounted on back. This telephone mounts over a 3-gang outlet box or cover set vertically in the wall. A special metal outlet box to fit this telephone can be furnished at an extra charge. Size of box 5⅝ in. high, 3¾ in. wide, 4 in. deep. Size of telephone 6⅜ in. high, 4½ in. wide.



No. 148017A

Impedance Coil—One impedance coil is required for each system. The coil is mounted on a wooden block. If an Holtzer-Cabot eliminator is used this coil is not required.



No. 148013A

Note: If special voltage is used this must be given on order so that proper impedance coil may be furnished.

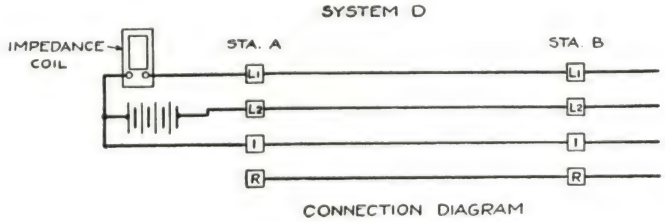
SYSTEM "D"—PRIVATE LINE TELEPHONES

Capacity: 2 Stations

Recommended for Use as a Private Line in Offices, for Interdepartment Lines, or for Lines from Home to Garage, Etc.

Nature of Service

As a strictly private line, this system offers a dependable means of communication between any two points not more than 1500 ft. apart. To call it is necessary to remove the receiver and push the button on the telephone at the calling station.



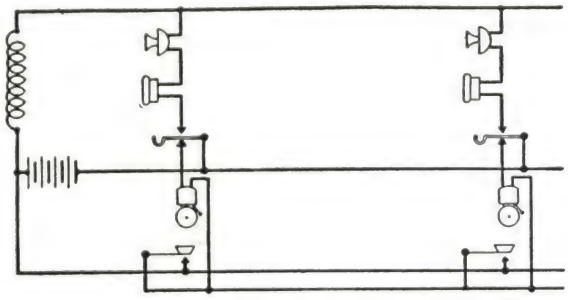
CONNECTION DIAGRAM

No. 1481119

Battery

Ten to sixteen volts are required for operating this system, with centralized battery or battery eliminator, see page 8, and impedance coil. Four wires are required between stations.

For wiring we recommend the use of No. 18 B&S gauge rubber-covered and braided interior telephone wire.



SCHEMATIC DIAGRAM

Private Line Equipment

Desk Telephone — The desk telephone is equipped with standard transmitter and long-type receiver. A 5-ft. cable is furnished between the instrument and terminal block. Has button in base.

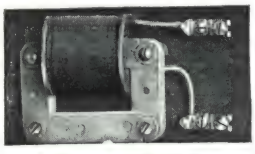
Wall Telephone — The surface type wall telephone consists of a compact pressed-steel wall case instrument, finished in durable black enamel with nickel trim. Long type receiver can be furnished at an extra charge. Dimensions, 7¼ in. high x 5¾ in. wide.

No. 148969

Impedance Coil

One impedance coil is required for each system. The coil is mounted on a wooden block. Mounting space, 2½x4½ in.

Note: If special voltage is used this must be given on order so that proper impedance coil may be furnished.



No. 148013A

Continued on next page

APARTMENT HOUSE TELEPHONE SYSTEMS

An essential feature of Apartment House Telephone Systems is dependability. Such systems must be properly designed to render continuous and reliable service. Maintenance is a serious problem and a poorly designed system, or inferior material, is a source of continuous expense and annoyance.

Our experience in this field enables us to offer a line of telephones and equipment which are especially designed and constructed to withstand the hard usage to which they are of necessity subjected in apartment house service.

There are three systems, each with its respective wiring plan, which will be found on the following page. We are prepared to furnish any other type of system required.

Construction Details

We recommend that No. 16 B&S wire be used, run in rigid conduit. Full wiring information is given in the diagram of each system on the following page.

All systems are designed to operate on 10 to 12 volts, d-c., for talking and 16 volts, a-c., for ringing.

The source of current supply should preferably be a battery eliminator (see page 8), having a tap on its transformer for furnishing the proper voltage, a-c., for ringing. While dry batteries may be used for talking circuits, with a transformer for ringing, the upkeep will be rather costly and service unsatisfactory.

Systems are so wired that leaving the receiver off the hook in the suites will not discharge the battery.

No. 148969A

Suite Telephones

Suite Telephones are interchangeable and any or all types may be used in combination on the same system. In ordering, specify number of buttons in accordance with service required.

Wall Telephone—Has a metal case, black enamel finish, with the assembly thoroughly insulated. All parts are readily renewable. Furnished standard with watch case receiver but long type receiver can be furnished at extra cost. Height 7¼ in., width 5¾ in.

Flush Telephone—Has a heavy brass faceplate finished in black.

The assembly is thoroughly insulated.

All parts are readily renewable.

Outlet box furnished at an extra cost, or the assembly can be mounted on a three-gang outlet box, set vertically.

Outlet box—height, 5⅝ in.; width, 3¾ in.; depth, 4 in.

Telephone—height, 6⅜ in.; width, 4½ in.

Note: Cradle or Desk Telephones can also be furnished if required.

No. 148017A. 1-button
No. 148017B 2-button

VESTIBULE TELEPHONES

No. 148021

Swinging Arm Telephone—A solid brass front plate contains calling buttons with directory cardholders. Transmitter and receiver are assembled on a movable arm and connected by an armored flexible section, anchored at each end. Lifting of receiver operates the switch.

All parts are thoroughly insulated and readily replaced. Standard finish brush or polished brass.

Furnished complete with metal outlet box.

Automatic in operation and its sturdy construction insures durability.

Type No. 148022—Similar to No. 148021 but equipped with standard watch case receiver having a thin flexible armored cable over the receiver cord.

A safety chain is provided to cut off talking current should receiver be left off hook.

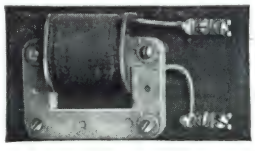
Impedance Coil

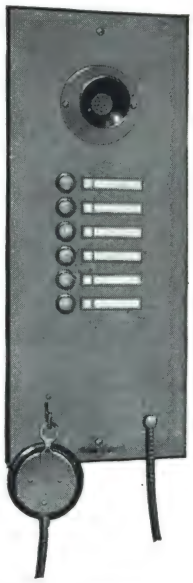
One impedance coil is required for each system, except when our battery eliminator is used.

DIMENSIONS NOS. 148021 AND 148022

No. of buttons	Trim size, in.	
	High	Wide
6 and 10	16½	6¾
16, 20, 24 and 30	16½	10⅛
40	16½	13½

Outlet box 1 in. less each way.





No. 148022

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JANITORS' TELEPHONE EQUIPMENT

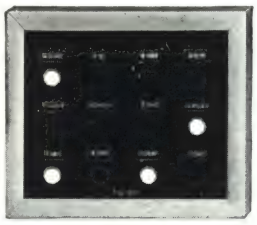
No. 148963

Janitors' Telephone

This instrument consists of a metal case, black enamel finish, containing a call button for each apartment. Transmitter, switch, etc., are assembled on a heavy moulded base and are readily replaced. Furnished with watch case receiver. Can be used only on Systems Nos. 2 and 3.

Janitors' Annunciator

This annunciator consists of an oak case, containing one indication for each apartment, equipped with target drops, with cardholders, electric reset. Gravity drops, mechanical reset, can be furnished at no extra cost.

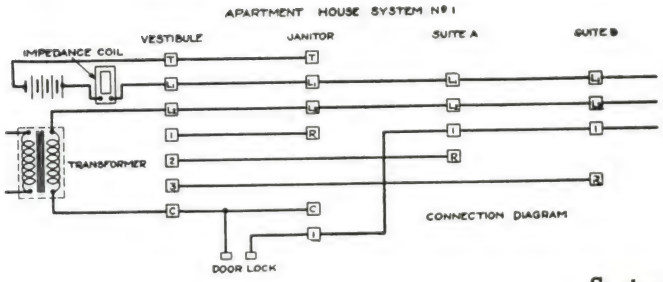


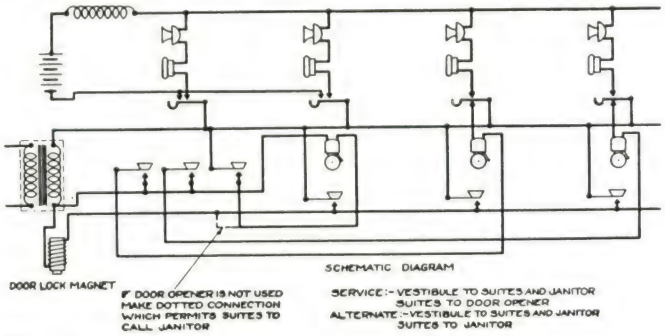
List No. 150025

This annunciator should be installed directly over janitor's telephone and can be used only on System No. 3.

No. of drops	Arr. of drops		Gravity		Elec. reset	
	Across	Down	Width	Height	Width	Height
6	3	2	$8\frac{5}{16}$	$8\frac{1}{2}$	$7\frac{11}{16}$	$7\frac{5}{16}$
10	4	3	$10\frac{9}{16}$	$10\frac{3}{4}$	$9\frac{7}{16}$	$8\frac{7}{16}$
16	4	4	$10\frac{9}{16}$	$13\frac{1}{2}$	$9\frac{7}{16}$	$10\frac{1}{8}$
20	5	4	$12\frac{13}{16}$	$13\frac{1}{2}$	$11\frac{5}{16}$	$10\frac{1}{8}$
24	5	5	$12\frac{13}{16}$	$16\frac{5}{16}$	$11\frac{5}{16}$	$11\frac{13}{16}$
30	6	5	$15\frac{1}{16}$	$16\frac{5}{16}$	$12\frac{5}{16}$	$11\frac{11}{16}$
40	7	6	$17\frac{3}{16}$	$18\frac{7}{8}$	$13\frac{11}{16}$	$13\frac{9}{16}$

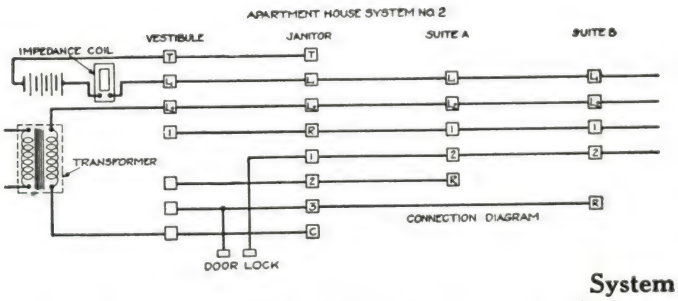
SPECIMEN WIRING DIAGRAMS

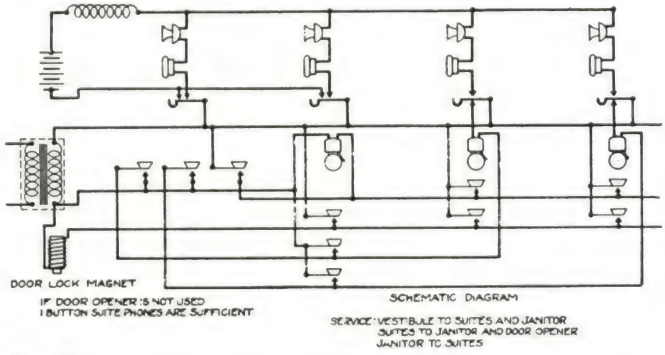




System No. 1

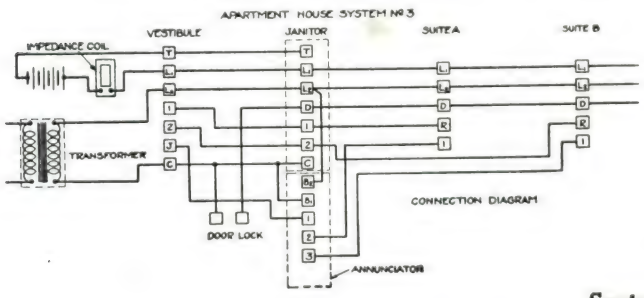
Provides service from vestibule to each apartment, vestibule to janitor, together with door opener from each apartment. Button on apartment phones under this system operates door opener. This system requires one-button suite telephone.

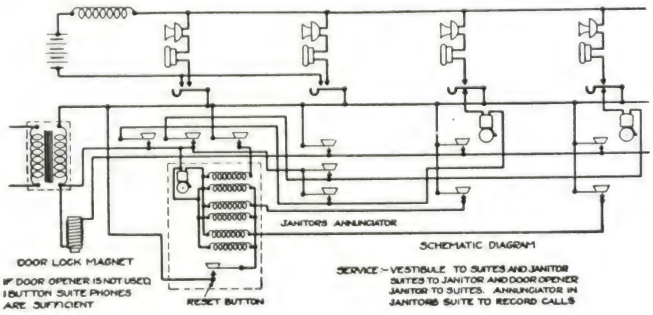




System No. 2

Provides service from vestibule to apartment, vestibule to janitor, apartment to janitor, janitor to apartment, with door opener from each apartment. Apartment telephones are two-button, one operates door opener and the other rings janitor. When door opener is not desired, one-button telephones can be used and one wire omitted.





System No. 3

Same as System No. 2 and in addition there is located at janitor's telephone an annunciator having one indication for each apartment. Annunciator notifies janitor of any call made for him during his absence. As in System No. 2, if door opener is not desired, the apartment phones can be of the one-button type, and one wire can be omitted.

Continued on next page

MAIL BOXES

Holtzer-Cabot Mail Boxes are approved by the U. S. Post Office Department. The fronts are of heavy brass and all partitions are turned or folded over, leaving no sharp edges or corners. Each compartment is an individual box with no joints. Standard finish is sprayed brass.

Post Office regulations provide that the maximum number of groups of boxes is six, i.e., it will not furnish over six master locks. The maximum number of boxes per group that we can furnish is twelve. Boxes may be installed in two or more rows, but the postman's lock must not be over 66 in. above the floor in compliance with Post Office Department's ruling.

No. 148029

The Post Office Department also stipulates that a mail box must be furnished for the janitor. Mail boxes are furnished as standard in arrangements shown below. Special arrangements, providing they conform with Post Office regulations, furnished to order.

Unless due to wall conditions, or by preference, the vestibule phone is combined with the letter boxes, we recommend mounting the telephone and mail boxes on separate side walls of entrance. By this arrangement there is no interference when tenants go for mail with callers using telephone, and incidental maintenance complications where both boxes and telephones are mounted together.

SINGLE ROW MOUNTING

No. of boxes	Arranged: No. of groups	Arranged: Gangs per group	Wall Cut: Height in.	Wall Cut: Width in.	Overall: Height in.	Overall: Width in.	Approx. wt., lb.
3	1	3	15	10½	16½	11⅞	13
4	1	4	15	13⅞	16½	15¼	16
5	1	5	15	17¼	16½	18⅝	18
6	1	6	15	20⅝	16½	22	23
7	1	7	15	24	16½	25⅜	26
8	1	8	15	27⅜	16½	28¾	29
9	1	9	15	30⅝	16½	32⅛	32
10	1	10	15	34	16½	35½	35
11	1	11	15	37⅜	16½	38⅞	38
12	1	12	15	40¾	16½	42¼	48
13	1	6 7	15	45¾	16½	47¼	49
14	2	7	15	49⅛	16½	50⅝	52
15	1	7 8	15	52½	16½	54	55
16	2	8	15	55⅞	16½	57⅜	58
17	1	8 9	15	59⅛	16½	60⅞	61
18	2	9	15	62½	16½	64¼	64
19	1	9 10	15	65⅞	16½	67⅝	67
20	2	10	15	69¼	16½	71	70
21	1	10 11	15	72⅝	16½	74⅜	73
22	2	11	15	76	16½	77¾	76
23	1	11 12	15	79⅜	16½	81⅛	86
24	2	12	15	82¾	16½	84½	96

DOUBLE ROW MOUNTING

No. of boxes	Arranged: No. of groups	Arranged: Gangs per group	Wall Cut: Height in.	Wall Cut: Width in.	Overall: Height in.	Overall: Width in.	Approx. wt., lb.
12	2	6	31½	20⅝	33	22	46
14	2	7	31½	24	33	25⅜	52
16	2	8	31½	27⅜	33	28¾	58
18	2	9	31½	30⅝	33	32⅛	64
20	2	10	31½	34	33	35½	70
22	2	11	31½	37¾	33	38⅞	76
24	2	12	31½	40¾	33	42¼	96
26	2 2	6 7	31½	45¾	33	47¼	98
28	4	7	31½	49⅛	33	50⅝	104
30	2 2	7 8	31½	52½	33	54	110
32	4	8	31½	55⅞	33	57⅜	116
34	2 2	8 9	31½	59⅛	33	60⅞	122
36	4	9	31½	62½	33	64¼	128
38	2 2	9 10	31½	65⅞	33	67⅝	134
40	4	10	31½	69¼	33	71	140
42	2 2	10 11	31½	72⅝	33	74⅜	146
44	4	11	31½	76	33	77¾	152
46	2 2	11 12	31½	79⅜	33	81⅛	172
48	4	12	31½	82¾	33	84½	192

NOTE

The dimensions shown cover letter boxes only. Where letter boxes combined with telephone must be furnished, the total width will be increased as follows:

Our standard Vestibule Telephones, either type, can be furnished up to 24 buttons on a plate 6¾ in. wide and 16½ in. high (the equivalent of two letter boxes in width and one box in height).

Above 24 buttons to 60 buttons, two plates are required, each plate will be 6¾ in. wide and 16½ in. high (the equivalent of two letter boxes in width and two boxes in height).

TELEPHONE BATTERY ELIMINATOR

This eliminator is designed to operate on 110 volts, 60 cycles only, and furnishes 10-16 volts d-c. for talking current and 16 volts a-c. for ringing current. It is adapted for standard systems.

Note: This eliminator will not operate switchboard telephone systems or group talking or selective talking system.

The eliminator consists of a dry plate rectifier, condenser, choke, and transformer mounted on substantial steel base, with steel cover furnished in black.

Note: When battery eliminator is used the impedance coil is included in eliminator and no other impedance is required.

Telephone Battery Eliminator 148900

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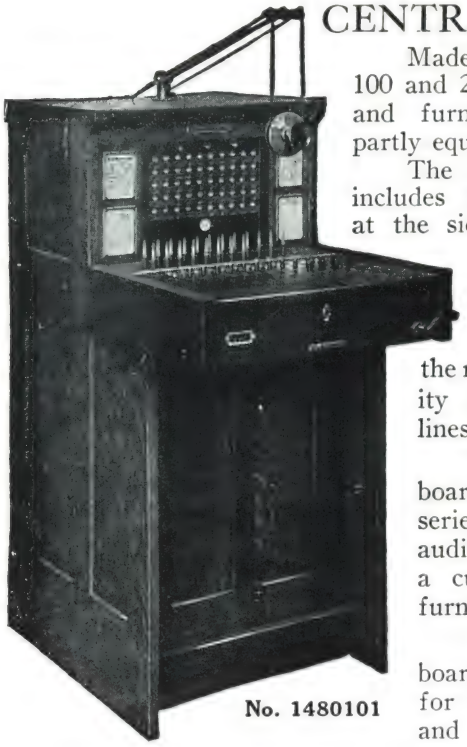
CENTRAL ENERGY LAMP SIGNAL SWITCHBOARD



No. 1480101

Made in two sizes—100 and 200-line capacity and furnished fully or partly equipped.

The standard board includes directory cards at the sides. Cardholders over line lamps can be furnished, but this reduces the maximum capacity to 80 and 160 lines.

These switchboards are of the series lamp type. An audible signal with a cutout switch is furnished.

This switchboard is designed for 22-volt talking and ringing from the same storage battery. For this purpose, a set of 24-ampere hour batteries is recommended.

For wiring we recommend No. 18 B&S gauge twisted triple copper conductors from each telephone. Two wires from the battery supply to the switchboard are required and their total resistance must not exceed 1/20 ohm, in order to reduce cross-talk effects to a minimum. It is recommended that the telephone storage batteries be located as near the telephone switchboard as possible.

Number of lines		Cord pairs	
Wired for	Equipped	Wired for	Equipped
No. 1480101: 100-line Capacity			
100	40	10	3
100	50	10	4
100	60	10	4
100	70	10	5
100	80	10	5
100	90	10	6
100	100	10	6
No. 1480102: 200-line Capacity			
200	140	18	7
200	150	18	7
200	160	18	8
200	170	18	8
200	180	18	9
200	190	18	9
200	200	18	10

Note: Battery eliminators are not suitable for this type of system, due to their inherently poor voltage regulation under varying loads.

OUTLYING TELEPHONES

No. 148015

Dustproof Wall Telephones

This is a special telephone so designed as to be dustproof and chalkproof. The transmitter is mounted on an adjustable arm. The switch hook passes through the front plate. The front is hinged and gasketed all around.

A special outlet box equipped with four-way connectors is furnished and included in price.

This instrument has been specially designed to meet the severe conditions of classroom service and therefore is more suitable than the standard types of telephones.

The finish is black.

Outlet box—5 7/8 in. wide, 9 7/8 in. high, 3 5/8 in. deep.

Telephone—7 7/16 in. wide, 10 1/4 in. high.

Wall Telephones

The telephone is of the surface type and consists of a compact pressed-steel wall case, finished in durable black enamel with nickel trim.

No. 148969

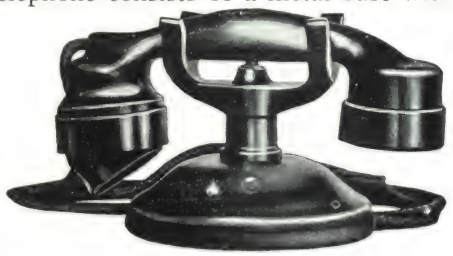
Long type receiver can be furnished if desired at extra charge.

Specify if long type receiver is required.

Dimensions: 7 1/4 in. high, 5 3/4 in. wide.

Cradle Telephones

The cradle telephone consists of a metal base with fixed bracket for holding a solid molded black bakelite hand set. The weight of the hand set when in place keeps the plunger switch depressed. Buzzer is in base.



No. 148971

Desk Telephones

The desk telephone is equipped with a transmitter, long type receiver, and 5 ft. of brown desk cord. The buzzer is located in the base.

No. 1481119

No. 148017A

Flush Telephones

This instrument consists of a brass plate finished in dull black and contains transmitter, push button and receiver with buzzer switch mechanism, and terminal block mounted on back. The telephone mounts over a three-gang outlet box cover set vertically in the wall. A special metal outlet box to fit this telephone can be furnished at an extra charge. Size of box—5 5/8 in. high, 3 3/4 in. wide, 4 in. deep.

Continued on next page

TARGET ANNUNCIATORS

Important Points to Be Observed in Ordering

If the following details are not given, manufacturing cannot proceed:

Pattern and List Number.
Number of Drops.
Type of Drops.

If the following are not specified, catalogue standard will be supplied:

Resetting.
Operating Voltage (if a-c. give frequency).
Wood or Finish.

Special Features

Resetting—Electric reset annunciators may be reset individually or collectively, either at the annunciator, at a distant point, or both; or may be arranged for automatic reset, in which case the last drop operated remains in sight until another call is sent in. May be arranged in multiple for both call and reset. Standard annunciators are wired to reset collectively; will operate separately or in multiple. Wire sizes must be computed on basis of 1 watt per drop (on a-c. figure 1 volt-ampere).

Gravity drops are reset manually at the annunciator and are not suitable for multiple operation.

Fronts—Electric reset annunciators have metal fronts and concealed cardholders for markings. Gravity annunciators have metal fronts with rectangular openings and markings are on drops.

Markings—Indications are marked from 1 up. Special markings for all types at extra cost.

Cases and Finishes—***Wood Cases***—Oak, mahogany or black.

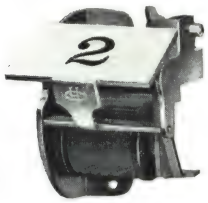
Metal Cases—Black.

Special finishes cost extra.

ANNUNCIATOR DROPS—ALTERNATING OR DIRECT CURRENT

Gravity Type—Mechanical Reset

Simple in construction, positive in operation and depends on gravity alone for its action. Reset *mechanically*. Especially suited for residence, office, factory and marine work. Provided with tension springs and screws for armature adjustment.



The indicator measures 1⅝x⅞ in. and the marking is placed directly on it.

"UF" Type—Electrical Reset

A sensitive electric reset drop operating on a minimum amount of current. The armature revolves in a magnetic field. As it never touches the pole pieces, sticking, freezing and noise are avoided. The target is $\frac{11}{16}$ in. in diameter.

Markings are not placed on targets but on cardholders directly above.

Pattern "M" Elevator Annunciator

Metal Case, Gravity or Electric Reset Drops.

Cases are made of heavy cold rolled steel $\frac{1}{16}$-in. thick. Buzzer is mounted inside of case where it cannot be tampered with. Bolts for attaching to elevator cab are furnished. Standard finish: Black.

No. 150012

List No. 150007 Standard type			List No. 150012 Up and down type			
No. of Drops	Ht. in. Elec. Reset Type	Ht. in. Gravity Type	Drops	Floors	Ht. in. Elec. Reset Type	Ht. in. Gravity Type
3	9¼	10⅞	.....	.....	.....	.....
4	10½	13⅛	.....	.....	.....	.....
5	11¾	15⅜	.....	.....	.....	.....
6	13	17⅝	6	4	10½	13⅛
7	14¼	19⅞	.....	.....	.....	.....
8	15½	22⅛	8	5	11¾	15⅜
10	18	15⅜	10	6	13	17⅝
12	20½	17⅝	12	7	14¼	19⅞
14	14¼	19⅞	14	8	15½	22⅛
16	15½	22⅛	16	9	16¾	24⅜
18	16¾	24⅜	18	10	18	26⅝
20	18	26⅝	20	11	19¼	28⅞
22	19¼	28⅞	22	12	20½	31⅛
24	20½	31⅛	24	13	21¾	33⅜
26	21¾	33⅜	26	14	23	35⅝
28	23	35⅝	28	15	24¼	37⅞
30	24¼	37⅞	30	16	25½	40⅛

Pattern "F" Flush House Annunciator

Wood or Metal Trim, Electric Reset Drops (Gravity type furnished special).

For flush mounting and includes concealed buzzer and metal outlet box to be set into the wall. Furnished in two types as follows:

Standard Type—Has one piece trim fastened to outlet box by screws. Drop section fastened to outlet box separately so that it can be installed and connected with trim removed, thus greatly facilitating installation.

Hinged Door Type—Has drop section fastened to the trim.

Glass front is mounted in hinged door giving access to drops and terminals for connecting.

This type is preferable to the plain door front.

No. 150020

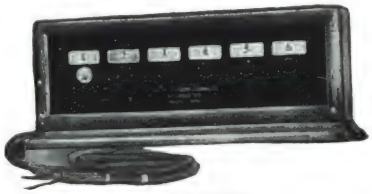
No. of drops	Arrangement of drops		No. 150020 Outlet Box dimensions, in.			
			Hinged front		Plain front	
	Across	Down	Width	Height	Width	Height
4	2	2	$9\frac{15}{16}$	$12\frac{3}{8}$	$9\frac{13}{16}$	$11\frac{1}{16}$
6	3	2	$12\frac{3}{16}$	$12\frac{3}{8}$	$11\frac{9}{16}$	$11\frac{1}{16}$
8	3	3	$12\frac{3}{16}$	$14\frac{5}{8}$	$11\frac{9}{16}$	$12\frac{5}{16}$
10	4	3	$14\frac{7}{16}$	$14\frac{5}{8}$	$13\frac{5}{16}$	$12\frac{5}{16}$
12	4	3	$14\frac{7}{16}$	$14\frac{5}{8}$	$13\frac{5}{16}$	$12\frac{5}{16}$
16	4	4	$14\frac{7}{16}$	$17\frac{3}{8}$	$13\frac{5}{16}$	14
20	5	4	$17\frac{11}{16}$	$18\frac{3}{8}$	$15\frac{1}{16}$	14
25	5	5	$17\frac{11}{16}$	$21\frac{1}{16}$	$16\frac{1}{16}$	$16\frac{11}{16}$
30	6	5	$19\frac{15}{16}$	$21\frac{1}{16}$	$18\frac{1}{16}$	$16\frac{11}{16}$

Trim size 1 in. larger each way. Either wood or metal.
Depth of outlet box is 4¼ in.

Pattern "D" Desk Annunciator

Wood or Metal Case, Electric Reset Only.

This annunciator is particularly adapted for use on desks.



No. 150026

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The bottom is felt covered to avoid scratching finished surfaces. Furnished complete with 6 ft. of flexible cable. Can also be furnished with a special detachable connector plug and receptacle if desired (see page 16, No. 150502 and No. 150505).

No. of drops	Arr. of drops		Size, in. Wood Case		Size, in. Metal Case	
	Across	Down	Width	Height	Width	Height
4	4	1	13 7/8	6 1/8	11 3/4	5 3/8
5	5	1	15 5/8	6 1/8	13 1/2	5 3/8
6	6	1	17 3/8	6 1/8	15 1/4	5 3/8
8	4	2	13 7/8	7 3/8	11 3/4	6 5/8
10	5	2	15 5/8	7 3/8	13 1/2	6 5/8
12	6	2	17 3/8	7 3/8	15 1/4	6 5/8
15	5	3	15 5/8	8 5/8	13 1/2	7 7/8
18	6	3	17 3/8	8 5/8	15 1/4	7 7/8

Pattern "MM" House or Office Pattern Annunciator

Metal Case, Gravity or Electric Reset.

This is a metal case annunciator similar in appearance to No. 150037 wood case shown below and is furnished with buzzer inside case. Standard finish, black.

No. 150025

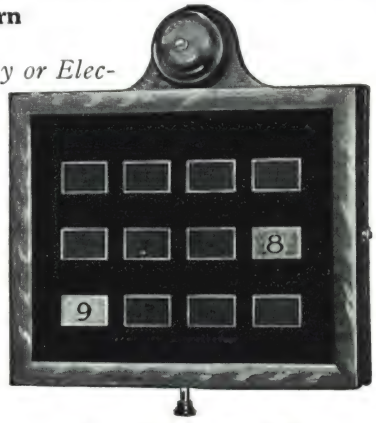
No. of drops	Arr. of drops		Gravity		Elec. reset	
	Across	Down	Width	Height	Width	Height
4	2	2	6 1/16	8 1/2	5 5/16	7 3/16
6	3	2	8 5/16	8 1/2	7 11/16	7 3/16
8	3	3	8 5/16	10 3/4	7 11/16	8 7/16
10	4	3	10 9/16	10 3/4	9 7/16	8 7/16
12	4	3	10 9/16	10 3/4	9 7/16	8 7/16
16	4	4	10 9/16	13 1/2	9 7/16	10 1/8
20	5	4	12 13/16	13 1/2	11 5/16	10 1/8
25	5	5	12 13/16	16 3/16	11 5/16	11 13/16
30	6	5	15 1/16	16 3/16	12 15/16	11 13/16

House or Office Pattern Annunciator

Wood Case, Gravity or Electric Reset Drops.

This is a wood case annunciator for house or office use and is furnished either with buzzer inside case or with dome type bell mounted over top of case on extension as shown.

Standard finishes, black, oak, or mahogany.



No. 150024, with Bell
No. 150037, with Buzzer

No. of drops	Arr. of drops		Gravity		Elec. reset	
	Across	Down	Width	Height	Width	Height
4	2	2	7 3/16	9 5/8	7 1/16	8 5/16
6	3	2	9 7/16	9 5/8	8 13/16	8 5/16
8	3	3	9 7/16	11 7/8	8 13/16	9 9/16
10	4	3	11 11/16	11 7/8	10 9/16	9 9/16
12	4	3	11 11/16	11 7/8	10 9/16	9 9/16
16	4	4	11 11/16	14 5/8	10 9/16	11 1/4
20	5	4	13 15/16	14 5/8	12 5/16	11 1/4
25	5	5	13 15/16	17 5/16	12 5/16	12 15/16
30	6	5	16 3/16	17 5/16	14 1/16	12 15/16

Marine Annunciator

Wood Case, Gravity Drop Only.

Designed particularly for use on shipboard. This annunciator is moisture proof and drops are not affected by pitching or rolling of the vessel. Front is hinged and closes against a soft rubber gasket. Back is impregnated with paraffin making a thorough seal against moisture. Provided with relay and terminals for separate bell or dome type bell will be furnished inside case, if preferred. Standard finish, black, oak, or mahogany.

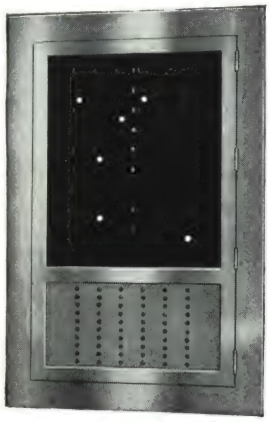
List No. 150032

No. of drops	Arr. of drops		Size, in.	
	Across	Down	Width	Height
4	2	2	9 1/2	11 3/4
6	3	2	11 3/4	11 3/4
8	4	2	14	11 3/4
10	4	3	14	14
12	4	3	14	14
16	4	4	14	16 1/4
20	5	4	16 1/4	16 1/4
25	5	5	16 1/4	18 1/2
30	6	5	18 1/2	18 1/2
36	6	6	18 1/2	21 1/4
42	7	6	20 3/4	21 1/4
49	7	7	20 3/4	23 3/4
56	8	7	23	23 3/4
64	8	8	23	26 1/2
72	9	8	25 1/4	26 1/2
80	10	8	27 1/2	26 1/2
90	10	9	27 1/2	29 1/4
100	10	10	27 1/2	32

Return Call Annunciator

Wood or Metal Case, Surface or Flush Type, Electric Reset Drops Only.

This type of annunciator is used principally in small hotels, Y. M. C. A. and similar club houses and nurses' homes. The annunciator serves to indicate calls from the different rooms and the push buttons are used for signaling to the rooms. Card holders over each indication show number of room calling. Requires one common and two individual wires from each room to annunciator. Furnished for operation on one individual and two common wires on special order.



List No. 150035

Note: For return call buzzers, see page 19.

Outlet boxes for flush type are 4¼ in. deep.

No. of drops	Drops arranged		Surface case wood or metal		Flush type wood or metal, outlet box size	
	Across	Down	Width, in.	Height, in.	Width, in.	Height, in.
25	5	5	12 1/4	22 1/4	16	25 1/8
30	6	5	14	22 1/4	17 3/4	25 1/8
36	6	6	14	25 3/4	17 3/4	28 5/8
42	7	6	15 3/4	25 3/4	19	28 5/8
49	7	7	15 3/4	29 1/4	19	32 1/8
56	8	7	17 1/2	29 1/4	20 3/4	32 1/8
64	8	8	17 1/2	32 3/4	20 3/4	35 1/8
72	9	8	19 1/4	32 3/4	22 1/2	35 1/8
81	9	9	19 1/4	36 1/4	22 1/2	39 1/8
90	10	9	20 1/2	36 1/4	23 3/4	39 1/8
100	10	10	20 1/2	39 3/4	23 3/4	42 5/8

Flush type, trim is 1 in. larger each way.
Flush type, outlet box is 4¼ in. deep.
Surface type, case projects from wall 2¾ in.

Continued on next page

LAMP ANNUNCIATORS (Low Voltage)

Patterns B, H and W Only

Various types of lamp indication annunciators listed below are suitable for calling and alarm systems for banks, insurance offices, business offices, and similar purposes.

We also manufacture special annunciators for parking control systems for garages, maids' location systems for large hotels, and other requirements.

Operation

Where lamp annunciators are to be operated by momentary contact buttons, it is necessary to include for each indication a locking type relay to hold the indications lighted until call is reset by attendant. Relays may be mounted in the annunciator or in a separate cabinet as desired. It is recommended that a separate relay cabinet be installed in some out-of-the-way location in order to make the annunciator itself as compact as possible. Where several annunciators are installed, all relays may be grouped in one cabinet. Where two or more annunciators operate in multiple from the same calling buttons, one group of relays will suffice.

Resetting

It is usually satisfactory to reset calls by a push button on annunciator trim, one button to reset all calls. Where it is desired to reset each call individually, as where more than one attendant answers from one annunciator, the annunciator should be of the individual reset type having one reset button for each indication. Should it be desired to install annunciator in a location not readily accessible, the push buttons may be installed in a button plate on the wall or desk.

Operating Current

All low voltage lamp annunciators operate on 12 or 20 volts, direct current, or 20 volts alternating current, and are equipped with candelabra base Mazda lamps.

Note: All annunciators listed are furnished complete with lamps.

GROUP RESET ANNUNCIATORS

Pattern "B"—Bull's Eye Type

Flush Mounting, Surface Mounting, Desk Mounting

These annunciators are furnished with solid bronze fronts, having ¾-in. convex face bull's-eyes. Bull's-eyes are numbered and a card holder $1\frac{1}{8} \times \frac{5}{16}$ in. is located under each bull's-eye.

Name cards are readily inserted from the back by opening the door.

Annunciators also furnished without card holders. One reset button for all indications.

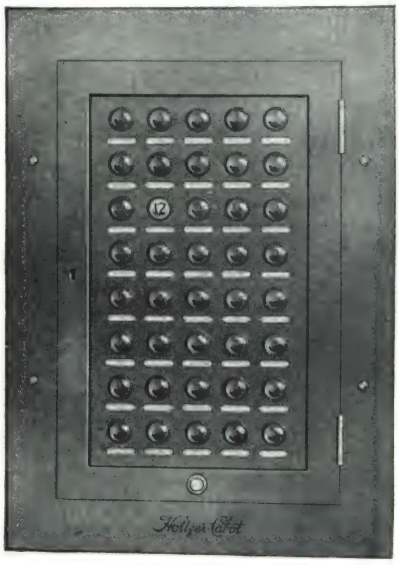
Pattern "B" Annunciator, Flush Type Group Reset

This annunciator has hinged door with lock and is furnished complete with outlet box. Buzzer mounted inside case.

DIMENSIONS PATTERN "B" FLUSH TYPE

No. of Lamps	Arrangement		No. 150280 with relays Outlet box, in.		No. 150300 without relays Outlet box, in.	
	High	Wide	High	Wide	High	Wide
4	2	2	10	8	9	8
6	2	3	10	9½	9	9½
9	3	3	12¾	9½	10¾	9½
12	3	4	12¾	11	10¾	11
16	4	4	15½	11	12½	11
20	4	5	15½	12½	12½	12½
25	5	5	19½	13¾	15½	13¾
30	5	6	19½	15¼	15½	15¼
36	6	6	22¼	15¼	17¼	15¼
42	6	7	22¼	16¾	17¼	16¾
48	6	8	22¼	18¼	17¼	18¼
56	7	8	25	18¼	19	18¼

Cardholders can be omitted if desired.



List 150280 and 150300

Pattern "B" Annunciator, Surface Type (Group Reset)

Has heavy bronze case hinged to a bronze base and is usually fastened to the wall by toggle bolts over a standard outlet box large enough to accommodate the number of wires required. Front of annunciator identical with flush type illustrated. Buzzer in case.

DIMENSIONS PATTERN "B" SURFACE TYPE

No. of Lamps	Arrangement		No. 150320 with relays Base size, in.		No. 150340 without relays Base size, in.	
	High	Wide	High	Wide	High	Wide
4	2	2	8¾	6½	6¾	6½
6	2	3	8¾	8	6¾	8
9	3	3	11½	8	8½	8
12	3	4	11½	9½	8½	9½
16	4	4	14¼	9½	10¼	9½
20	4	5	14¼	11	10¼	11
25	5	5	17	11	12	11
30	5	6	17	12½	12	12½
36	6	6	19¾	12½	13¾	12½
42	6	7	19¾	14	13¾	14
48	6	8	19¾	15½	13¾	15½
56	7	8	22½	15½	15½	15½

Cardholders can be omitted if desired.

Pattern "B" Annunciator, Desk Type—Group Reset

This type annunciator is furnished in solid cast bronze case with felt-covered bottom and includes 6 ft. silk-covered flexible cable for connecting. Cable may be equipped when desired with detachable plug and receptacle. See page 16—separable connectors.

This type is not furnished with relays. Use separate relay cabinet.

No. 150360

DIMENSIONS PATTERN "B" DESK TYPE, No. 150360

No. of Lamps	Arrangement		Base size, in.		Height at case, in.
	High	Wide	Width	Depth	
2	1	2	4	4⅜	6
4	2	2	5½	4⅜	6
6	2	3	7	4⅜	6
8	2	4	8½	4⅜	6
10	2	5	10	4⅜	6
12	3	4	11½	4⅜	6
16	4	4	14½	4⅜	6
20	4	5	17½	4⅜	6
24	4	6	20½	4⅜	6

Cardholders can be omitted if desired.

Continued on next page

PATTERN "H"—GLASS FRONT TYPE

Flush Mounting—Surface Mounting

Has opalescent glass front with blocked out markings on back. Markings are not visible until lamps are lighted. Each indication is 1½ in. square and allows for larger letters or figures than on bull's-eye type.

Pattern "H" Annunciator—Flush Type—Group Reset

Has hinged door with lock and is furnished complete with outlet box for mounting in wall. Buzzer mounted inside case.

DIMENSIONS PATTERN "H"—FLUSH TYPE ANNUNCIATORS

No. of lamps	Arrangement		No. 150065 with relays Outlet box, in.		No. 150066 without relays Outlet box, in.	
	High	Wide	High	Wide	High	Wide
6	2	3	10	9½	8⅞	8⅞
9	3	3	12¾	9½	8⅞	8⅞
12	3	4	12¾	11	8⅞	10⅜
16	4	4	15½	11	10⅜	10⅜
20	4	5	15½	12½	10⅜	11⅞
25	5	5	19½	13¾	11⅞	11⅜
30	5	6	19½	15¼	11⅞	13⅜
36	6	6	22¼	15¼	13⅜	13⅜
42	6	7	22¼	16¾	14⅞	16⅜
48	6	8	22¼	18¼	14⅞	17⅞
56	7	8	25	18¼	16⅜	17⅞

No. 150065

Pattern "H" Annunciator—Surface Type—Group Reset

Has heavy formed metal case, hinged to formed metal base for fastening to wall by toggle bolts. Base may be mounted over any standard outlet box large enough for number of wires required, or may be arranged for surface conduit is so ordered.

DIMENSIONS PATTERN "H"—SURFACE TYPE

No. of lamps	Arrangement		No. 150060 with relays Base size, in.		No. 150061 without relays Base size, in.	
	High	Wide	High	Wide	High	Wide
6	2	3	8½	7½	6	7½
9	3	3	11	7½	7½	7½
12	3	4	11	9	7½	9
16	4	4	13¾	9	9	9
20	4	5	13¾	10½	9	10½
25	5	5	16½	10½	10½	10½
30	5	6	16½	12	10½	12
36	6	6	19¼	12	12	12
42	6	7	19¼	13½	12	13½
48	6	8	19½	15	12	15
56	7	8	22¼	15	13½	15

PATTERN "W"—LARGE INDICATION TYPE

Has opalescent glass front and larger indications for use where the markings must be visible up to 30 ft.

Made in single and double face types. Each indication is 2x3 in. Not furnished with relays, use separate relay cabinet.

Pattern "W" Annunciator—Double Face Wall and Ceiling Suspended Mounting—Group Reset

Made with heavy formed steel case, having one face hinged to provide ready access to terminals and lamps.

Cases are identical for both wall and ceiling type, but mounting base is at top for ceiling mounting, and at side for wall mounting.

Ceiling type may be suspended on pipe support if desired.

When so ordered, a ceiling plate with pipe flanges is furnished, and top of annunciator is equipped with pipe flanges instead of mounting base.

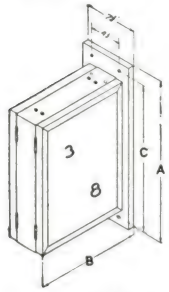
Special outlet boxes are included. Outlet boxes are 5½ in. wide, 3 in. deep, and are 1¼ in. shorter than mounting bases (dimensions A). For corner mounting a special bracket is furnished.

Pattern "W" Annunciator—Flush Mounting, Single Face and Double Face (for Partitions)—Group Reset

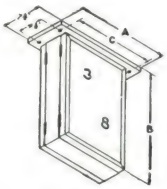
The front has hinged door with lock and an outlet box is included. The double face for partition mounting has door on one face only and outlet box must be made to order to exact thickness of wall. Where wall is thicker than annunciator, one face of annunciator will set inside outlet box. Where annunciator is thicker than wall, a steel mat of proper height will be furnished for one face.

Pattern "W" Annunciator—Surface Mounting, Single Face—Group Reset

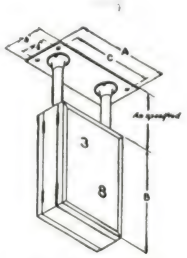
Made with heavy formed steel case, hinged to steel base. Base may be toggled to wall over standard outlet or pull box, or will be arranged for surface conduit when so ordered.



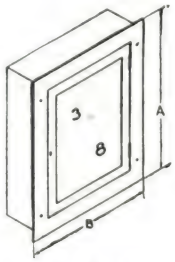
No. 150100
Wall Mounting



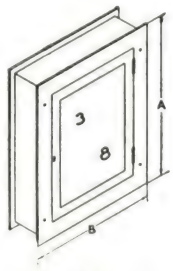
No. 150110
Ceiling Mounting



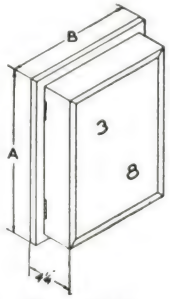
No. 150110C
Pipe Mounting



No. 150140
Flush Mounting



No. 150130
Partition Mounting



No. 150150
Surface Mounting

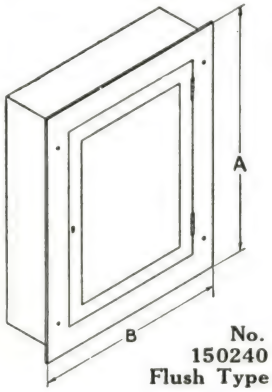
DIMENSIONS PATTERN "W"—LARGE INDICATION LAMP ANNUNCIATORS (INCHES)

No. of lamps	Arrangement		No. 150100 Wall mounting			No. 150110 and No. 150110C Ceiling or Pipe mounting			No. 150140 Flush mounting outlet box		No. 150130 Partition mounting outlet box		No. 150150 Surface mounting	
	High	Wide	A	B	C	A	B	C	High	Wide	High	Wide	A	B
6	3	2	14¼	11½	12¼	14¾	11	12¾	11¾	11¾	11¾	11¾	12¼	12¾
8	4	2	16¼	11½	14¼	14¾	13	12¾	13¾	11¾	13¾	11¾	14¼	12¾
10	5	2	18¼	11½	16¼	14¾	15	12¾	15¾	11¾	15¾	11¾	16¼	12¾
12	6	2	20¼	11½	18¼	14¾	17	12¾	17¾	11¾	17¾	11¾	18¼	12¾
16	8	2	24¼	11½	22¼	14¾	21	12¾	21¾	11¾	21¾	11¾	22¼	12¾
21	7	3	22¼	15¾	20¼	19	19	17	19¾	17¾	19¾	17¾	20¼	17
24	8	3	24¼	15¾	22¼	19	21	17	21¾	17¾	21¾	17¾	22¼	17
30	10	3	28¼	15¾	26¼	19	25	17	25¾	17¾	25¾	17¾	26¼	17
40	10	4	28¼	20¼	26¼	23½	25	21½	25¾	23¾	25¾	23¾	26¼	21½

Continued on next page

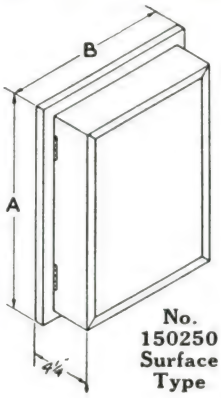
PATTERN "R" RELAY CABINETS—LOW VOLTAGE

As relay cabinets are usually placed in an inconspicuous location, they are furnished in plain finish steel cases. Hinged doors with lock are provided and relays are completely wired to terminal strips. Relays are of the double coil remote control type. Energizing one call closes the relay contacts and keeps the annunciator indication lighted until resetting coil is energized by pushing reset button. A separate momentary contact relay is included for sounding buzzer at annunciator. Relay cabinets are wired for group or individual reset as required. Where individual reset cabinets are furnished with annunciators having individual reset buttons, there is no extra charge. When relay cabinets are ordered for individual reset from separate button plate, extra charge is made for relay cabinet. Dimensions for flush or surface type identical. Outlet box for flush type 1 in. less each way.



No. 150240 Flush Type

No. of Relays	Dimensions, in. A	B
6	12½	10½
8	14½	10½
9	16½	10½
10	16½	10½
12	14½	14
15	16½	14
16	16½	16
18	16½	16
20	16½	16
21	18½	16
24	18½	16
25	18½	19½
30	18½	19½
36	20½	19½
40	22½	19½
48	24½	19½
56	26½	21½



No. 150250 Surface Type

LAMP ANNUNCIATORS—HIGH VOLTAGE

These annunciators have large indications 2¾ in. high and 4 in. wide and are designed to operate directly from the lighting circuit either a-c. or d-c. Indications are plainly visible at a distance of 100 ft.

Where these annunciators are required to operate from momentary contact push buttons, they must be of the high voltage type, and a special relay cabinet having heavy duty relays must be provided. Full data will be furnished on request.

Note: These annunciators are usually operated from standard lighting switches.

Pattern "Z" Annunciator—Double Face Wall, Ceiling, and Ceiling Suspended Mounting

Made with heavy formed steel case, having one face hinged.

Cases are identical for both wall and ceiling types, but mounting base is at top for ceiling mounting, and at side for wall mounting.

Ceiling type may be suspended on pipe support if desired.

When so ordered, a ceiling plate with pipe flanges is furnished, and top of annunciator is equipped with pipe flanges instead of mounting base.

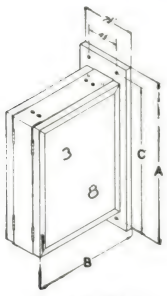
Special outlet boxes are included. Outlet boxes are 5½ in. wide, 3 in. deep and are 1¼ in. shorter than mounting bases (dimension A).

Pattern "Z" Annunciator—Flush Mounting, Single Face and Double Face (Partition Type)

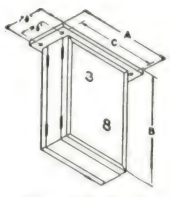
The front has hinged and locked door and an outlet box is included. The double face for partition mounting has door on one face only and the outlet box must be made to order to the exact thickness of wall. Where wall is thicker than annunciator, one face of the annunciator will set inside outlet box. Where annunciator is thicker than wall, a steel mat of proper height will be furnished for one face of annunciator.

Pattern "Z" Annunciator—Surface Mounting, Single Face

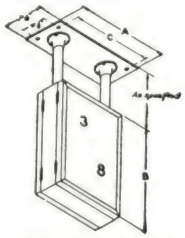
Made with heavy formed steel case, hinged to steel base. Base may be toggled to wall over standard outlet or pull box, or will be arranged for surface conduit when so ordered.



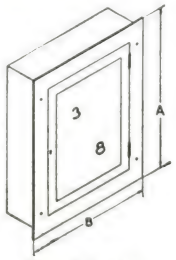
No. 150160 Wall Mounting



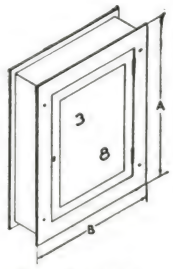
No. 150170 Ceiling Mounting



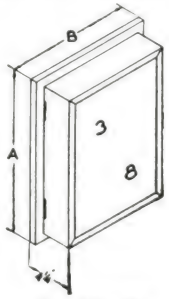
No. 150170C Pipe Mounting



No. 150200 Flush Mounting



No. 150190 Partition Mounting



No. 150210 Surface Mounting

DIMENSIONS PATTERN "Z"—LARGE INDICATION ANNUNCIATORS FOR 110-VOLT OPERATION (INCHES)

No. of lamps	Arrangement		No. 150160 Wall mounting			No. 150170 and No. 150170C Ceiling or Pipe mounting			No. 150200 Flush mounting outlet box		No. 150190 Partition mounting outlet box		No. 150210 Surface mounting	
	High	Wide	A	B	C	A	B	C	High	Wide	High	Wide	A	B
6	3	2	16½	14	14½	17¼	13¼	15¼	16½	17⅜	16½	17⅜	14¼	14⅞
8	4	2	19¼	14	17¼	17¼	16	15¼	19¼	17⅜	19¼	17⅜	17	14⅞
10	5	2	22	14	20	17¼	18¾	15¼	22¼	17⅜	22¼	17⅜	19¾	14⅞
12	6	2	24¾	14	22¾	17¼	21½	15¼	24¾	17⅜	24¾	17⅜	22½	14⅞
16	8	2	30¼	14	28¼	17¼	27	15¼	30¼	17⅜	30¼	17⅜	28	14⅞
21	7	3	27½	20½	25½	23¾	24¼	21¾	27½	23	27½	23	25¼	21½
24	8	3	30¼	20½	28¼	23¾	27	21¾	30¼	23	30¼	23	23	21½
30	10	3	35¾	20½	33¾	23¾	32½	21¾	35¾	23	35¾	23	33½	21½
40	10	4	35¾	26¼	33¾	29½	32½	27½	35¾	27	35¾	27	33½	27½

Continued on next page

PUSH BUTTONS AND CONNECTOR PANELS

Push Buttons and Button Plates for use with annunciators. Also Foot Rail Contactors, floor and counter type Buttons and Connector Panels for use with bank, office and miscellaneous signaling systems.

Elevator Call Buttons

150014

150015

The double push button is designed to be used in connection with "Up" and "Down" annunciators.

The single push button is suitable for ordinary annunciator signaling on all floors, or as an "Up" and "Down" button on the top or bottom floor where "Up-Down" signaling is installed.

Contacts are positive in action.

Front is a substantial casting, drilled to fit over single gang outlet box cover.

Finish is black.

Dimensions: Height, 5¼ in.; width, 3 in.

Midget Push Button

151080

Shell is turned from solid brass rod.

All insulation is moisture-proof bakelite.

Has heavy wiping contacts and combination screw and solder type terminals.

Furnished in either polished nickel or brushed brass rims with white pearl centers. Also furnished with radialized center. No. 150182.

Solid Bronze Directory Type Button Pads and Plates

Portable Type Button Pad No. 150493—Consists of solid cast bronze mat with face plate, felt covered bottom and a 6-ft. cord.

150496

150493

Its high-grade construction, neat design and compact size make it particularly desirable for executives' desks in business offices.

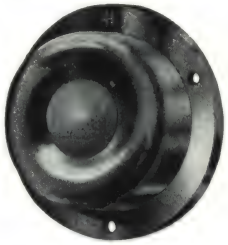
Flush Type No. 150496—Has bronze front plate and is designed for mounting flush on desk or wall.

This type is regularly furnished with special outlet box.

No. 150496 Flush Type			No. 150493 Portable Type		
No. of buttons	Dimensions, in. Height	Width	No. of buttons	Dimensions, in. Height	Width
2	4½	3⅞	1	2⅝	3¾
3	5⅜	3⅞	2	3¼	3¾
4	5⅞	3⅞	3	3⅝	3¾
5	6⅜	3⅞	4	4⅝	3¾
6	7¼	3⅞	5	5⅜	3¾
8	5⅞	6½	6	6	3¾
12	7¼	6½	8	4⅝	6⅜
16	8⅝	6½	10	6	6⅜
			12	7	6⅜
			16	7¾	6⅜

Standard finish—Natural bronze. Special finishes on order. Engraving on buttons or plate extra.

Watertight Push Buttons (Low Voltage)


151070

For use in exposed places. Capacity 2 amperes at 48 volts. Case is of cast composition.

Standard Type No. 151070, wires enter from back through separate holes. Type No. 151075 has a boss extending from back, tapped for ½ in. conduit. Both types are 2¾ in. in diameter.

High Voltage Push Buttons

Quick make-and-break mechanism. Sensitive in apparatus and is, therefore, especially adapted for code signaling.

Surface Type No. 151085 measures 2⅝ in. in diameter. Flush Type No. 151095 mounts on a standard single-gang switch plate. Both types rate 2 amperes, 115 volts.

151085

Desk Push Button Plates and Blocks

150055

Individual Ringing—*Type M*— Consists of metal plate with two contact buttons and mounts flush over outlet box.

Type MW—Same as Type M except plate mounts on a wood mat—no felt base.

Type MWB—Same as Type MW except has a felted base and 6-in. flexible cable.

Group and Individual Ringing—*Type G*—Consists of a metal plate with three contact buttons, mounts over outlet box.

Type GW—Same as Type G except plate mounts on a wood mat—no felt base.

Type GWB—Same as Type GW except has fitted base and 6-in. flexible cable.

Finish—Mats, black, oak or mahogany. Plates, black, nickel or brushed brass.

Note: Type G, GW and GWB can be furnished with the three contacts arranged for either multiple operation of contacts, or for group ringing having make-and-break contacts.

No. of buttons	Dimensions, in. Type M High	Wide	Dimensions, in. Type MW and MWB High	Wide	Dimensions, in. Type G, GW, and GWB High	Wide
1	4½	2¾	2½	2½		
2	4½	2¾	2½	2½		
3	4½	4⅜	3	2⅝		
4	4½	4⅜	3	2⅝		
6	4⅞	5⅜	4½	6⅝	7¼	4¾
8	5⅛	5⅜	5⅜	5⅜	7⅜	7¼
10					7⅜	8⅜
12	5⅛	6⅝	5⅝	6¾		
16	6⅛	6⅝	6¾	6¾	8¾	8⅝
20	6⅛	7⅞	6¾	7⅞	8¾	10
25	8⅜	7⅞	7⅞	7⅞	10⅛	10
30	8⅜	9⅛	7⅞	9	10⅛	11⅛

Continued on next page

Foot Switches

Rail Type—Heavy cast bronze construction with bronze tubing rail. For mounting on floor under counter. Concealed conduit type designed to fit Steel City Elec. Cat. 441 rectangular floor box complete, less cover. Contact mechanism in right hand box has four contacts and can be arranged for make or break

No. 150475

contacts or combination of both. Signals are sounded by lifting rail. Rail regularly furnished to lock in operated position, sounding alarm continuously. Furnished non-locking if desired. Standard length of rail is 24 in.—longer rail on special order.

Finish, natural cast bronze.

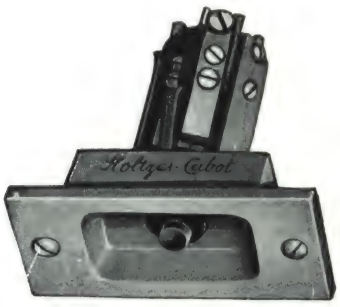
Foot Contact Button—Has same arrangement of contacts as rail switch type but cannot be furnished in locking type. Heavy cast bronze construction and includes cast bronze box for mounting over Steel City Floor Box Cat. 441, less cover.

No. 150478

Finish, natural cast bronze.

Flush Counter Buttons

Locking Type—Has four contacts and may be arranged to give momentary signal on one circuit and continuous signal on other circuits if required. Button



No. 150481

arranged to close circuits only and is reset by pressing release collar which surrounds push. Can be furnished with one or more buttons in same casting. Can be furnished non-locking if desired. Requires counter opening.

Finish, natural cast bronze.

No. 150487

Non-Locking Type—Made with heavy rolled bronze front plate, equipped with one or more midget type two-contact buttons; momentary type, make contact only. One-button plate is 1¼ in. wide and 2 in. long; each additional button adds 1⅛ in. to length of plate.

Type P Pinch Type Button—Furnished in two types, locking and non-locking. Locking type is released by a thumb latch shown in illustration. Its special feature of design is that contacts will not transmit a signal unless both buttons are pressed simultaneously.

This button was designed to meet a demand for an alarm button on which a call could not be turned on accidentally.

No. 150482

Bottom mechanism is mounted in a cast bronze frame and requires counter opening $4\frac{9}{16}$ in. long and 1 in. wide and 2½ in. deep.

Separable Connectors (Low Voltage)

A multiple contact plug and receptacle for use in connection with portable cables for push button pads, annunciators, etc.

Made in two types, flush type for wall mounting over outlet and floor duct type for connection to any underfloor duct system. These connectors are very desirable for use with push button blocks, annunciators, telephones and other devices on office desks, as they provide means for quickly disconnecting and reconnecting these devices for the purpose of their removal or moving of desks.

The design is such that plug cannot be replaced improperly.

These connectors are not suitable or approved for use on lighting circuits.

In both types the plugs and receptacles are identical. Plugs are of ball type, plugging into split spring bronze receptacles, insuring a positive grip and electrical connection. The separation of plug and receptacle requires considerable pull, which prevents accidental disconnection.

Both types are furnished in 4 and 10 contact units. Larger sizes are furnished in multiples of 10 contact units.

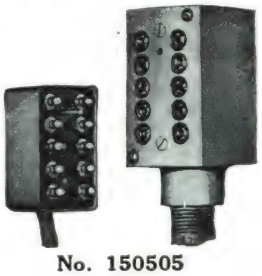
Flush Type Connectors—These connectors are furnished complete with plug, receptacle and plate.

The 4 and 10 point units fit single gang box.

Each additional unit of 10 requires an extra gang in box.

No. 150502

Floor Duct Type—This is furnished complete with plug and cast bronze conduit boxes for attaching to any make of standpipe connection to underfloor direct system. Can be furnished tapped for other pipe threads to order. The 4 and 10-point connectors are as shown in cut. The 20-point connectors have two 10-point receptacles mounted back to back on same casting. The 30 and 40 point sizes will have same arrangement using three or four sides of conduit box.



No. 150505

Continued on next page

BELLS, BUZZERS AND HORNS

Alternating Current—12, 24 and 110 Volts

Type "UD" Bell

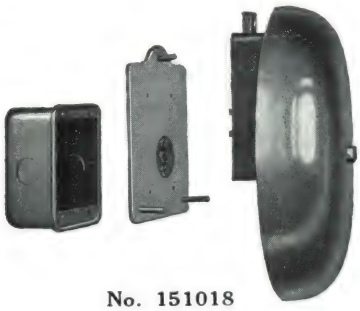
This is an underdome type bell in which the mechanism is entirely concealed under the gong. The mechanism is synchronous in operation, but not of the solenoid type. Has no contact or sliding plunger to wear or stick.

The attractive feature of the bell is the method of mounting and connecting. The gong case containing the mechanism mounts to a separate back plate fitting a standard box and is held securely by one locknut.

There is a heavy duty, 2-way plug on the gong and a receptacle on the back of the plate with terminals for wires.

When installing, wiring is connected to plate receptacle which in turn fastens to outlet box. The bell is simply plugged in and then fastened by a lock nut.

Made in 3, 4, 6, 8, 10 and 12-in. sizes, fitting a special outlet box which is included in price of bell. Finish is black.



No. 151018
12, 24 or 110 volts

Type "PS" Bell

This bell is of the polarized type, and has no pivots or contacts of any kind. It is particularly suitable where a large number of bells are to be sounded simultaneously, as the current requirements are very low and heavy wiring is not necessary. Case and cover of cast iron; gong, steel; finish, black.

No. 151170

Case is drilled to mount on standard two-gang switch box or surface type outlet box can be furnished. Can also be furnished with full grid of cast aluminum over gong. Made in 6 and 8-in. sizes. Can be furnished with 4 or 6-in. cow gong where different tone gong is required.

No. 151110
12, 24 or 110 volts

Type "DG" Bell

This is a polarized bell having two gongs, and is without pivots or contacts of any kind. Base and cover are of heavy pressed steel, finished black; gongs of steel, finished nickel plate. Current requirements are low. Made in 6 and 8-in. sizes. Can be furnished with 4 or 6-in. cow gongs where different tone gong is required.

No. 151119

Small Double-Gong Bells

This is a 2½-in. double gong polarized bell, having no contacts, and is recommended where a large number of small bells are required to operate simultaneously. Has cast iron frame with brass cover and steel gongs; finish, black with nickeled gongs.

Industrial Horn

This is a vibrating horn furnished for alternating current without contacts. Case is of heavy cast iron and equipped with two knockouts on sides and one in base for ½-in. conduit. Diameter of base, 6 in. Current requirements:

12V	24V	110V
amp.	amp.	amp.
2.2	2	.04

No. 151125

Type "A" Weatherproof Schoolyard Gong

This is a thoroughly weatherproof, though not watertight gong, suitable for outdoor use. Housing and wire screen are of heavy galvanized steel. Mat and housing painted dull green. Gang polished bell metal made in 8, 10 and 12-in. sizes.

No. 151036

"HD" Bell

Has simple, rugged mechanism with automatically locked adjusting screw and base of high test insulating material thoroughly insulating current carrying parts. Mechanism entirely enclosed in both buzzer and bell. Finish, black; bell gong, nickel.

No. 151048

Continued on next page

No. 151045

Type "S" Buzzer (Heavy Duty)

This is loud-toned buzzer and will give long life under the most severe service conditions. Has heavy cast iron case, triple set of coin silver contacts, enclosed terminals, and all current-carrying parts are thoroughly insulated from case. Can be furnished for 12, 24 and 110 volts. Size 3¾ in. wide x 4¼ long x 2 in. deep.

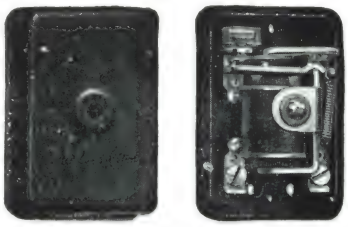
Type "MC" Buzzer

Metal case buzzer. Has heavy cast iron case with outside terminals and outside adjustment. Recommended where a loud-toned buzzer is required. Finish, black and nickel. Overall dimensions, 3x3½x1 in. deep. Furnished for 12 and 24 volts only.

No. 151040

"HD" Buzzer

Has dustproof cover as shown. Has simple and rugged mechanism with automatic locking adjustment. Mounted on insulated base of high test material. Furnished for 12 and 24 volts only. Size 2½x1¾x1⅞ in. deep. Can be furnished mounted on front or back of a standard switch plate.



No. 151052
The HD Buzzer Cover Removed Showing Mechanism

List 151061

Type "YB" Return Call Buzzer

This is a flush type buzzer and push button combined. The mechanism is mounted on steel yoke for mounting on single-gang box. Plate separate. Single gang. Finish, brush brass. Furnished for 12 and 24 volts only.

Transformers

This is an approved transformer, of extra large size, having separate primary and secondary. Will give continuous service at full rated voltage without overheating. Furnished with secondary taps to provide adjustment of voltage as follows: 12-volt secondaries tapped for 10-12 volts, 24-volt secondaries tapped for 18-20-24-26 volts.

List No.	Capacity, watts	Volts	
		Primary	Secondary
151019	50	110	12 or 24
	125	110	12 or 24
	250	110	12 or 24
	500	110	12 or 24

No. 151019

TABLE OF CURRENT REQUIREMENTS FOR A-C. BELLS AND BUZZERS—AMPERES

Voltage		UD bell 3 and 4 in.	UD bell 6 and 8 in.	UD bell 10 and 12 in.	PS bell 6 and 8 in.	DG bell 6 and 8 in.	Small DG 2½ in.	Type A yard gong 8, 10 and 12 in.	Type "S" metal case buzzers	HD bell buzzer return call buzzer
Cycles	Volts									
60	12	0.25	0.60	0.80	0.35	0.35	0.25	3.0	0.25	0.25
	24	0.15	0.45	0.60	0.22	0.22	0.2	1.8	0.15	0.20
	110	0.03	0.09	0.12	0.04	0.06	0.04	0.3	0.03	.....
25	12	0.20	0.45	0.60	0.25	0.25	0.20	1.7	0.20	0.20
	24	0.12	0.35	0.45	0.15	0.15	0.12	0.77	0.12	0.15
	110	0.03	0.07	0.1	0.04	0.04	0.03	0.1	0.03	.....

BELLS, BUZZERS AND HORNS

Direct Current—12, 24 and 115 Volts

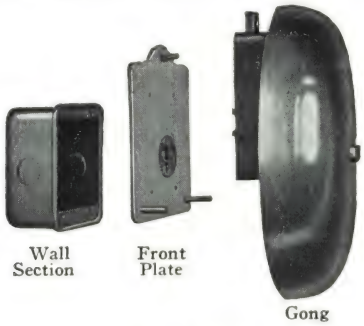
Type "UD" Bell

This is an underdome type bell in which the mechanism is entirely concealed under the gong. The heavy duty vibrating mechanism has laminated core and triple silver contacts.

The attractive feature of the bell is the method of mounting and connecting. The gang case containing the mechanism mounts to a separate back plate, fitting a standard box, and is held securely by one lock nut.

There is a heavy duty 2-way plug in the gong, and a receptacle on the back plate which has terminals for wires.

When installing, wiring is connected to plate receptacle which in turn fastens to outlet box. The bell is then simply plugged in and fastened by lock nut.



Wall Section | Front Plate | Gong

No. 151046

Made in 3, 4, 6, 8, 10 and 12-in. sizes fitting a special outlet box which is included in price. Finish is black.

Type "S" Bell

A vibrating bell having triple contacts of coin silver. Has heavy cast iron base and cover, and steel gong; finish, black. Made in 3, 4, 6, 8, 10 and 12-in. sizes. A special outlet box for surface of flush conduit can be furnished. 6-in. size and larger can be wound to operate on 115 volts d-c.

No. 151020

Industrial Horn

This is a vibrating horn furnished for direct current. Case is of heavy cast iron and equipped with two knockouts on sides and one in base for ½-in. conduit. Diameter of base 6 in. Current requirements:

12V amp.	24V amp.	115V amp.
2.2	2.	—4

No. 151125

Continued on next page

Watertight Schoolyard Gong

For mounting on the outside of schools and similar purposes the bell is watertight and furnished with green painted wood mat with cast iron hood, and heavy galvanized screen guard as shown. Made in 10 and 14 in. sizes.

List No. 151035

Type "S" Buzzer

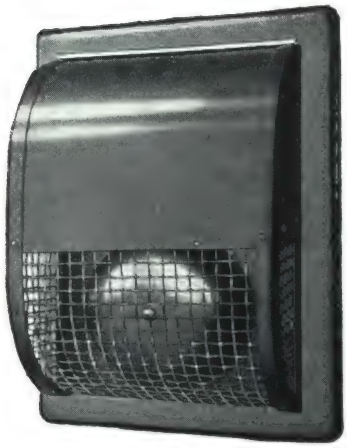
This is a loud-toned buzzer and will give long life under the most severe service conditions. Has heavy cast iron case, triple set of coin silver contacts, enclosed terminals, and all current-carrying parts are thoroughly insulated from case. Can be furnished for 12, 24 or 115 volts. Size, 3¾ in. wide x 4¼ in. high x 2 in. deep.

No. 151045

No. 151040

Type "MC" Buzzer

Metal case buzzer. Has heavy cast iron case with outside terminals and outside adjustment. Recommended where a loud-toned buzzer is required. Finish, black and nickel. Overall dimensions, 3x3½x1 in. deep. Furnished for 12x24 volts only.



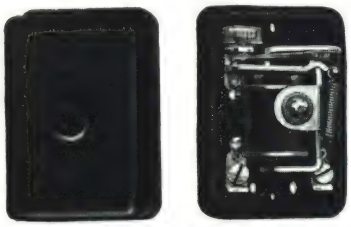
No. 151033

Type "D" Weatherproof Schoolyard Gong

This is a thoroughly weatherproof, though not watertight gong, suitable for outdoor use. Bell is our standard Type S. Housing and wire screen are of heavy galvanized steel. Mat and housing painted dull green. Made in 8, 10 and 12 in. sizes.

"HD" Buzzer

Has dust proof cover as shown. Mechanism is rugged and simple with automatic locking adjustment, mounted on insulated base of high test material. Furnished for 12 and 24 volts only. Size 2x1¾x1⅞ in. deep. Can be furnished mounted on front or back of a standard switch plate.



No. 151052

The "HD" buzzer cover removed showing mechanism

"HD" Bell

Has simple, rugged mechanism with automatically locked screw and base of high test insulating material. Mechanism entirely enclosed in both buzzer and bell. Finish, black; bell gong, nickel. Diameter, 2⅝ in.

No. 151048

No. 151061

Type "YB" Return Call Buzzer

This is a flush type buzzer and push button combined. The mechanism is mounted on steel yoke for mounting on single-gang box. Plate separate. Finish, brush brass. Furnished for 12 and 24 volts only.

TABLE OF CURRENT REQUIREMENTS FOR D-C. BELLS IN AMPERES

Voltage, volts	Type UD and S 3 and 4 in.	Type UD and S 6 and 8 in.	Type UD and S 10 and 12 in. Type D weatherproof gong	Watertight yard gong	Metal case and Type S buzzer	HD bell buzzer return call buzzer
9-12	.16	.2	.2	.2	.2	.14
20-24	.09	.12	.18	.25	.12	.09
115	.04	.05	.08	.1	...	...

Continued on next page

NURSES' SILENT CALL SYSTEMS

The Holtzer-Cabot Nurses' Call System is the development of over fifty years of experience in manufacturing signal systems of various types for hospitals. Our first "silent call" or lamp signal system with locking button was installed in 1910 in Grace Hospital, Detroit, Mich. A patent was immediately applied for and granted in 1916. Its advantages over existing systems were so great that its adoption has been almsot universal and since that time it has been installed in over 2000 hospitals throughout the country. It is made in two types, the Low Voltage System and the High Voltage System.

(Patients' Signal Telephone System can be combined with Locking Button System. See page 26)

THE LOW VOLTAGE SYSTEM

Locking Button—Low Voltage Type

Experience gained through the installation of many systems has shown that the Low Voltage (12 volt) System is generally more satisfactory. The component parts of the system are described in the following pages. The combination of these parts into a complete system to suit the needs of any particular institution is almost unlimited.

Reliability Insured by Design, Material and Workmanship

The Holtzer-Cabot System is the cumulative result of experience gained in manufacturing systems for over 2000 hospitals. The design, material and workmanship are such as to insure absolute reliability for long and satisfactory service.

Simple and Complete Operation

The system is set in operation by the patient. A slight pressure on the locking button, which lies on the bed and is connected to a wall station by means of a plug and cord, establishes contacts which light lamps in annunciators and various types of signaling stations installed throughout the hospital. These signals consist of units which can be assembled in different groups on gang plates to fill a wide variety of signaling requirements. Once the locking button is depressed, the signals set up are maintained until the nurse reaches the patient's bedside and resets the calling button. The signals cannot be restored in any other way.

The time elapsing between the patient's call and the nurse's arrival may be recorded on an elapsed time recorder which is designed for the purpose of providing a permanent record of the service given to every patient. On the paper chart included in this device is shown the exact time the call was made and the time required for the nurse to answer.

Holtzer-Cabot Locking Button

This is the heart of the Holtzer-Cabot System. First manufactured in 1910, it has been constantly improved and strengthened and is today one of the simplest, most durable and most positive device of its kind. All contact springs have a current carrying capacity of 10 times the maximum load and are backed up by heavy brass stop plates, positively preventing any loss of spring tension. The plunger is operated by a separate piano wire spring. It does not depend on any action of the contact springs for its restoration. Resetting collar has a separate spring for restoring and does not depend on plunger spring.

The mechanism is assembled on a heavy bakelite moulding enclosed in a heavy bakelite shell. Plunger is of bakelite reinforced for its entire length. The button is practically unbreakable. Due to the fact that no riveted or permanently fastened parts are used, worn parts may be readily replaced, instead of buying a new button each time.

The Operating Mechanism of the System Is All in the Holtzer-Cabot Locking Button

No operating devices are installed in the walls in the Holtzer-Cabot System. Therefore, should trouble develop, it can be confined to a single station. Any locking button unit may be instantly replaced by another by the nurse or attendant, thereby eliminating the confusion and annoyance of a workman in the sick room. There are no other operating devices.

The Holtzer-Cabot System Has a Very High Factor of Safety

The Holtzer-Cabot System is tested and listed as standard by the Underwriters' Laboratories and complies with all insulation requirements for 115-volt service. As the system operates on 10 volts, the factor of safety is very large. There are no exposed parts in the locking button that may become "alive."

Other Holtzer-Cabot Equipment Features

Cords—A flexible waterproof cord is used exclusively on all Holtzer-Cabot hospital calling systems. The rubber on this cord is of the purest grade without braid covering of any kind. It is highly durable and hygienic.

Lamps—The lamps furnished with annunciators, pilot stations, bull's-eye stations, etc., have a normal maximum voltage of 16. The candle power of the lamps is such that by operating them at 12 volts, sufficient illumination for all signaling purposes is secured. At the same time, the life of the lamps is lengthened greatly.

Audible Signal—A buzzer, furnished as a part of each nurses' annunciator or pilot station, sounds momentarily only. The lamp signals remain lighted until the call is answered. A switch is furnished at each buzzer station to prevent the buzzer sounding whenever complete silence is desired.

Continued on next page

CALLING AND RESETTING STATIONS

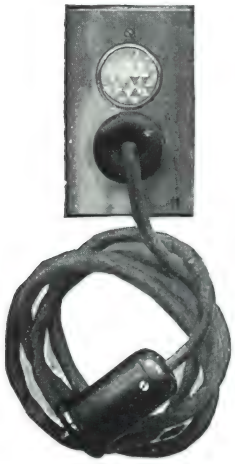
No. 162002

Private Room Calling Station

This is principally a private room station but may be used in small wards where a signal lamp is not required at each bed. This station consists of a locking button, a flexible cord, an easily detachable plug, a special receptacle for wall mounting and a face plate. Receptacle is mounted on an adjustable yoke to which the plate fastens.

Will fit any standard single-gang switch box cover having a clear opening 1¾ in. wide by 2⅞ in. high. For surface mounting use National Metal Molding fitting No. 439 or Wiremold fitting No. 5748.

Install 2 ft. to center above the floor.



No. 162003

Ward Calling and Indicating Station

This is the standard ward station and is the same as No. 162002 with the addition of a bull's-eye signal which enables the nurse on entering the ward to determine at a glance from which bed the call came. The bull's-eye is removable so that it is possible to renew the lamp which is mounted behind it without taking the plate from the wall. The receptacle is mounted on an adjustable yoke to which the plate fastens.

Will fit the same boxes and fittings as the No. 162002.

Install 5 ft. to center above the floor.

Private Room Calling and Emergency Station

This station is the same as No. 162002 with the addition of an emergency locking button mounted in the plate. The emergency button is for use in critical cases and enables the nurse who answers the patients' calls to summon the doctor or another nurse. The receptacle is mounted on an adjustable yoke to which the plate fastens.

Will fit the same boxes and fittings as No. 162002.
Install 5 ft. to center above the floor.

No. 162004

No. 162005

Ward Calling, Indicating and Emergency Station

This station is the same as No. 162003 with the addition of an emergency locking button for summoning the doctor or another nurse.

The receptacle is mounted on an adjustable yoke to which the plate fastens.

Will fit any standard deep type box with two-gang cover having a clear opening 3⅜ in. wide by 2⅞ in. high and at least 2¾ in. deep. For surface mounting use 2 Gem XS boxes, and National metal moulding No. 442 or Wiremold No. 5752 fittings.

Install 5 ft. to center above the floor.

Wall Type Calling Station, No. 162006

Designed for use in toilets, operating rooms, etc. This station is not equipped with a cord and plug, but has the locking button mounted on a yoke to which the plate is secured,

Will fit any standard deep type outlet box with single-gang cover having a clear opening 1¾ in. wide by 2⅞ in. high and at least 2¾ in. deep. For surface mounting use Gem XS box and National Metal Molding No. 441 or Wiremold No. 5751.

Install 5 ft. to center above floor.

No. 162006

Wall Type Calling and Emergency Stations

This is the same station as No. 162006 but with the addition of an emergency locking button mounted directly under the calling button for summoning the doctor or another nurse.

Will fit the same boxes and fittings as the No. 162006.

Install 5 ft. to center above the floor.

No. 162007

No. 162010

Weatherproof Balcony Calling Station

Designed for exposed locations, such as porches and balconies. This station is similar to No. 162002 with a 15-ft. cord and a rubber gasket for installing between plate and wall. Plate has a lift cover to protect the receptacle when not in use.

Will fit the same boxes and fittings as No. 162002.

Install 5 ft. to center above the floor.

Extra Cords and Double Cords

All calling stations requiring cords are furnished complete with cord plug and button. We recommend that a reasonable number of extra cords, plug and button units be provided so that as units wear out in service extra units will be available for immediate replacement.

Double Cords—Give calling service to two beds from one outlet. For use in cases of emergency where extra beds must be installed temporarily, this unit with two cords and two buttons attached to the same plug may be substituted for the standard unit. May also be used between two adjacent beds in wards. However, this practice is not recommended as there is but small saving over two separate stations.

Special Plates for Gang Combinations

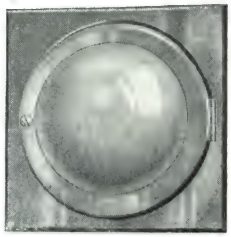
Sometimes it is desired to include in the same plate with a calling station receptacles, switches or jacks which are part of other installations. For this purpose gang plates with various combinations are furnished.

The use of combination plates is not recommended due to the extra cost of installing multiple gang outlet boxes and the extra labor involved in fitting the units properly. The saving in cost is negligible and the installation of separate units gives a better appearance and lessens the chance of confusion with cords.

Continued on next page

NURSES' SIGNAL STATIONS

Corridor Lamp Stations



No. 162026

Single Dome

Used over doors to private rooms and wards. Consists of a two-gang switch plate equipped with a white glass dome secured to a mounting ring hinged to the gang plate. As many as four lamps in candelabra base receptacles can be mounted under this dome.

Fits standard outlet box with two-gang cover having a clear opening 3 3/32 in. wide by 2 7/8 in. high, and not less than 2 3/4 in. deep. For surface mounting, one and two-lamp, furnished to fit National Metal Molding No. 365 or Wiremold No. 5738 fixture box. Three and four-lamp furnished to fit National Metal Molding No. 440 or Wiremold No. 5747 two-gang fittings.

Double Dome

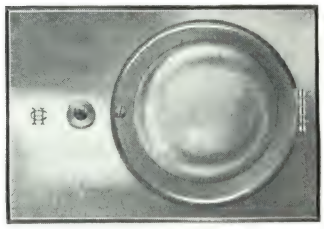
Used over doors to private rooms and wards for systems employing the emergency call and for use as a pilot to indicate the section of the floor from which a call is made. When used on emergency call systems a white light under one dome indicates a nurse's call and a red light under the other dome shows an emergency call.

Will fit any four-gang outlet box with cover having a clear opening 7 1/4 in. high by 2 7/8 in. wide. For surface mounting a special mat is required.

No. 162026X

Duty Room and Diet Kitchen Stations

Dome Type Pilot Lamp and Buzzer Station

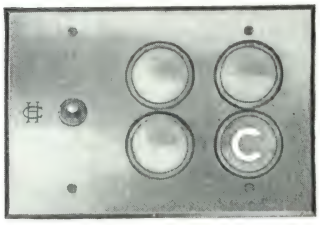


No. 162027

Has three-gang switch plate and the same equipment as No. 162026 with the addition of a flush type buzzer mounted on the back of the plate and cut-off switch on the front. Buzzer sounds momentarily when lamp lights to call attention to the signal. As many as four lamps in candelabra base receptacles can be mounted under this dome.

Fits standard outlet box with three-gang cover having a clear opening 5 3/32 in. wide by 2 7/8 in. high, and not less than 2 3/4 in. deep. For surface mounting a special mat is required.

"GB" Annunciator Type Pilot Lamp and Buzzer Station



No. 162028

Used where it is desired to indicate the section or ward calling. Similar to No. 162027 except that the various pilot lamps have individual caps which are lettered so that when a lamp is lighted it indicates a definite location. Furnished with as many individual lamps as required.

Standard 2-lamp station fits standard outlet box with two-gang cover having clear opening 3 3/32 in. wide by 2 7/8 in. high and not less than 2 3/4 in. deep. Additional pairs of lamps increase the size of the outlet box and plate by one gang up to 8 indications. Above 8 lamps the arrangement will be such as to make the plate as nearly square as possible. A special outlet box is furnished with each station over 8 lamps. For surface mounting a special mat is required.

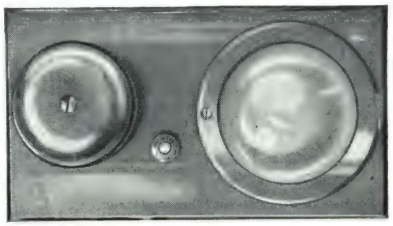
Flush Type Buzzer Station

No. 162031

Used as a supplementary signal in locations where a signal is desirable but a lamp station is not required. May be used in place of No. 162027 where conditions of economy make this necessary. Consists of a single-gang switch plate with a flush type buzzer mounted on the back and a cut-out switch on the front.

Fits standard outlet box with single-gang cover having a clear opening 1 13/32 in. wide by 2 7/8 in. high, and at least 2 3/4 in. deep.

Dome Type Pilot Lamp, Buzzer and Emergency Bell Station

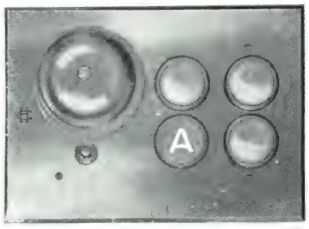


No. 162030

Used with systems employing the emergency call. Has four-gang switch plate and same equipment as No. 162030 with the addition of a bell which rings when emergency button is depressed and continues to sound until the call is answered and the button reset.

Fits any standard outlet box with four-gang cover having a clear opening 7 1/4 in. wide by 2 7/8 in. high, and at least 2 3/4 in. deep. For surface mounting a special mat is required.

"GB" Annunciator Type Pilot Lamp, Buzzer and Emergency Bell Station



No. 162029

Used with systems employing the emergency call. Similar to No. 162028 with the addition of a bell which rings when the emergency button is depressed and continues to sound until the call is answered and the button reset. Furnished with as many individual lamps as required.

The 4-indication size illustrated fits standard outlet box with four-gang cover having a clear opening 7 1/4 in. wide by 2 7/8 in. high, and at least 2 3/4 in. deep. Additional pairs of lamps increase the size of the outlet box and plate by one gang up to eight indications. Above 8 lamps the arrangement will be such as to make the plate as nearly square as possible. A special outlet box is furnished with each station above 8 lamps. For surface mounting a special mat is required.

Flush Type Buzzer and Emergency Bell Station

No. 162033

Similar to No. 162031 with the addition of a bell which rings when the emergency button is depressed and continues to sound until the call is answered and the button reset.

Fits the same outlet box as No. 162031.

Emergency Bell Station, No. 162034

Equipped with emergency bell only. For use as a supplementary signal in doctors' rooms, etc. Appearance same as 162033.

Fits the same outlet boxes as No. 162031. Not illustrated.

Continued on next page

NURSES' AND SUPERINTENDENT'S LAMP ANNUNCIATOR

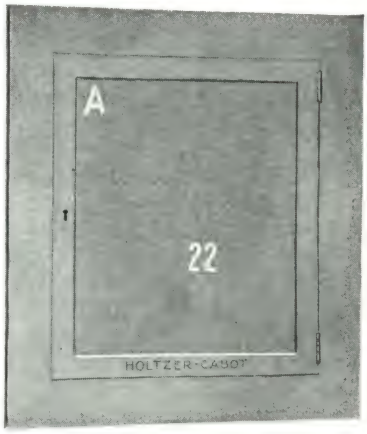
This annunciator is usually placed in the duty room at the nurses' desk or in the superintendent's office.

The indications consist of blocked-out letters or figures. They are placed on the back of the glass and are not visible until the lamp is lighted. Space for each indication is 1¼ in. square.

Special combination lamp sockets and porcelain reflectors are mounted on an asbestos wood panel with terminals on the back. Panel is hinged and swings out through the door opening, making the terminals easily accessible.

Made for flush mounting with metal trim and for surface mounting with a metal case.

Nurses' annunciators, unless otherwise specified, are equipped with a buzzer to call the nurses' attention to the lighted signal. A flush type control switch is mounted on the trim to cut out the buzzer. Superintendent's annunciators are not usually equipped with a buzzer, but have the front subdivided and marked for respective floors and sections.



No. 162052

Outlet boxes are furnished with all flush type lamp annunciators. They are 1 in. smaller each way than trim size, and 4¼ in. deep.

DIMENSIONS OF STANDARD LAMP ANNUNCIATORS

No. of stations	Dimensions, in.				
	List No. 162052 flush type, trim size		List No. 162050 surface type		
	High	Wide	High	Wide	Deep
6–9	9¾	9¾	8⅞	8⅞	4¼
10–16	11¼	11¼	10⅜	10⅜	4¼
17–20	11¼	12¾	10⅜	11⅞	4¼
21–25	12¾	12¾	11⅞	11⅞	4¼
26–30	12¾	14¼	11⅞	13⅜	4¼

Note: When emergency bell is ordered, annunciator cases are 1½ in. higher. On flush type outlet box is 1 in. less each way.

ELAPSED TIME RECORDER

This instrument provides an invaluable check on the nursing service, particularly in larger institutions. By means of punched holes on a paper time chart it furnishes a permanent authentic record of every patient's call. The record shows the number of the station calling, the time at which the call is made, and the time required by the nurse to answer the call.

The recorder consists of one or more electrically operated units operating the required number of paper time charts, and any number of 50 station units may be assembled in one cabinet. The mechanism is operated by a master clock furnished as a separate unit. The recorder is furnished in a wood cabinet.

Operation — Recording is effected by electro-magnets, one connected to each patient's calling station. A separate recording magnet should be provided for each patient's station, whether in a private room or a ward. Immediately a patient presses the locking button, this instrument perforates a strip of paper and for every minute a call remains unanswered, a hole is made in the traveling paper strip. Thus the exact time the patient sends in the call and the exact number of minutes elapsing until it is answered by the nurse is recorded. The paper roll is of sufficient length to give a continuous record for 15 days and can be readily renewed.

Note: Where elapsed time recorder is required complete installation data should be secured from the factory before proceeding with conduit or wiring.

Sizes—The recorder is regularly furnished in two sizes for wall mounting and in six sizes for floor mounting. For very large hospitals can be made with any required number of sections. Cabinets are of wood finished as required.

No. 162072, Elapsed Time Recorder

CABINET DATA

No. stations	Type	Dimensions, inches		
		High	Wide	Deep
50	Wall	27¾	21⅞	12¾
100	Wall	27¾	32½	12¾
150	Floor	66	32¼	14¾
200	Floor	66	32¼	14¾
250	Floor	66	62¼	14¾
300	Floor	66	62¼	14¾
350	Floor	66	62¼	14¾
400	Floor	66	62¼	14¾

POWER SUPPLY

No. 162080

Transformers

The Nurses' Call System described in this bulletin is designed to operate on a step down transformer connected to the lighting or power circuit.

The transformers listed are of the insulated type, have a particularly low core loss, and will carry full rated load without undue heating or voltage drop.

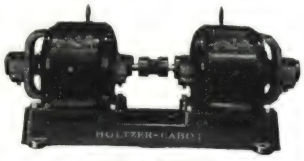
Furnished in 125, 250, 500, 1000 and 2000 watt capacities.

Secondary voltage 10, 12 and 14.

Motor Generator

Where direct current only is available, we recommend the installation of duplicate sets of motor generators. Holtzer-Cabot motor generators are designed particularly for 24-hour continuous operation and under the most severe service have made an enviable record. They are furnished as illustrated, direct connected on cast iron sub-base with flexible coupling. Furnished in 150 and 275 watt capacities, generator voltage 11 to 13 compound wound.

Note: We do not recommend operating this calling system from batteries.



No. 162320

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SPECIFICATIONS FOR NURSES' CALL SYSTEM

Architect's Specifications, System "A"

General—Furnish and install a Holtzer-Cabot Nurses' Call System as covered by these specifications, system to be wired and connected and left in first-class operating condition.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—At each bed there shall be a station having a cord with a locking call button attached. A patient desiring a nurse shall press the locking call button which shall cause a lamp signal to light at the following locations: over patient's room door, corridor side; in the annunciator at nurses' desk, and in duty room and diet kitchen. At the same time there shall sound momentarily a buzzer in the annunciator and in duty room and diet kitchen. The locking call buttons shall be so designed as to permit of the buzzer being sounded repeatedly, if necessary, in order to attract attention, but all lamp signals must remain lighted until the call is reset by the nurse at the patient's bed.

Calling Stations—Install at each bed where indicated by symbol* ⋋ on plans a nurses' call station No. 162002. The station shall consist of a single gang brass plate with receptacle mounted on separate yoke and having a detachable plug with 6-ft. cord and locking call button. Station shall be located 18 in. above floor line.

Corridor Lamp Stations—Install in the corridor over the door of each ward and private room, at points indicated by symbol* ⋋ in the plans, a dome type corridor lamp station list No. 162026. The station shall consist of a two-gang brass plate having mounted thereon a hemispherical glass dome covering a candelabra base receptacle and lamp. The glass dome shall be frosted white inside so as to give marked contrast between lighted and unlighted condition. This station shall fit any two-gang outlet box or cover.

Nurses' Annunciator—Install at nurses' desk on each floor, at point indicated on the plans by symbol* ⋋ a flush type lamp annunciator, list No. 162052. This annunciator shall be of the flush type, all metal, and provided with the necessary number of lamps to give one indication for each room or ward on the floor. It shall be of hinged door construction and equipped with lock. The glass shall be white coated on the inside. There shall be an audible signal (buzzer) contained inside the case which shall have a control switch mounted flush on the outside of the trim by means of which the audible signal (buzzer) may be cut in or out of the circuit as may be desired.

The markings shall be so arranged that they will show the letter or number of the station calling only while the call remains on. No indications are to be visible unless call is on. Markings shall be as directed by architect.

Pilot Stations—For nurses' duty room and diet kitchen shall be No. 162027, shall consist of a brass plate having a dome light identical to that specified for corridor lamp stations, and in addition shall contain a concealed buzzer with cut-off switch on front of plate. This station shall fit a three-gang outlet box cover.

Operating Current—The system shall operate on 10 volts a-c. Current shall be taken from the regular lighting mains and reduced to the proper voltage by a transformer to be furnished with the system.

Wiring—All wiring used in this system must be run in approved iron conduit in the same manner as for lighting service. All wires on each floor shall be No. 14 B&S rubber covered, and all risers shall be No. 10 B&S rubber covered. The system shall be wired in accordance with the wiring diagram to be furnished by the manufacturer of the system.

*Use Standard Electric Code Symbol.

Architect's Specifications, System "B"

General—Furnish and install a Holtzer-Cabot Nurses' Call System as covered by these specifications, system to be wired and connected and left in first-class operating condition.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—At each bed there shall be a station having a cord with a locking call button attached. A patient desiring a nurse shall press the locking call button which shall cause a lamp signal to light at the following locations: over patient's room door, corridor side; in the annunciator at nurses' desk; in duty room and in diet kitchen. (In addition, stations in public wards shall light a bull's-eye in wall plate behind patient's bed.) At the same time there shall sound momentarily a buzzer in the annunciator, and in duty room and diet kitchen. The locking call buttons shall be so designed as to permit of the audible signal (buzzer) being sounded repeatedly, if necessary, in order to attract attention, but all lamp signals must remain lighted until the call is reset by the nurse at the patient's bed.

Calling Stations—Install at each bed in private rooms where indicated by symbol* ⋋ on plans a nurses' call station No. 162002. The station shall consist of a single gang brass plate with receptacle mounted on separate yoke and having a detachable plug with 6-ft. cord and locking call button. Station shall be located 18 in. above the floor line.

Install at each bed in public wards where indicated by symbol* ⋋ on plans a nurses' call station No. 162003. This shall be the same as the private room calling station with the addition of a bull's-eye on the wall plate located 5 ft. above floor line.

Corridor Lamp Stations—Install in the corridor over the door of each ward and private room, at points indicated by symbol* ⋋ in the plans, a dome type corridor lamp station, list No. 162026. The station shall consist of a two-gang brass plate having mounted thereon a hemispherical glass dome covering a candelabra base receptacle and lamp. The glass dome shall be frosted white inside so as to give marked contrast between lighted and unlighted condition. This station shall fit any two-gang outlet box or cover.

Nurses' Annunciator—Install at nurses' desk on each floor, at point indicated on the plans by symbol* ⋋ a flush type lamp annunciator, list No. 162052. This annunciator shall be of the flush type, all metal, and provided with the necessary number of lamps to give one indication for each room or ward on the floor. It shall be of hinged door construction and equipped with lock. The glass shall be white coated on the inside. There shall be an audible signal (buzzer) contained inside the case which shall have a control switch mounted flush on the outside of the trim by means of which the audible signal (buzzer) may be cut in or out of the circuit as may be desired.

The markings shall be so arranged that they will show the letter or number of the station calling only while the call remains on. No indications are to be visibe unless call is on. Markings shall be as directed by architect.

Pilot Stations—For nurses' duty room and diet kitchen shall be No. 162028 and shall consist of a brass plate having a concealed buzzer with cut-off switch and one bull's-eye indication for each ward or floor, and an additional bull's-eye indication for all private rooms.

Operating Current—The system shall operate on 10 volts a-c. Current shall be taken from the regular lighting mains and reduced to the proper voltage by a transformer to be furnished with the system.

Wiring—All wiring used in this system must be run in approved iron conduit in the same manner as for lighting service. All wires on each floor shall be No. 14 B&S rubber covered, and all risers shall be No. 10 B&S rubber covered. The system shall be wired in accordance with the wiring diagram to be furnished by the manufacturer of the system.

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SPECIFICATIONS FOR NURSES' CALL SYSTEMS

Architect's Specifications, System "C"

General—Furnish and install a Holtzer-Cabot Nurses' Call System as covered by these specifications, system to be wired and connected and left in first-class operating condition.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—At each bed there shall be a station having a cord with a locking call button attached. A patient desiring a nurse shall press the locking call button which shall cause a lamp signal to light at the following locations: over patient's room door, corridor side; in the annunciator at nurse's desk, in duty room, diet kitchen, and in master annunciator in superintendent's office. (In addition, stations in public wards shall light a bull's-eye in wall plate behind patient's bed.) At the same time there shall sound momentarily a buzzer in the nurses' annunciator, in duty room and in diet kitchen. The locking call buttons shall be so designed as to permit of the audible signal (buzzer) being sounded repeatedly, if necessary, in order to attract attention, but all lamp signals must remain lighted until the call is reset by the nurse at the patient's bed.

Calling Stations—Install at each bed in private rooms where indicated by symbol* ≍ on plans a nurses' call station No. 162002. The station shall consist of a single gang brass plate with receptacle mounted on separate yoke and having a detachable plug with 6 ft. cord and locking call button. Station shall be located 18 in. above floor line.

Install at each bed in public wards where indicated by symbol* ≍ on plans a nurses' call station No. 162003. This shall be the same as the private room calling station with the addition of a bull's-eye on the wall plate, located 5 ft. above floor line.

Corridor Lamp Station—Install in the corridor over the door of each ward and private room, at points indicated by symbol* ≍ in the plans, a dome type corridor lamp station list No. 162026. The station shall consist of a two gang brass plate having mounted thereon a hemispherical glass dome covering a candelabra base receptacle and lamp. The glass dome shall be frosted white inside so as to give marked contrast between lighted and unlighted condition. This station shall fit any two gang outlet box or cover.

Nurses' Annunciator—Install at nurses' desk on each floor, at point indicated on the plans by symbol* ≍ a flush type lamp annunciator, list No. 162052. This annunciator shall be of the flush type, all metal, and provided with the necessary number of lamps to give one indication for each room or ward on the floor. It shall be of hinged door construction and equipped with lock. The glass shall be white coated on the inside. There shall be an audible signal (buzzer) contained inside the case which shall have a control switch mounted flush on the outside of the trim by means of which the audible signal (buzzer) may be cut in or out of the circuit as may be desired.

The markings shall be so arranged that they will show the letter or number of the station calling only while the call remains on. No indications are to be visible unless call is on. Markings shall be as directed by architect.

Superintendent's annunciator shall be identical with nurses' annunciator but shall be divided into sections, one section for each nurses' annunciator in the hospital. Each section shall be a duplicate of one of the nurses' annunciators and shall operate in multiple with same.

Pilot Stations—For nurses' duty room and diet kitchen shall be No. 162028 and shall consist of a brass plate having a concealed buzzer with cutoff switch and one bull's-eye indication for each ward or floor, and an additional bull's-eye indication for all private rooms.

Operating Current—The system shall operate on ten volts a-c. Current shall be taken from the regular lighting mains and reduced to the proper voltage by a transformer to be furnished with the system.

Wiring—All wiring used in this system must be run in approved iron conduit in the same manner as for lighting service. All wires on each floor shall be No. 14 B&S rubber covered, and all risers shall be No. 10 B&S rubber covered. The system shall be wired in accordance with the wiring diagram to be furnished by the manufacturer of the system.

Architect's Specifications, System "D"

General—Furnish and install a Holtzer-Cabot Nurses' Call System as covered by these specifications, system to be wired and connected and left in first-class operating condition.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—At each bed there shall be a station having a cord with a locking call button attached. A patient desiring a nurse shall press the locking call button which shall cause a lamp signal to light at the following locations: over patient's room door, corridor side; in the annunciator at nurses' desk, in duty room and in diet kitchen. (In addition, stations in public wards shall light a bull's-eye in wall plate behind patient's bed.) At the same time there shall sound momentarily a buzzer in the annunciator, in duty room and in diet kitchen. The locking call buttons shall be so designed as to permit of the audible signal (buzzer) being sounded repeatedly, if necessary, in order to attract attention, but all lamp signals must remain lighted until the call is reset by the nurse at the patient's bed.

An additional emergency call shall be provided by means of a second locking call button mounted on wall plate of calling station. To summon assistance, nurses, by pressing their button, shall ring a bell in duty room, diet kitchen and in superintendent's office and light a lamp indicator (red) over door of room or ward and in superintendent's office. All signals, both bells and buzzers, shall remain on until help arrives and resets the calling button.

Calling Stations—Install at each bed in private rooms where indicated by symbol* ≍ on plans a nurses' call station No. 162004. The station shall consist of a single gang brass plate with receptacle mounted on separate yoke and having a detachable plug with 6 ft. cord and locking call button, and an additional locking call button for emergency calls mounted directly on yoke.

Install at each bed in public wards where indicated by symbol* ≍ on plans a nurses' call station No. 162005. This shall be the same as the private room calling station with the addition of a bull's-eye on the wall plate and shall have a gang plate.

Corridor Lamp Stations—Install in the corridor over the door of each ward and private room, at points indicated by symbol* ≍ in the plans, a dome type corridor lamp station list No. 162026. The station shall consist of a brass plate having mounted thereon two hemispherical glass domes one above the other, each dome covering candelabra base receptacle and lamp. One glass dome shall be colored white for patients' calls and the other dome shall be red for emergency calls.

Nurses' Annunciator—Install at nurses' desk on each floor, at point indicated on the plans by symbol* ≍ a flush type lamp annunciator, list No. 162052. This annunciator shall be of the flush type, all metal, and provided with the necessary number of lamps to give one indication for each room or ward on the floor. It shall be of hinged door construction and equipped with lock. The glass shall be white coated on the inside. There shall be an audible signal (buzzer) contained inside the case which shall have a control switch mounted flush on the outside of the trim by means of which the audible signal (buzzer) may be cut in or out of the circuit as may be desired.

The markings shall be so arranged that they will show the letter or number of the station calling only while the call remains on. No indications are to be visible unless call is on. Markings shall be as directed by architect.

Pilot Stations—For nurses' duty room and diet kitchen shall be No. 162029, and shall consist of a brass plate having a concealed buzzer with cutoff switch and one bull's-eye indication for each ward or floor, and an additional bull's-eye indication for all private rooms. There shall also be a continuous ringing bell for emergency calls.

Pilot station for superintendent's office shall be same as for diet kitchen and duty room except no buzzer or switch is required. There shall be one red bull's-eye indication for each floor.

Operating Current—The system shall operate on ten volts a-c. Current shall be taken from the regular lighting mains and reduced to the proper voltage by a transformer to be furnished with the system.

Wiring—All wiring used in this system must be run in approved iron conduit in the same manner as for lighting service. All wires on each floor shall be 14 B&S rubber covered, and all risers shall be No. 10 B&S rubber covered. The system shall be wired in accordance with the wiring diagram to be furnished by the manufacturer of the system.

*Use Standard Electric Code Signal.

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NURSES' SIGNAL PHONE SYSTEM

We are pleased to announce that by special arrangements we are prepared to furnish a Nurses' Signal Phone system consisting of Holtzer-Cabot Locking Button Calling System combined with Dictagraph sensitive telephone instruments specially manufactured for us. This additional feature of telephone communication can be embodied in any of the calling equipment or systems shown on pages 24 to 29 inclusive. This system provides in addition to the customary signal-features of lamps and buzzers an invaluable telephone connection between patient and nurse without the necessity of nurse going to patient's bedside. The saving of the nurse's time alone is well worth the additional cost of the apparatus. An additional advantage is the convenience with which the system may be used to supervise all patients' rooms from the nurses' desk. The transmitter in patient's room is extremely sensitive and is especially valuable in quickly detecting unusual sounds in patients' rooms.

Operation—To call nurse, the patient calls in the usual way, lighting lamps over door and in duty rooms and at nurses' desk, and sounding audible signals wherever located. The nurse operates a key on her signal phone corresponding to that room and speaks to patient. The patient answers nurse, indicating his or her wants, in an ordinary tone of voice without arising from pillow. Nurse coming to room complying with patient's request restores call by resetting locking button, thus accomplishing in one visit to patient's room that which would ordinarily require two visits.

Operating Current and Wiring Requirements—To insure proper installation of these systems it is suggested that full information regarding operating current and wiring details be secured from our nearest sales office. As the requirements vary considerably in accordance with the system required, it is impossible to give proper information here.

Nurses' Signal Phone—Consists of a master receiving station as shown located at nurses' station. It contains an individual key for each patient's private room and one for each bed in wards, in addition to a sensitive transmitter and a standard watch case receiver.

Patients' Signal Phone—Consists of a cabinet as shown in cut having a separate transmitter and receiver

connected by separate cord and plug to patients' calling station. Signal phone is usually placed on, or built into, a standard bedside table and is equipped with a switch for disconnecting when not in use or when patient has callers desiring privacy.

Architects' Specifications

(To be added to specifications covering Nurses' Call Systems, see pages 24 and 25.)

Provide at each patient's calling station where shown on plans a patient's calling station No. ..... consisting of a loud speaker clearly audible at a distance of 10 ft. from instrument and a sensitive microphone which will transmit effectively at the same distance at normal tone of voice, all encased in highly graded hard wood cabinet finished in walnut. Signal phone to be connected by 8 ft. tyrex rubber cord to plug of calling station. At nurses' station where shown on plans install a complete Signal Phone Cabinet with operators set and containing a control key for each room indicated on plans.

Install required talking battery or battery eliminator (rectifier) as recommended by manufacturer. All wiring to run in same conduit with Nurses' Call System and of size suitable for this system.

Continued on next page

NURSES' SILENT CALL SYSTEM

Toggle Switch, High Voltage Type

The High Voltage System

For Nurses' Call System installations where the first cost is the deciding factor, or where preference is given to this type of system, due to its operation direct from 115-volt service, a high-grade dependable system of the toggle switch type has been developed.

The functions performed by this system are identical to those accomplished by our locking button system except the method of operating the calling station.

With the locking button system, the patient presses the button on the end of a portable cord; with the toggle switch system the patient pulls a cord, attached to the handle of the switch on the wall, both methods operating a switch mechanism that registers the call in the same identical manner.

In systems using this type of switch, particular attention must be given to see that the switch in the wall is properly located with relation to the patient's bed. It should be remembered that the patient must pull a cord attached to a switch in the wall and the proper location of a station on the wall should be such that the cord will have as direct a pull as possible. It is obvious that beds cannot be moved around to such positions that the cords are apt to be pulled out by nurses or visitors moving about the room.

It is recommended that where possible, the switch be placed on the wall at the head of the bed at a height of 5 ft. from the floor, arranging cord to the proper length with pendant at end, so that the cord is readily accessible without danger of it accidentally getting out of reach of the patient.

General Information

All apparatus listed on this and the following page is designed to operate direct from 115-volt d-c. or a-c. except as noted. All wiring must conform to the standard rules of Underwriters, covering this class of wiring; same as for lighting service.

All equipment is furnished complete with lamps where required, and consists of a 115-volt candelabra base carbon filament lamp.

Outlet boxes are included with No. 162452 lamp annunciators. Outlet box sizes for all other equipment are given under each heading.

Typical wiring diagram for any type system will be furnished upon request.

CALLING AND RESETTING STATIONS

No. 162402

Private Room Calling Station

This consists of a single-gang brass plate, with separate mounting switch, having momentary buzzer contact with device for disconnecting this contact.

Equipped with cord guide, and 8 ft. linen cord and pendant. May be mounted on any standard single-gang box with cover.

Ward Calling and Indicating Station

This station consists of a two-gang brass plate with separable mounting switch, having momentary buzzer contact with a device for disconnecting this contact. The bull's-eye is mounted in the plate with separate mounting for a 115-volt lamp and receptacle. The lamp is included in the complete station. Equipped with guide and 8-ft. cord and pendant. May be mounted on any standard two-gang box with cover.

No. 162403

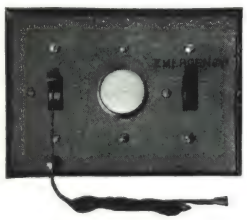
Private Room Calling and Emergency Station

This station is the same as No. 162402 private room station with the addition of an emergency call switch as illustrated. Switches are mounted separate from the plate and the audible contact in emergency switch is not of the momentary type but continues to operate until shut off at the patient's bed. The emergency call is for use in cases where the patient is found in a critical condition and a doctor is desired, and for such service a continuous audible call should be used. May be mounted on any standard two-gang box with cover.

No. 162404

Ward Calling, Indicating and Emergency Station

This station is the same as No. 162403, with the addition of the emergency call switch described under No. 162404. May be mounted on a standard three-gang box with cover.



No. 162405

No. 162406

Emergency Bath or Toilet Call Station

This station consists of a single-gang brass plate equipped with 1 ft. cord and pendant having a separable mounting emergency call switch. Switch is equipped with a continuous audible contact as calls from such locations are usually of an emergency nature. May be mounted on a standard single-gang box with cover.

Continued on next page

NURSES' SIGNAL STATIONS

Corridor Lamp Stations

No. 162426

Single Dome Type, No. 162426

This station consists of a single-gang brass plate having mounted thereon a candelabra base receptacle with 115-volt lamp, covered by a semi-opalescent glass dome.

The dome is held by a metal ring which screws to the face plate, making it easy to renew lamps. May be mounted on a single-gang box with cover.

Double Dome Type, No. 162426-D

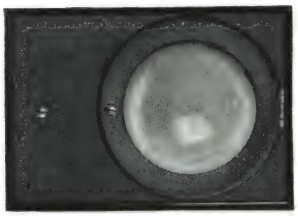
This station is the same as No. 162426, except that it consists of two domes, with one lamp under each dome. Used where calling and emergency systems are required, each having a separate signal. Emergency call lamp is red. Plate should be mounted in a vertical position and may be mounted on a two-gang tandem box with cover installed in a vertical position.

No. 162426-D

Duty Room and Diet Kitchen Stations

Dome Type Pilot Lamp and Buzzer Station, No. 162427

This station consists of a brass plate having mounted thereon a candelabra base receptacle and 115-volt lamp covered by a semi-opalescent glass dome, held by a metal ring which screws to face plate. On back of plate is mounted a polarized buzzer for a-c. operation. Buzzer for d-c. operation can be furnished at no extra charge. May be mounted on a three-gang box with cover.



No. 162427

Silencing switch if required is special and will be furnished at an extra charge.

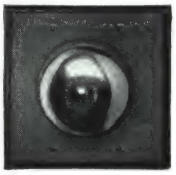
Buzzer Station

This station consists of a brass plate, having mounted on the back a polarized buzzer for 115-volt a-c. operation. 115-volt d-c. buzzer furnished at no extra charge. May be mounted on a two-gang box cover.

Silencing switch if required is special and will be furnished at an extra charge.

Bell Station, No. 162434

This station consists of a brass plate on the face of which is mounted a 2⅝-in. diam. dome type vibrating bell. With this station is furnished a bell ringing transformer that mounts at back of plate in outlet box. Station as shown is suitable for operation on a-c.; where d-c. operation is required special station will be furnished at no extra charge. May be mounted on a two-gang box with cover.

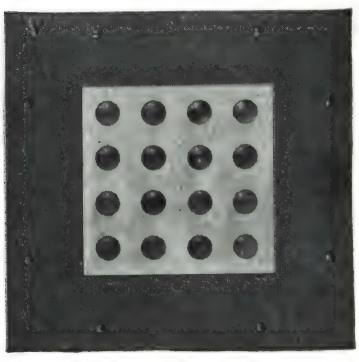


No. 162434

NURSES' AND SUPERINTENDENT'S LAMP ANNUNCIATORS

Annunciators are usually installed at the nurses' station on each floor and a master annunciator in the superintendent's office. The indicators are white bull's-eyes numbered to indicate the number of rooms or wards. Name markings cannot be furnished. Where systems are equipped with emergency call, annunciators are furnished in two sections, and red jewels are used in emergency section. Annunciators are furnished complete with lamps mounted in individual moulded porcelain reflector sockets. Fronts are furnished with hinged door and lock. Outlet boxes are special and are included in price of annunciators. Audible signal (buzzer) is included in annunciator. A silencing switch if required is special and will be furnished at an extra charge.

Note: Elapsed Time Recorders *can not* be furnished for this system.



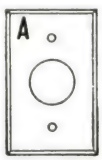
No. 162452

No. of stations	Arrangement, in.		Dimensions, inches				
			Trim size		Outlet box		
	High	Wide	High	Wide	High	Wide	Deep
6–9	3	3	9¾	9¾	8⅞	8⅞	4¼
10–12	3	4	11¼	11¼	10⅜	10⅜	4¼
13–16	4	4	11¼	11¼	10⅜	10⅜	4¼
17–20	4	5	11¼	12¾	10⅜	11⅞	4¼
21–25	5	5	12¾	12¾	11⅞	11⅞	4¼
26–30	5	6	12¾	14¼	11⅞	13⅜	4¼
31–36	6	6	14¼	14¼	13⅜	13⅜	4¼

Combination Plates

We are listing below the various types of plates for convenience outlet receptacles that can be furnished on one continuous plate, with the various calling stations listed.

Note: Receptacle not furnished.



Single Convenience Receptacle Plate

Examination Light Plate

Duplex Convenience Receptacle Plate

Finish—Standard finish is brushed brass or white enamel sprayed finish.

Continued on next page

DOCTORS IN AND OUT REGISTER SYSTEMS

A system by which the staff and visiting doctors can conveniently register and so keep the telephone operator and others informed of their presence or absence. It is an exceedingly simple system yet one of the most necessary and useful in any hospital regardless of size. Experience has shown that an electrically operated system is the most satisfactory.

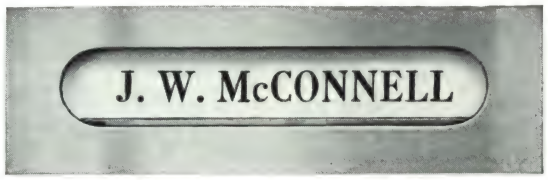
The Holtzer-Cabot System consists of an individual keyboard located at one or more entrances operating in conjunction with one or more indicators placed near the main entrance, at the telephone switchboard, or other location. The doctor registers his arrival by the throw of a toggle switch (or pushing a button) in the entrance register—made in various types as described below—conveniently placed in the wall near the door. The signal is transmitted to the office indicator where the individual's presence remains registered until his departure is signaled by the reverse operation of the toggle switch (or push button) when he leaves the building.

There are two styles of system, viz.: the Lamp Type and the Target Type. Both accomplish the same results, the only difference being in the apparatus used.

The In and Out Register System is an invaluable adjunct to the Doctors' Paging System described on pages 32 to 34, the operation of which demands that the operator know whether or not the individual wanted is in the institution.

LAMP INDICATION TYPE

Consists of metal cabinets having an illuminated name holder for each indication required. All indications are clear and visible at all times, the lighted indicators showing the individuals who are in the building. Each name is in a separate compartment with its own lamp unit to preclude the possibility of cross lighting. The construction is such that the directory interior is readily accessible and names are easily changed.



Standard Opening for Name Card
Actual size

Current Supply—Lamp type indicators can be most economically operated from a step-down transformer of the proper voltage and capacity connected to the lighting or power circuit. Where direct current service only is available, we recommend that duplicate motor generators be installed.

In estimating capacity of transformer or motor generator required, figure 4 watts per lamp, including all lamps in the system.

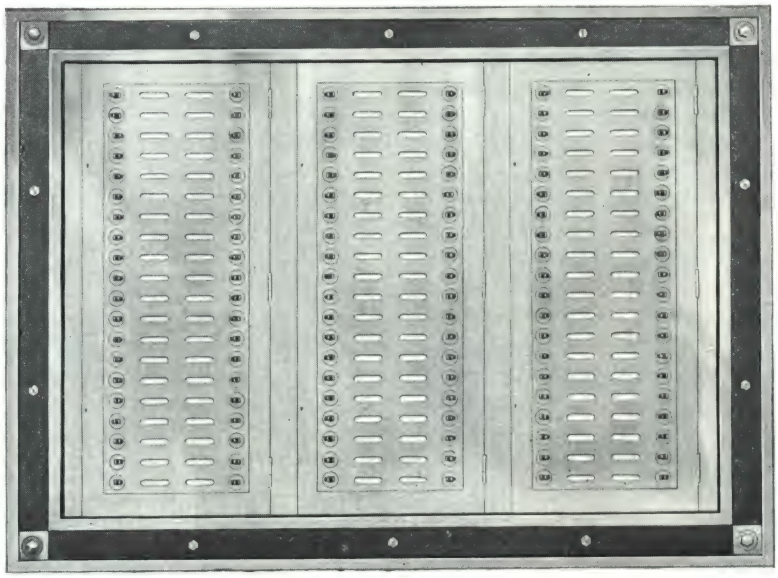
Wire Sizes—Wire sizes must be figured in accordance with current requirements given above, allowing a maximum voltage drop of not over 20%. Particular attention should be given to size of feeders, which must be of sufficient size to carry 100% load.

The standard operating voltage is 20 volts a-c. or d-c. Where two Indicators are used, they are wired in series, using 12-volt lamps in each Indicator. Where one Indicator is used, it is equipped with 18 to 24-volt lamps. Where more than two Indicators are installed, full wiring information must be secured before any work is done.

ENTRANCE REGISTER AND INDICATOR

For placing near the main entrance. A toggle switch is mounted on the panel opposite each opening by means of which the person entering or leaving the building turns the light on or off. While a register and indicator is placed near the main entrance, registration can be effected at other entrances to the building by installing other registers at the different entrances so that the individual's arrival or departure may be conveniently recorded regardless of the door by which he may be entering or leaving the building.

The name is made up of gummed letters on a glass slide which is inserted close behind each compartment window. When the switch is thrown on, the light from the lamp behind causes the name to stand out boldly and easily readable from any angle. An adequate supply of letters is furnished with each indicator and the making up or changing of names is readily accomplished by anyone.



Entrance Register and Indicator, No. 150601

The lamps used are such that sufficient illumination is secured at less than rated voltage, thus insuring long life for the lamps.

The register and indicator is made in sizes given in the table on the following page. Larger sizes can be furnished to order, but intermediate sizes cannot be furnished.

Note: When a register only is required at the entrance without lamp signal these can be furnished.

The construction, appearance and size will be identical with the standard register and indicator, except omitting lamps and lamp receptacles. Catalogue List Number will be 150603.

Continued on next page

Office Indicator

Usually mounted close to the telephone switchboard. It is connected in series with the Entrance Register and Indicator (either No. 150601 or 150603) so that the lighting of a lamp or the throwing of a switch in the latter lights a corresponding lamp in the Office Indicator. The openings, lamps, etc., are the same as in No. 150601 and 150603 shown on preceding page, and it is made in the same sizes.

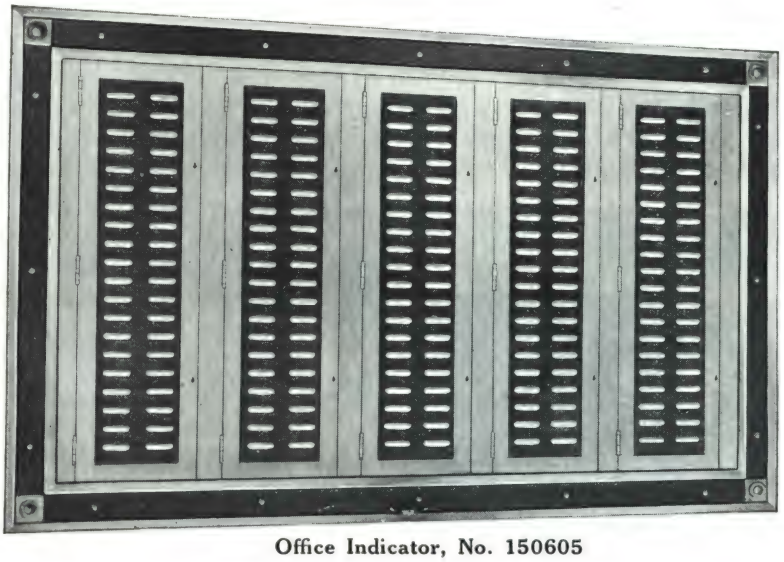
CAPACITY AND DIMENSIONS

No. of indications	No. 150601 Trim size, in.		No. 150603 Trim size, in.		No. 150605 Trim size, in.	
	Height	Width	Height	Width	Height	Width
20	20 5/8	16 1/2	18 3/8	15	20 1/8	12
30	20 5/8	30 1/4	18 3/8	27 1/4	20 1/8	18
60	28 1/2	31 1/2	25	28 1/2	27	18
80	37 3/8	36 1/4	30 5/8	28 1/2	34 7/8	19
120	37 3/8	50 1/2	32 5/8	45 1/2	36 7/8	33 1/4
160	37 3/8	64 3/4	32 5/8	58	36 7/8	39 1/4
200	37 3/8	79	32 5/8	70 1/2	36 7/8	56 1/2

Note: Dimensions of Outlet Box 1 in. less either way for all types.

Important Installation Note

It is designed for mounting with the center line 4 ft. above floor and not over 9 ft. from telephone operator. Where a deviation from these dimensions is necessary, special construction may be required and complete information should be secured before any work is done. A very satisfactory installation is secured by suspending from ceiling over telephone switchboard with front tilted downwards at an angle.



Office Indicator, No. 150605

ARCHITECTS' SPECIFICATIONS

General

Furnish and install an "In" and "Out" register system as covered by this specification. The system to be completed, connected and tested for satisfactory operation.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids of any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation

This system is to operate as follows: Doctors on entering the hospital will throw a switch opposite their names on the entrance register and indicator which will light a lamp behind their names both on the entrance register, indicator and on the office indicator. On leaving the hospital, reverse operation of the switch will extinguish the lamps.

Entrance Register and Indicator

Shall be Holtzer-Cabot No. 150601. Shall consist of a steel outlet box having a bronze trim with hinged doors fitted with locks and keys. There shall be provided for each name a rectangular opening so designed that doctor's name may be inserted behind it. The arrangement must be such that neat and readable markings may be made up and inserted by the hospital staff. Apparatus requiring names to be printed or painted by hand will not be accepted.

Behind each opening shall be mounted a candelabra base Mazda lamp of sufficient candle power to illuminate the markings properly and beside each opening shall be located an approved lever switch for controlling the lamp.

Entrance register and indicator shall have a capacity of .... names and shall be installed in the wall near the main entrance where directed.

Office Indicator

Shall be Holtzer-Cabot No. 150605 and shall consist of steel outlet box with bronze trim and doors equipped with locks and keys. This indicator shall be an exact duplicate of the entrance register and indicator with the exception that no lever switches are required as it is to operate in multiple with the entrance register and indicator.

Office indicator shall have a capacity of .... names and shall be installed in office near telephone switchboard.

Wiring

System shall be wired complete in rigid iron conduit and individual indication wires between office register and entrance register; shall be not less than No. 16 rubber covered. Common wires between office indicator and entrance register and feed wire to transformer shall be of such size so as to carry 50 per cent of the total load with no more than 10 per cent drop in voltage.

Transformer

Transformer shall be of insulated type and shall be installed in steel box with blank cover where directed in office. Transformer shall have total output of not less than 50 per cent of the entire load for one hour without undue heating and with not more than 5 per cent drop in voltage.

Continued on next page

TARGET INDICATION TYPE

This system, like the lamp type, can be operated with registers at one or more entrances and indicators at one or more locations. Registrations are effected by pushing buttons on button plate which operate targets on indicator. White targets appearing under names on indicator show individuals who have registered "In."

Wiring

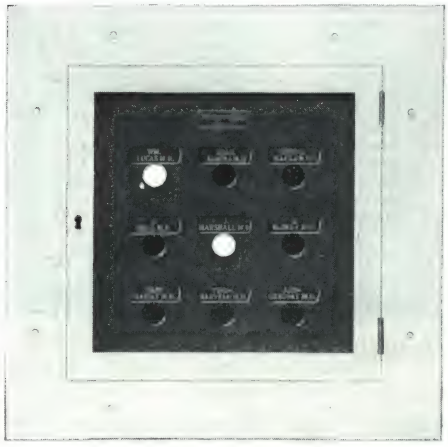
Use not smaller than No. 16 B & S wire. Two wires per indication are required between indicator and register in addition to common wires.

Operating voltage 12 volts a-c. or d-c. Current required, 25 watts.

Office Indicator (Target Type)

Made for wall mounting also in a cabinet for top of telephone switchboard. When so used it is finished to match switchboard and no wider than it.

Indicator has a glass front behind which is a name holder plate with holes through which white targets are visible under each name. Name cards are readily changed by opening the front. Indicators are our standard target type electric reset drop and are operated by means of the Button Plate shown.

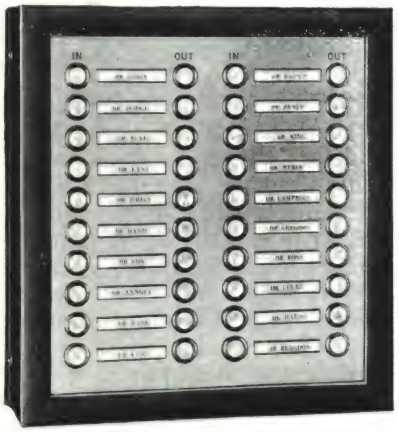


No. 150039

Entrance Register (Button Type)

For mounting near an entrance for use with the Target Type Indicator. It consists of a plate with cardholders and two buttons for each. One button is for registering "In" and the other for registering "Out."

Note: Button plate must have two buttons for each drop on indicator.



No. 150041

CAPACITY AND DIMENSIONS

No. of drops	No. of buttons	No. 150039 Flush Type Trim size, in. Height	No. 150039 Flush Type Trim size, in. Width	No. 150039 Surface Type Trim size, in. Height	No. 150039 Surface Type Trim size, in. Width	No. 150041 Button Plate Trim size, in. Height	No. 150041 Button Plate Trim size, in. Width
10	20	13 5/16	14 5/16	11 1/8	10 9/16	13 3/4	8 1/8
20	40	15 1/2	16 1/16	13 3/8	12 5/16	13 3/4	12 3/4
30	60	18 1/2	18 13/16	15 5/8	14 1/16	18 1/8	12 3/4
40	80	20 3/4	20 9/16	17 7/8	15 13/16	22 1/2	14 3/4
50	100	22 7/8	22 5/16	20 1/8	17 9/16	30 3/8	19 7/8

Note: Dimensions of Outlet Box 1 in. less either way for both types.

ARCHITECTS' SPECIFICATIONS

General—Furnish and install an "In" and "Out" register system as covered by this specification. The system to be completed, connected and tested for satisfactory operation.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids of any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—The system is intended to operate as follows: Doctors on entering the hospital will push a button opposite their names on the entrance register which will cause a target to appear under their names on the office indicator. Doctors when leaving the hospital will push another button which will reset the indication.

Entrance Register—Shall be Holtzer-Cabot No. 150041 consisting of a steel outlet box with flush brass trim, having hinged door with lock and key. Door shall be provided with one cardholder and two push buttons for each name. One of the push buttons shall be marked "In" and the other "Out."

Entrance register shall have a capacity of ..... names, and shall be installed where directed on the wall near the hospital entrance.

Office Indicator—Shall be Holtzer-Cabot No. 150039 and shall consist of steel outlet box with flush brass trim, having hinged door with lock and key.

There shall be provided for each name a cardholder with a round opening underneath, behind which white targets will appear when "In" buttons on entrance register are operated.

Office indicator shall have a capacity of ..... names.

Shall be installed where directed in the office near the telephone switchboard.

Wiring—System shall be wired in rigid iron conduit, using not smaller than No. 18 rubber covered wire for individual connections and No. 14 for common wired to transformer.

Transformer—Shall be of the insulated type and shall have a minimum output of 25 watts at 12 volts without undue heating.

Transformer shall be installed in flush outlet box with blank cover directly under office indicator.

Continued on next page

HOLTZER-CABOT DOCTORS' PAGING SYSTEMS

In every institution it is frequently necessary to locate quickly some individual. In a hospital, the lessening of pain and discomfort, even the saving of life, may depend on quickly locating the doctor or other hospital official.

To accomplish this, we have developed Doctors' Paging Systems which are simple and reliable and designed to quickly inform the party who is wanted.

Made in four types—three of the "Lamp Call" type (with audible signal for emergency if desired) and one "Full Audible Call" type.

SYSTEM NO. 1—FLASHING LAMP TYPE

Consists of any number of Lamp Annunciators having numerical indications so located throughout the building as to be readily seen from any point; a keyboard for operating the system (usually placed at the telephone operator's desk), and a control panel preferably installed in basement.

Each individual to be paged is assigned a code call of three digits, such as 3-5-7. When this person is wanted, his particular call is "flashed" on and off intermittently and simultaneously at all annunciators throughout the building. The annunciators have only ten indications but the system has a maximum of 120 different code calls.

Three signals can be set up at one time and will be flashed automatically and in rotation on the annunciators. The calling, or transmitting unit is of the three-circuit type which permits the operator to set up and cancel a code on any circuit without interference to the other.

For institutions requiring more than 120 calls we recommend a double system with capacity of 240 calls. This permits a total of six calls to be set up at one time, and they will flash in pairs in rotation.

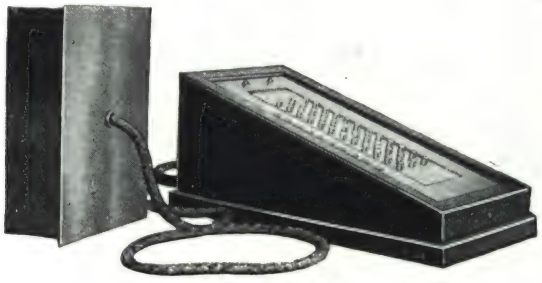
An audible signal can be furnished in conjunction with the lamp annunciators and a switch provided on keyboard for controlling the audible units located in the corridors. This enables the operator to transmit an audible signal directing attention to the codes being flashed on the lamp annunciators as the audible signal operates in unison with the code.

Selector Keyboard

This keyboard is equipped with metal plungers for operating contacts of heavy construction mounted inside of the case. All current carrying parts are thoroughly insulated. Each of the three circuits consists of ten buttons, engraved from 1 to 9 and 0 with a "start" button on top and a "stop" button at the bottom of each row. There is also provided a row of lamp bull's-eyes alongside of buttons, marked to correspond and which flash in unison with communications, as a check to operator that proper calls are being sent out.

The standard finish for the face plate is set in nickel, and the case ebony.

Furnished for flush or surface wall mounting, or in portable type with flexible table.



No. 162300

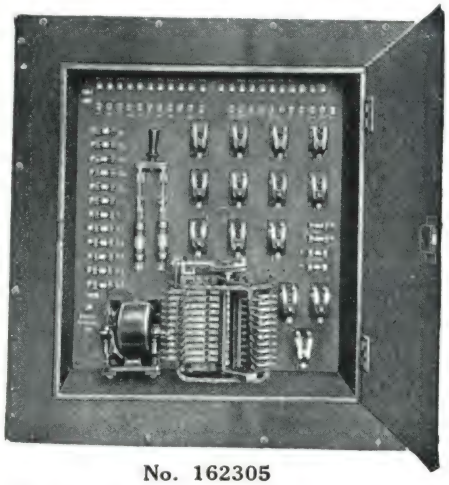
List No.	Description	Height	Width	Depth
162300	Portable desk type keyboard	19½	12¼	8¾
	*Connector panel box for above	14	11	4¼
162301	*Flush wall type keyboard	20½	12½	4¼
162302	Surface wall type keyboard	19¾	11¾	3¾

*Outlet box 1 in. smaller each way than trim dimensions.

Control Unit and Wiring

Consists of a panel in steel cabinet containing a special motor driven flasher, relays, fuses and terminals for flashing the codes on the annunciators. Standard panels will operate up to 75 annunciators; larger systems require a special panel. Size of cabinet is 34 in. high, 35 in. wide, 8⅜ in. deep.

The wiring for this system consists of 44 wires between calling unit and control operating on 24 volts, and between control unit and all annunciators in parallel 11 wires. If audible signal is required add 1 additional wire.



No. 162305

Audible Signals

Audible signals consist of single-stroke bells or sounders located near each annunciator and can be arranged to sound with each flash of lamp signals. The signals listed under system 4 will be found satisfactory for this purpose.

Continued on next page

Flashing Annunciators

Metal case type, designed and insulated for 115-volt operation on standard lighting circuits, either a-c. or d-c., and are equipped with 15 watt Edison base Mazda lamps. The light partitions are of metal with a light diffusing finish. Lamp sockets are of solid moulded porcelain. Door is hinged to allow lamp replacement. By a patented chemical process the blocked out numerals on back of the glass are not visible except when lighted. The arrangement of the indications is in two vertical rows, numbered from 1 to 9 and 0, as shown in the accompanying illustration. It will be noted that each number is one-half space higher than the next succeeding number. This arrangement gives the effect of one vertical row of numbers without requiring a case too long for installation in a hospital corridor. The code combinations are so arranged that all codes read from top downwards. Due to the special process of finishing glass fronts, there is absolutely no halo around the lighted numeral which can be plainly read at a distance of 50 ft.

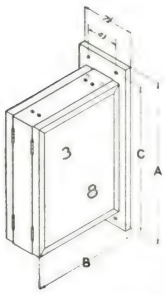
No. 162160

These annunciators are furnished in 6 types—sidewall double face, ceiling double face, ceiling suspended double face, partition double face, flush single face and surface single face.

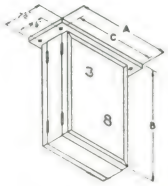
Installations of all types are shown below together with dimensions of the annunciators.

TYPES AND SIZES OF ANNUNCIATORS

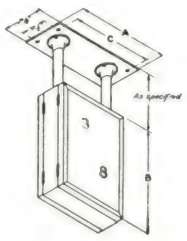
List No. and type of mounting	No. of stations	Dimensions, in.					
		Annunciator case			Outlet box		
		A	B	C	Height	Width	Depth
162160—Sidewall	10	22	14	20	20¾	5½	3
162170—Ceiling	10	17¼	18¾	15¼	16	5½	3
162170C—Pipe	10	17¼	18¾	15¼	16	5½	3
162190—Partition	10	23¾	18⅞	.....	22¼	17⅜	4⅞
162200—Flush	10	23¾	18⅞	.....	22¼	16	4⅞
162210—Surface	10	19¾	15	.....	.....	.....	.....



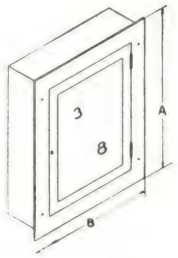
No. 162160
Sidewall
Double face



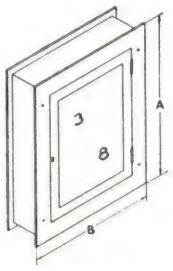
No. 162170
Ceiling
Double face



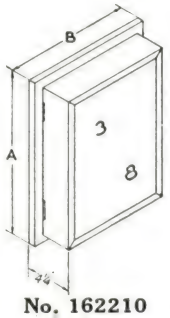
No. 162170C
Ceiling
Suspension double face



No. 162190
Partition
Double face



No. 162200
Flush
Single face



No. 162210
Surface
Single face

SYSTEM NO. 2—FLASHING LAMP TYPE

One Circuit

Similar to System No. 1 except in the control mechanism. The annunciators are identical and the same number of codes (120) are available. The control mechanism, however, allows of only one call being flashed at a time. The flasher feature can be omitted if not desired.

The system operates on the lighting circuit voltage (105-115). Cannot be furnished for operation on low voltages.

System No. 2 is admirably adapted for the growing hospital. More annunciators can be added from time to time and, whenever desired, the system can be changed over to System No. 1 by the installation of a new control mechanism arranged for three simultaneous calls. No change in the annunciators or their wiring is necessary.

No. 162310

Selector Keyboard

Has two rows of five keys, each representing a single digit indication on the annunciators. Switches are of the standard toggle variety. The numbers are engraved above the insulated handles. An "On" and "Off" switch directly below the two rows of set up serves to start or cancel the signal. Ordinarily furnished for surface or flush mounting. The portable type is not recommended but can be furnished when ordered. Size, flush type, 7 in. high, 11½ in. wide. Surface type is 8x12½ in.

Note: It is possible to operate audible signals (described in System 4) in conjunction with this system the same as for System No. 1.

Flasher Control Mechanism

Where flashing signals are desired, a much simpler flasher control than that required for System No. 1 is furnished, as only one call can be flashed at a time. The mechanism is very similar to a motor-driven sign flasher and should be mounted in the basement near the power and light panels.

Annunciators—This system uses the same annunciator as System No. 1.

Wiring

This system requires 11 wires between keyboard and annunciators, and 3 wires between keyboard and control unit. Where audible signal is used one extra wire is necessary.

Continued on next page

SYSTEM NO. 3—INDIVIDUAL INDICATION

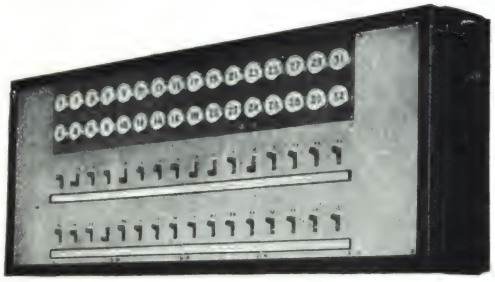
Suitable for institutions where it is frequently necessary to call a large number of individuals at one time. Annunciators are larger than in Systems 1 and 2 as a separate indication is provided for each person to be paged. This system can be furnished either with or without the flasher feature. It is not practical to operate this system with audible signals due to the number of indicators lighted at one time.

Operating Annunciators

Furnished in double or single face types. For corridor use, the double face type is usually employed, being suspended from the ceiling. For work and rest rooms, a single face flush type annunciator with smaller indications is recommended.

For full details on annunciators refer to patterns shown on page 14. Any of the annunciators shown may be used with this system but dimensions will vary in accordance with number of indicators.

The standard finish is lacquer. Fronts are of semi-opalescent glass with large blocked-out indications. Lamps are standard, 115-volt, 10-15 watt Mazda, mounted in solid moulded porcelain sockets. Front is hinged for easy replacement of lamps.



No. 162315

Selector Keyboard

Has an operating key and bull's-eye indication for each lamp in the outlying annunciators as illustrated. The case is of steel, finished as required, and the front plate is brass with dull black lacquered finish. Not furnished in a portable type.

Note: This system can be furnished either with or without the flasher feature.

Flasher Control Mechanism

The flasher control for this system is practically as for System No. 2 except that it will be of larger capacity.

Wiring

All annunciators are connected in multiple, requiring one common wire plus one individual wire for each indication.

Size of common wire must be of sufficient capacity to carry total load of all indications without a greater drop than 10% in voltage. Operates on lighting circuit voltage (105-115).

Complete wiring data for any size of system furnished on application.

SYSTEM NO. 4—AUDIBLE CALL ONLY

This system consists of a number of small sounders, tapper bells or musical bar signals, installed throughout the institution, and a code call machine for automatically sounding code calls (a different code for each individual). Only one code call can be sounded at a time and the time required to sound a complete code is considerably longer than with the Lamp Systems.

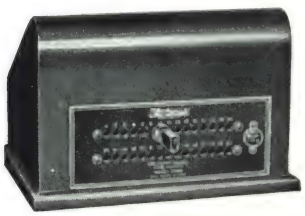
This system is very satisfactory where the extra service furnished by the silent systems is not required or where audible signaling is not objectionable.

Wiring

This system is recommended to operate from 110 volts a-c. or d-c. The wiring consists of two wires in parallel to all sounding devices.

Automatic Code Transmitter

Transmits and repeats three times (or continuously as may be desired) a code signal on doctors' sounders or tapper bells. Furnished in 10, 20 or 30 station sizes. Transmits only one call at a time. Recommended where a simple audible calling system is satisfactory. Readily combined with calling devices of Systems Nos. 1 and 2 which permits flashing of a code number on the annunciators and audibly sounding the same code on bells or sounders. A heavy duty relay of proper capacity is included with transmitter.



No. 164025

Doctors' Sounding Station

No. 162073

Flush type doctors' sounding station on standard single-gang brass plate. White enamel finish and equipped with white resonator. Suitable for mounting in standard single-gang outlet box cover. Requires a depth of 2¾ in.

No. 151175

Tapper Bell

Consists of a small tapper bell mounted on a standard single-gang switch plate. Requires single-gang outlet box cover with a total depth of 2¾ in.

No. 151178

Musical Bar Signal

Consists of a pressed steel base and cover having a xylophone bar and suitable resonator on top. Its musical tone is of low pitch but more penetrating than the tapper bell. Designed to mount on two-gang box cover.

Continued on next page

SPECIFICATIONS FOR HOLTZER-CABOT DOCTORS' PAGING SYSTEMS 1 AND 2

Architect's Specifications System No. 1

General—Furnish and install a complete Doctors' Paging System of the silent flashing lamp type with an audible signal for emergency calls. The system to be wired and connected complete and left in satisfactory operating condition. This system shall have a maximum capacity for calling 120 different doctors.

The manufacturers' names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—Each doctor shall be assigned a code number of 3 digits, such as—3-5-7, etc., and directory charts listing the various doctors and the code numbers assigned to them is to be kept at telephone operator's switchboard and at each nurse's station.

To call a doctor, the telephone operator will set up the 3 digits comprising that doctor's code call on the keyboard, which shall cause the 3 digits of that code to flash out simultaneously and repeatedly on annunciators located in the corridors throughout the hospital. The code number set up shall flash repeatedly until the call is reset by telephone operator. System must be so arranged that the operator may set up simultaneously on keyboard 3 distinct and separate doctors' code numbers, which must flash in rotation until all are reset by the operator.

In cases where a doctor is urgently needed the operator may be means of a special key on the keyboard sound audible signals located in corridor near each annunciator—audible signals operating in unison with the flashing of the lights.

Keyboard—Operating keyboard shall be Holtzer-Cabot No. 162300 and shall consist of an inclined front mahogany finished cabinet suitable for mounting alongside of telephone operator's desk. This cabinet shall contain 3 rows or sections of keys so arranged and numbered that in each section there are 10 keys numbered 1-9 and 0, together with any other keys necessary to control starting and stopping of code calls individually in each section. This keyboard shall be equipped with a 6-ft. flexible cable connected to suitable terminal board which shall be mounted in a flush steel outlet box with cover to be located in the wall near base board. Keyboard shall operate on not more than 24 volts.

Flasher Control Unit—Shall be Holtzer-Cabot No. 162305 and is to be installed in basement where directed. This shall consist of a steel outlet box with door and trim and shall contain a motor driven flasher arrangement, together with all necessary relays, fuses, terminals, etc., to control the flashing of the doctors' codes set up on the keyboard. The mechanism is to be so arranged that all 3 digits of any one code will flash simultaneously, and that when more than one code is set up on the keyboard the codes will flash in rotation. Codes shall light for a period of 1 second and there shall be ½ second between codes. Control unit shall operate from the 115-volt lighting circuit.

Annunciators—Shall be Holtzer-Cabot No. 150160 where mounted on side wall—No. 150170 where mounted on ceiling. Annunciators shall be all metal case, double face type with indications showing on both faces. Annunciators shall have 10 indications marked 1-9 and 0. Annunciators shall be furnished complete with 115-volt Mazda lamps.

Audible Signals—Should be Holtzer-Cabot No. 1151178 xylophone type signal designed to operate on 115-volt lighting circuit and to mount over two-gang outlet box cover.

Wiring—Wiring must be done in rigid iron conduit to meet all requirements for power and light wiring. All annunciators and audible signals to be wired in multiple, using No. 14 wire for individual leads and No. 10 for common leads. Wiring between keyboard and control unit shall be No. 16 for individual wires and No. 14 for common wires.

Directory Charts—With the system there shall be furnished 50 Directory Charts of cardboard on which shall be printed a total of 120 3-digit code calls with a blank space for inserting a doctor's name opposite each code call.

Architect's Specifications System No. 2

General—Furnish and install a complete Doctors' Paging System of the silent flashing lamp type with an audible signal for emergency calls. The system to be wired and connected complete and left in satisfactory operating condition. This system shall have a maximum capacity for calling 120 different doctors.

The manufacturer's names and catalog numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—Each doctor shall be assigned a code number of 3 digits, such as—3-5-7, etc., and directory charts listing the various doctors and the code numbers assigned to them is to be kept at telephone operator's switchboard and at each nurse's station.

To call a doctor, the telephone operator will set up the 3 digits comprising that doctor's code call on the keyboard, which shall cause the 3 digits of that code to flash out simultaneously and repeatedly on annunciators located in the corridors throughout the hospital. The code number set up shall flash repeatedly until the call is reset by telephone operator.

In cases where a doctor is urgently needed, the operator may by means of a special key on the keyboard sound audible signals located in corridor near each annunciator—audible signals operating in unison with the flashing of the lights.

Keyboard—Operating keyboard shall be Holtzer-Cabot No. 162310 and shall consist of a metal case suitable for mounting on wall near telephone switchboard. This shall contain 10 lever switches marked 1-9 and 0 for controlling lamps in annunciator, 1 switch marked "start" and "stop" for operating flasher control unit, and 1 switch for controlling audible signals.

Flasher Control Unit—Shall be Holtzer-Cabot No. 162307 and is to be installed in basement where directed. This shall consist of a steel cabinet containing a motor driven flasher with necessary contact arrangements to control the flashing of the doctors' codes set up on the keyboard and to operate the audible signals.

Annunciators—Shall be Holtzer-Cabot No. 150160 where mounted on side wall—No. 150170 where mounted on ceiling. Annunciators shall be all-metal case, double face type with indications showing on both faces. Annunciators shall have 10 indications marked 1-9 and 0. Annunciators shall be furnished complete with 115-volt Mazda lamps.

Audible Signals—Should be Holtzer-Cabot No. 151178 xylophone type signal designed to operate on 115-volt lighting circuit and to mount over two-gang outlet box cover.

Wiring—Wiring must be done in rigid iron conduit to meet all requirements for power and light wiring. All annunciators and audible signals to be wired in multiple using No. 14 wire for individual leads and No. 10 for common leads.

Directory Charts—With the system there shall be furnished 50 Directory Charts of cardboard on which shall be printed a total of 120 3-digit code calls with a blank space for inserting the doctor's name opposite each code call.

Continued on next page

NIGHT LIGHTS

For illumination in hospitals, hotels and similar institutions, the modern practice is to place these in corridors, rooms, wards and other desired locations about 18 in. above the floor. By means of transverse louvre openings in the front, the light is directed downward thus giving enough illumination to permit of sufficient visibility without the necessity of full illumination. Night lights are preferably operated from the regular lighting currents controlled by standard lighting switches located where most convenient. In hospital corridors they are generally controlled in groups for each section, but in private rooms or wards are controlled by individual switches.

It is recommended that lamps having a rated voltage of about 10% over building voltage be used to insure long life.

Type "VB" Louvre Night Light, Cat. No. 162152

This is a special night light for use in psychopathic wards. So arranged that the front cannot be removed except from the outside of the room or ward. Front is furnished in cast bronze only, and is equipped with heavy brass louvre assembly placed in front of wire glass so that glass cannot be broken. The outlet box has no back but extends through the wall. A separate back is provided for outlet box having an extension rim providing for ¾ in. adjustment for thickness of wall. The front is fastened to outlet box by screws passing through ears inside of box, and lamp may be changed by removing back cover.

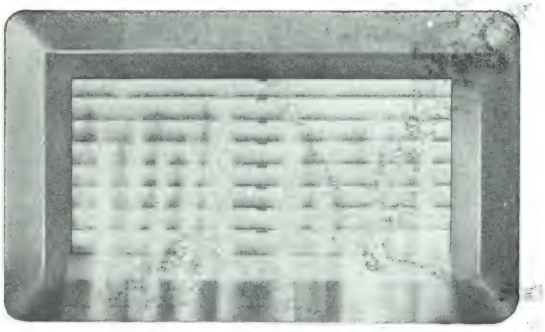
The standard outlet box is 8⅝ in. wide, 5 in. high and 5¼ in. deep and is provided with knockouts for ½ in. conduit on top, bottom and sides. Front and back plates are $9\frac{13}{16}$ in. wide, 5⅝ in. high. Front may be finished in dull or polished bronze. Back plate is steel, finished in lacquer only. Lamp may be 15 to 60 watt. Lamps are not included.

Note: The standard outlet box is 5¼ in. deep and by means of adjustment of back will answer for walls from 5¼ to 6 in. thick. Where walls are more than 6 in. thick a deeper outlet box will be furnished if specified on order.

Type "SVB" Louvre Night Light, Cat. No. 162154

This is identical with Type VB excepting that it is not intended for psychopathic wards and is furnished with standard outlet box construction, i.e., the box has solid back and the front is removable for changing lamps. There is no separate back plate.

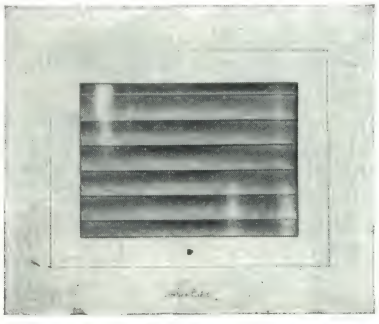
The outlet box is 8⅝ in. wide, 5 in. high and 4 in. deep and is equipped with knockout for ½ in. conduit at top, bottom and one side. Size of front $9\frac{13}{16}$ in. wide, 5⅝ in. high. Lamps not included.



No. 162154 Type "SVB" Louvre Night Light

Type "FL" Louvre Night Light, Cat. No. 162155

This is a flush type night light, having a flat metal trim with a hinged door, fitted with special lock and key. The front is fastened to the outlet box by means of special lugs accessible when door is open, so that there are no mounting screws visible on the front. The front has generous lateral adjustment, to compensate for errors in setting outlet boxes. Night light is furnished complete with outlet box and Edison base socket, suitable for 15 or 25 watt lamp, lamp not included. Finish of front, lacquer. Size of outlet box is 6½ in. high x 8⅛ in. wide and 4 in. deep. The size of trim is 7¾ in. high x 9⅜ in. wide.



No. 162155 Type "FL" Night Light

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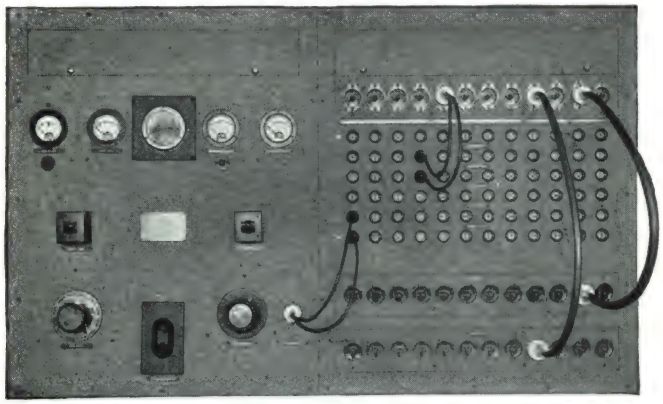
LABORATORY PANELS AND EQUIPMENT

The conducting of electrical experiments in present day High School and College laboratories requires adequate equipment properly installed and connected if best results are to be attained and the time of students and instructors is to be conserved. Since 1913, we have been manufacturing and supplying schools and colleges with electrical equipment for laboratories. In this as in many other lines, Holtzer-Cabot has been the pioneer, originating equipment and improving the apparatus wherever possible.

The laboratory equipment listed herein when properly installed and connected will provide a most practical and convenient system for quickly connecting to work tables and instructors' benches the various voltages af alternating and direct current required for electrical experiments.

All equipment is listed and approved by the Underwriters' Laboratories.



List No. 165025. Type CM Combined Control and Charging, and Distribution Panel

The Equipment

The equipment provided consists of the following units as described in detail:

(1) Control and Charging Panel—Containing all meters, switches, rheostats, and other apparatus necessary for controlling the charge and discharge of batteries and the control of voltage and current of motor generator.

(2) Distribution Panels—Containing an assembly of plugs, receptacles, and cord units for connecting to each work table the current or voltage required.

(3) Storage Battery—An assembly of battery cells connected and tapped to provide varying battery voltages.

(4) Motor Generator—To provide 115 volts d-c. where power service is a-c. current and to provide a-c. where power service is d-c.

(5) Transformers—To provide low voltage a-c. at the work tables.

Note: A control and charging panel is usually combined in the same cabinet with a distribution panel for the main laboratory, as shown in illustration above, in which the control panel, motor generator and batteries are installed. Additional distribution panels only may be installed in other laboratories, and fed from this main combined panel.

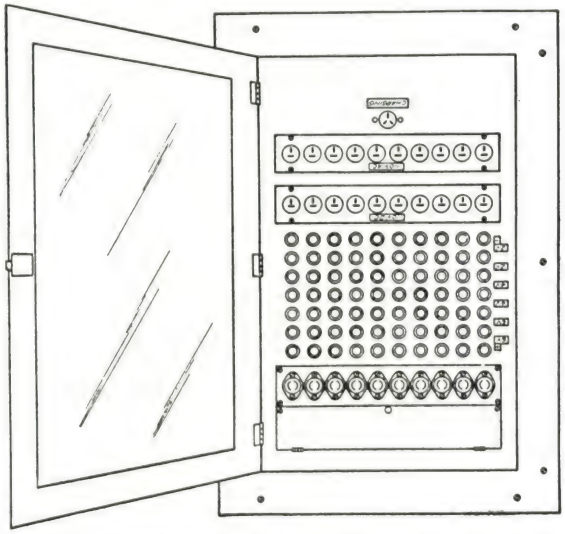
Distribution Panel, List No. 165027, Type "CS"

Contains an assembly of receptacles with plugs and cords and fuses. The fuses are in a compartment at top of panel, one fuse for each out-going circuit to work bench. Fuse compartment is covered by hinged door. The top row of receptacles on panel are for outgoing circuits, one for each work bench.

The assembly of receptacles in center consists of vertical rows of seven (7) receptacles, one row for each work table. The 7 receptacles are connected to various taps on storage battery so that by plugging into the proper receptacles any battery voltage from 2 to 24 may be connected to the out-going receptacles.

The next to the bottom row of receptacles are connected to motor generator output and are "brown" in color, the bottom row to 110-volt lighting circuit and are "red" in color. The single receptacle at bottom is a special 3-way polarized type and by means of special cord and plug unit permits of charging separately any section of battery. When two or more distribution panels are installed the charging jack is furnished on one panel only; usually the distribution panel installed in same laboratory with charging and control panel. When distribution panels are installed separately from control and charging panel in other laboratories there is also included a remote control switch with bull's-eye for motor generator and a heavy duty tumbler switch for the 110-volt lighting circuit supply.

The plug and cord units are of such construction that it is impossible to create false connections or short



List No. 165027. Type "CS" Distribution Panel

circuits by connecting battery to motor generator or lighting circuit, or motor generator to lighting circuit. The bench outlet receptacles and plugs are 20-ampere polarized twist lock type insuring safe positive connections. The motor generator and lighting circuit receptacles and battery cords are also polarized. Plugs are of cord grip type.

Panels are of steel and enclosed in steel cabinets having glass paneled door with lock and key. Cabinets may be for flush, surface, or partition mounting, or equipped with pipe legs for floor mounting. A space is provided in bottom of cabinets for holding cords and plugs. Finish as required.

NUMBER OF CIRCUITS AND WIDTH OF CABINET

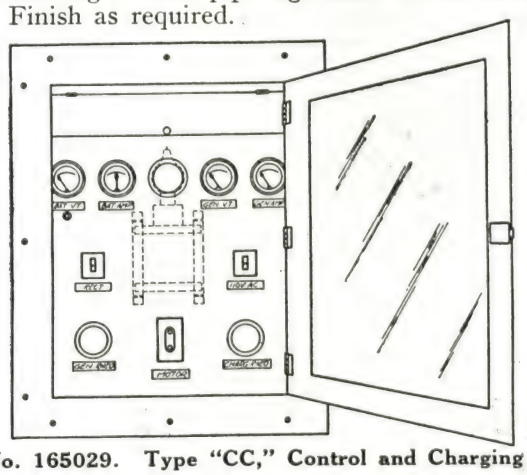
Distribution panel No. circuits	Width of metal cabinet, in.
6	30
10	30
14	38
20	50
24	58
Cabinet height	45
Cabinet depth	16

Trim size 2 in. greater each way for flush or partition mounting.

Continued on next page

Control and Charging Panel, List No. 165029, Type "CC"

This panel contains a voltmeter and ammeter with remote control switch and rheostat for starting, stopping, and controlling voltage of the motor generator; a voltmeter and ammeter with switch, rheostat, and Tungar charger for controlling charge and discharge of battery; a switch for connecting and disconnecting the supply circuit from regular 110-115-volt school lighting circuit; and a fuse compartment, having a fuse for each incoming line from lighting service, motor generator, and batteries. Panel is of steel and is enclosed in heavy steel cabinet with glass paneled doors provided with lock and key. Cabinets may be for flush or surface wall mounting; partition type (*i.e.*, extending through the wall with door on back); also furnished with pipe legs for floor mounting. Where panels are to be set into the wall the partition type is recommended—size of cabinet 36¾ in. high, 29 in. wide, and 16 in. deep, with trim 2 in. larger each way. Surface cabinet wall mounting or with pipe legs same size as flush cabinet. Finish as required.



List No. 165029. Type "CC," Control and Charging Panel

Combined Control and Distribution Panels, List No. 165025, Type "CM"

These panels can be enclosed in one large steel cabinet for flush, surface, or partition mounting, or with pipe legs for floor mounting. Wood cabinets floor mounting only may be furnished having drawers for housing cords and plugs and a compartment in base for motor generator. Cabinet sizes are as follows:

DATA, COMBINED CONTROL AND DISTRIBUTION PANELS

No. of distribution panel circuits	Wood cabinet, width, in.	Steel cabinet, width, in.
6	51	45
10	59	53
14	67	61
20	79	73
24	87	81
.....	Height 72	Height 36¾
.....	Depth 24	Depth 18

Trim size 2 in. greater each way for flush or partition type.

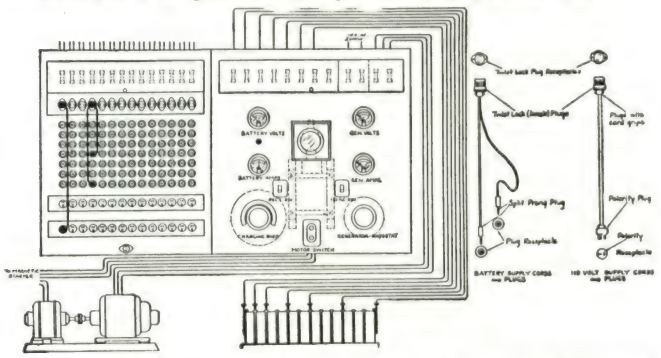


Diagram of Wiring and Arrangement of Combined Control, Charging and Distribution Panel

Motor Generator

This is of standard Holtzer-Cabot manufacture having separate motor and generator mounted on cast iron sub-base and connected together by flexible coupling. Regularly furnished for 1200 watts output, but larger sizes can be furnished if specified. D-c. generators are regularly furnished flat compounded for 115 volts with field regulation for plus or minus 10%. A magnetic starter is included.

Storage Battery

We regularly furnish the Electric Storage Battery Company's sealed top battery, type DMGO-5, of 40-ampere-hour capacity—12 cells—24 volts. Battery is furnished completely charged, connected, and assembled.

Note: We do not recommend couple type batteries due to the voltage drop at heavy loads.

Where possible we recommend that batteries be installed in a ventilated closet or room. Where battery is to be installed direct in laboratory we recommend and furnish a heavy wood battery cabinet painted on the inside with asphaltum paint. Steel cabinets are not recommended but can be furnished if specified.

Transformers

Low voltage alternating current is most economically and conveniently supplied by separate transformers at the different work tables. We supply a special transformer having a 24-volt secondary with taps for any voltage from 2 to 24 in 2-volt increments. Maximum output is 250 watts at 24 volts.

Wiring

It is usual practice to provide one circuit to each student's table and two circuits to instructor's bench. Each circuit should consist of 2 No. 12 B&S wires run in iron conduit to distribution panel. The storage battery requires 7 No. 8 wires to control and charging panel. The control panel also requires 2 wires from the a-c. power and light circuits and 6 wires to motor generator set. All wires should be No. 12 B&S run in iron conduit.

Where separate distribution panels are installed they should be connected to the control and charging panel, the requirements being 7 No. 8 wires for battery and 7 No. 12 wires for motor generator and 110-volt a-c. supply.

Table Outlets

Laboratory tables are regularly supplied with convenience outlets. The outgoing circuits from the laboratory distribution panel are connected to the tables and instructor's bench through iron conduit usually brought up through the floor directly under each bench.

Special Equipment

Where standard equipment will not meet requirements, The Holtzer-Cabot Electric Co. through its long experience in this field has built and is prepared to build laboratory panels and motor generators of any size and to meet any requirements. We welcome inquiries concerning any type of equipment to meet any conditions.

Continued on next page

SCHOOL FIRE ALARM SYSTEMS (163-B)

The functions of a fire alarm system in a school, should be: First, to so train the children by means of periodical fire drills that they will vacate the building quickly and without confusion; and Second, to call automatically the city fire department in case of actual fire. Any system which performs less than this, is not giving to school children the fullest measure of protection from fire and fire panic which should be theirs. Experience has shown that the best and most orderly response to fire alarm signals is secured in those communities where fire signals are uniform in all schools and are not used for any other purpose.

To best meet the above requirements, THE HOLTZER-CABOT ELECTRIC CO. unqualifiedly recommends its standard:

S. A. FIRE ALARM SYSTEM

Architects' Specifications

Furnish and install as covered by these specifications a Holtzer-Cabot Type S. A. closed circuit double supervised code ringing fire alarm system, with auxiliary connections to the city fire department.

The manufacturer's names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—Operation shall be as follows: For genuine fire, any person can break the glass in front of any station, causing front door to open, exposing the pull lever which must be pulled all the way down. This shall sound the school code 4-4 on all fire alarm bells in the school and automatically summon the city fire department by tripping the auxiliarized city fire alarm station.

For a fire drill only, any authorized person may open the door of any station by key, thus exposing the pull lever which may be pulled down and shall sound the school code 4-4 on all fire alarm bells but shall not call the city fire department.

Fire Alarm Station, No. 163436—Fire alarm stations shall be No. 163436 semi-flush code ringing station mounted over special cast iron outlet box. Station must have substantial code ringing movement with non-interference pull lever and must be equipped with approved type door contacts, so arranged that drill signals may be given by authorized persons without causing false alarms to the city fire department.

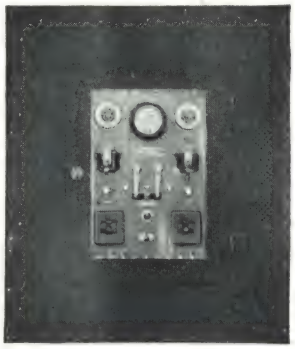
Breaking Glass Causes Door to Fly Open, Exposing Lever

Pulling Lever Transmits Alarm to Both Local and City Systems

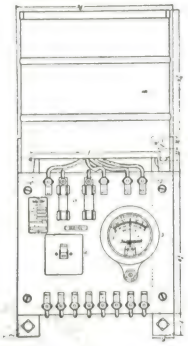
Sounding Drill Signal (Door Opened by Key)

E. M. Gong, No. 151037—Fire alarm gongs shall be No. 151037 electro mechanical type with heavy 10-in. bell metal gong and shall be of the turtle type, i.e., all mechanism shall be under the gong, and shall be capable of sounding 500 blows without the necessity of rewinding.

Electro-Mechanical Bell



Control Panel Used on Type "SA" Fire Alarm System



Installation Diagram of Panel and Rectifier on Wall Bracket

S. A. Control Panel, No. 1630446—Control panel shall be No. 1630446 mounted in flush or surface type steel cabinet with slate gutter barriers and steel trim with glass panel door, lock and key.

Panel shall be double supervised type having two trouble bells and two pilot lights, together with necessary relays, switches, etc., to provide automatic trouble signal in case of any failure of wires or apparatus or battery supply, either the operating or supervisory battery.

Battery—Battery shall be 12 ampere hour storage battery in grooved bottom glass jars, mounted on lead covered shelf.

Battery shall be in two sections—one for operating the fire alarm system and one for supervisory purposes.

Operating battery shall consist of one cell for each fire alarm gong in the system, plus two cells extra for line drop.

The supervisory battery shall consist of three cells.

Battery charger shall be No. 163404, consisting of bulb type rectifier on slate panel with ampere meter switches and adjustable resistance.

Auxiliarized City Box—Auxiliarized Code Fire Alarm Box shall be the same type box used in municipal fire alarm system, with the addition of an auxiliary electrical tripping device for summoning the city fire department, when operated by the school fire alarm system.

This box to be furnished under this contract and mounted where shown on the outside of building near front entrance.

Connections to the school fire alarm system to be made by this contract.

Connections to the city fire alarm lines will not be made under this contract.

Continued on next page

C. I. FIRE ALARM SYSTEM FOR SCHOOLS

In places where there is no permanently-manned fire department, or where it is not possible to secure a direct fire department connection for the school, the C. I. System furnishes a most satisfactory alternate.

The C. I. System operates under constant electrical supervision and has same characteristics as S. A. System, except there is no connection to city fire department.

Architects' Specifications

Furnish and install as covered by these specifications a Holtzer-Cabot Type C. I. closed circuit double supervised code ringing fire alarm system.

The manufacturer's names and catalog numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specifications.

No. 163830

Fire Alarm Station, No. 163830—Fire Alarm Station shall be flush type No. 163830, mounted over special cast iron outlet box. Station must have substantial code-ringing movement with non-interference pull lever. Must have hinged door of the break glass pattern in which breaking the glass in front causes door to fly open, exposing the pull lever.

Note: For surface type specify No. 163810.

Fire Alarm Station (Alternate), No. 163805—Fire Alarm Station shall be flush type No. 163805, mounted over special outlet box. Station must have substantial code-ringing movement with non-interference, pull lever. Must have hinged door, held shut by spring tension so that opening the door by hand gives access to the pull lever of the station.

No. 163805

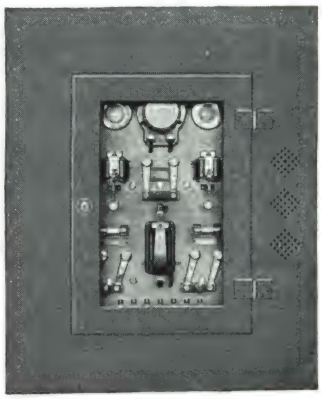
Note: For surface type specify No. 163800.

No. 151037

Fire Alarm Gong, No. 151037—Fire Alarm Gongs shall be No. 151037 electro-mechanical type with heavy 10-in. bell metal gong and shall be of the turtle type, i.e., all mechanism shall be under the gong, and shall be capable of sounding 500 blows without the necessity of rewinding.

Control Panel, No. 1630253—Control Panel shall be No. 1630253, mounted in flush type steel cabinet with slate gutter barriers and steel trim with glass panel door, lock and key. Panel shall be double supervised type having two trouble bells, and two pilot lights to provide automatic trouble signal in case of any failure of wires or apparatus or battery supply, either the operating or supervisory battery.

Battery shall be 12 ampere hour storage battery in grooved bottom glass jars, mounted on lead covered shelf. Battery shall be in two sections—one for operating the fire alarm system and one for supervisory purposes. Operating battery shall consist of one cell for each fire alarm gong in the system, plus two cells extra for line drop. The supervisory battery shall consist of three cells. Battery charger shall be No 163404, consisting of bulb type rectifier on slate panel with ampere meter switches and adjustable resistance.



No. 1630253

Wiring—System shall be wired in strict accordance with diagram furnished by manufacturer, using No. 14 rubber covered wire in rigid iron conduit throughout.

Alternate Specifications for Fire Alarm Gongs

Note: In case alternate gongs are specified omit paragraph on battery above and insert paragraphs "Operating Current" and "Supervisory Battery" below.

Fire Alarm Gongs shall be No. 151120, single stroke type for operating in series on 110 volt direct current circuit of the building. Gongs shall be 10 in. diameter.

No. 151120

No. 151121

Fire Alarm Gongs shall be No. 151121, single stroke type for operating in series on 110 volt alternating current circuit of the building. Gongs shall be 10 in. diameter.

No. 151170

Fire Alarm Gongs shall be No. 151170 type PS vibrating synchronous bells with 8-in. gongs. They shall be wound to operate in series on 110 volt alternating current circuit.

No. 151125

Fire Alarm Horns shall be No. 151125 vibrating type without contacts wound to operate in series on 110 volt alternating current circuit.

Operating Current — System shall operate from the 110 volt lighting supply, feeders for same being brought directly to the main light and power panel in the basement.

Supervisory Battery—Supervisory battery shall be 10 cells Edison BSCO, 500 ampere hour, primary battery mounted in suitable steel cabinet.

Continued on next page

E. T. S. FIRE ALARM SYSTEMS—FOR SCHOOLS

This system is designed particularly for schools and has no city fire alarm connection. The system consists of non-code break glass stations and gongs, one or more on each floor, and a control panel with code sounding device in the basement.

Architects' Specifications

Furnish and install as covered by these specifications a Type ETS Holtzer-Cabot closed circuit double supervised code ringing fire alarm system.

The manufacturer's names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specifications.

Operation—Breaking the glass in any station shall trip the code sounding mechanism in control panel and cause the school fire code (4-4) to be sounded four times on the fire alarm gongs. For a drill signal, inserting a key and opening the front of any station shall sound the gongs in the same manner.

Non-code Fire Alarm Station, No. 163500—Fire Alarm Station shall be flush type non-code No. 163500, mounted over single gang outlet box. Station must have

No. 163500

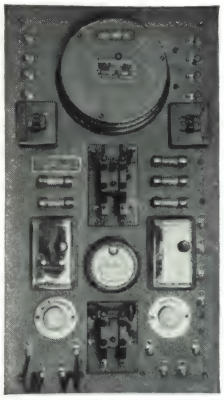
substantial knife-blade switch contacts which will close automatically when glass front is broken. Front to be hinged and have special lock and key for sounding drill signals.

Fire Alarm Gong, No. 151121—Fire Alarm Gongs shall be No. 151121, single stroke type for operating in

No. 151121

series on 110-volt alternating current circuit of the building. Gongs shall be 10-in. diameter.

Control Panel, No. 1631405—Control Panel shall be No. 1631405, mounted in flush type steel cabinet with glass panel door, lock and key. Panel shall be double supervised type having two trouble bells and two pilot lights to provide automatic trouble signal in case of any failure of wires or apparatus or current supply, either the operating or supervisory current. Panel to contain a prewound code-ringing mechanism which will sound the school code 4-4 four rounds on the fire alarm gongs when a fire alarm station is operated.



No. 1631405

Operating Current—System shall operate from the 110-volt lighting supply, feeders for same being brought directly to the main light and power panel in the basement.

Supervisory Battery—Supervisory Battery shall be 10 cells Edison BSCO, 500 ampere hour, primary battery mounted in suitable steel cabinet.

Wiring—System shall be wired in strict accordance with diagram to be furnished by the manufacturer, using No. 14 rubber covered wire in rigid iron conduit throughout.

Alternate Specifications for Fire Alarm Gongs

Fire Alarm Gongs, No. 151120—Fire Alarm Gongs shall be No. 151120, single stroke type for operating in series on 110-volt direct current circuit of the building.

Gongs shall be 10-in. diameter.

No. 151120

No. 151170

Fire Alarm Gongs, No. 151170—Fire Alarm Gongs shall be No. 151170 Type PS vibrating synchronous bells with 8-in. gongs. They shall be wound to operate in series on 110-volt alternating current circuit.

No. 151125

Fire Alarm Horns, No. 151125—Fire Alarm Horns shall be No. 151125 vibrating type without contacts wound to operate in series on 110-volt alternating current circuit.

Continued on next page

GROUP TYPE FIRE ALARM SYSTEMS

This is an ideal system for large groups of buildings such as colleges, hospitals, etc. It is extremely flexible in that it may be arranged to sound gongs in all buildings simultaneously, or in certain buildings only, as may be desired. A very important advantage is its adaptability to additions and extensions. With this system installed additional buildings may be equipped and connected without necessitating any change in original equipment or wiring.

The system described in the following specifications is only typical, and can be changed to cover practically any requirements.

Architects' Specifications

Furnish and install as covered by these specifications a Holtzer-Cabot closed circuit group type auxiliarized fire alarm system with auxiliary connections to city fire department.

The manufacturer's names and catalogue numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specification.

Operation—Operation shall be as follows: The pulling of a fire signal from any station in any ward building shall sound the fire alarm bells in that ward building but in no other ward building. It shall also sound the fire alarm gongs in the Administration Building, Nurses' Home, Power House and Laundry and automatically transmit an alarm to the city fire department.

Pulling a fire signal from any station in Administration Building, Nurses' Home or Laundry shall sound the bells in these buildings but not in any ward building. The system must be so designed that as additional buildings are built, they may be equipped with stations and gongs and connected to this system, so as to operate in accordance with these specifications, without necessitating any change whatever in this system, or any additional wiring in other than the new buildings to be equipped.

No. 163830

Fire Alarm Stations—Fire Alarm Station shall be flush type No. 163830, mounted over special cast iron outlet box. Station must have substantial code lever. Must have hinged door of the break glass pattern, in which breaking the glass in front causes door to fly open, exposing the pull lever.

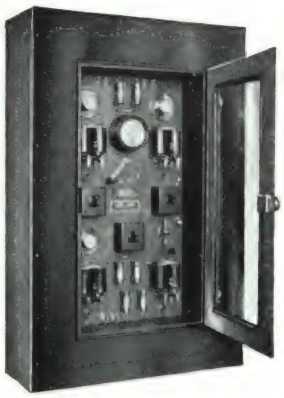
Fire Alarm Gongs—Install in Administration Building, Power House, Laundry and Nurses' Home where indicated on plans No. 151037 electro mechanical bell with heavy 10-in. cast bell metal gong. These bells shall be of the turtle type in which all mechanism is under the gong and shall be capable of sounding 500 blows without the necessity of rewinding.

No. 151037

Install in ward buildings at nurses' station on each floor as indicated on plans No. 151181 dome type tapper bells with 6-in. cast bell metal gongs. Tapper bells to be mounted over single gang outlet boxes.

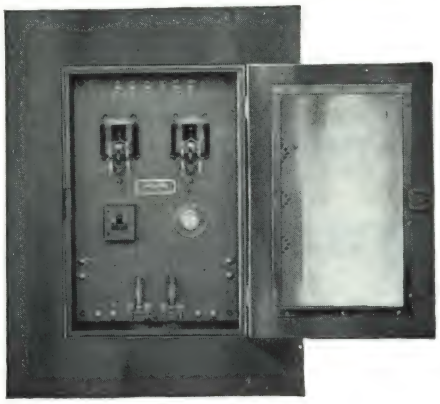
No. 151181

Master Control Panel—Install in power house a No. 1630817 master control panel in steel cabinet with locked door containing all necessary instruments for the control and operation of the circuits between master control panel and local control panels in other buildings. In addition to automatically controlling the fire alarm gongs in the service buildings and ward buildings as specified, this panel must also have means for manually sounding the gongs in Administration Building, Power House, Nurses' Home and Laundry if desired.



No. 1630817

Local Control Panels—Install in Administration Building, Nurses' Home, Laundry and each ward building, a No. 1630730 local control panel in steel cabinet with locked door containing all necessary instruments for the control and operation of the station and gongs in that building in accordance with the requirements of these specifications.



No. 1630730

Register—Install in Power House a No. 163600 recording punch register and automatic take-up reel mounted in oak shelf fastened to wall with suitable brackets.

No. 163600

Battery and Charger—Install in power house duplicate sets of 25 cells each of 40 ampere hour storage battery mounted on substantial iron pipe battery rack.

Install on wall near battery a bulb type rectifier and charging panel with means for connecting one battery on charger and the other to operate system and vice versa.

Wiring—All interior wiring to be in rigid iron conduit using rubber covered wire not less than No. 14 run in accordance with wiring diagram to be furnished by manufacturer. Wiring between buildings shall be not less than No. 10 B. & S. and shall be run in one section of wire ducts, marked "reversed for fire alarm" on plans.

Continued on next page

FIRE WATCH AND TELEPHONE SYSTEMS

This is a most complete protective system for large industrial plants, Federal and State buildings, insane hospitals and similar risks where several watchmen are employed and adequate supervision is necessary.

Holtzer-Cabot Systems of this type are installed in many important buildings such as:

Kelly Springfield Tire and Rubber Company, Cumberland, Md.
Simmons Company, Kenosha, Wis.
Bureau of Printing and Engraving
U. S. Department of Internal Revenue Building
U. S. Department of Commerce Building
U. S. Department of Agriculture
Washington, D. C.
N. Y. State Office Buildings at Albany, New York City, Buffalo and others

The system described here is only typical and can be varied to meet any requirements.

No. 1631500

Architects' Specifications

Furnish and install as directed by these specifications a closed circuit Holtzer-Cabot combined fire watch and telephone system.

The manufacturer's names and catalog numbers specified herein are the type and quality of apparatus desired. Bids on any similar apparatus of equal quality will be considered, but shall be submitted as an addition or deduction to or from the basic bid. Bids with no alternate will be considered as binding to furnish equipment in accordance with specifications.

Watch and Telephone System

Operation—In operation the system shall accomplish the following:

(1) Each watchman's "route call" from any watch station shall register on chart of watchman's recorder and indicate visually on annunciator at head watchman's desk.

(2) An "emergency call" from any watch station shall sound an emergency bell, light an emergency light and record on a punch register at head watchman's desk. Emergency calls must have right of way over "route calls."

(3) Telephone service — talking and ringing— between any watch station and head watchman's desk.

Watchman's Station, No. 163690—Install where shown on plans No. 163690 combined watch and telephone stations—flush type—finished in blue enamel. Stations shall be round type, having hinged door with spring lock.

Stations shall have a substantial code-ringing movement for sounding an emergency call and non-code contact fingers for registering route calls. Route calls shall be registered by watchman's key without opening door of station. Emergency calls to be sounded by watchman's opening door with key and pulling inside lever down.

No. 163690

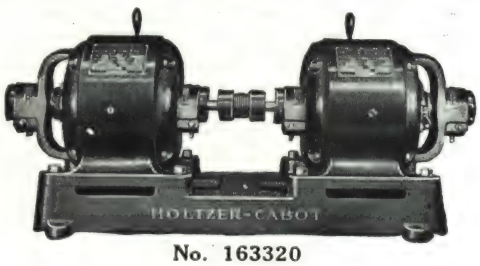
Telephone equipment of watchman's stations shall consist of sensitive transmitter and receiver units mounted behind substantial cast cover plate on inside of station door. Station must also have audible signal for calling watchman and switch for automatically cutting in telephone units when door is opened.

Head Watchman's Desk, No. 1631500—Install in superintendent's office a No. 1631500 central desk consisting of a high grade walnut finish steel office desk with linoleum covered top and having a steel superstructure finished to match desk. Superstructure of desk to contain:

(a) A rectangular dial watchman's recorder.
(b) A target type visual annunciator.
(c) One Automatic Punch Register for emergency watchman's calls.
(d) One code ringing bell and a bull's-eye for emergency calls.
(e) All necessary telephone equipment to enable head watchman to send and receive calls and talk with any watch station in the building and any other apparatus necessary to provide complete service as required by these specifications.

Battery shall consist of duplicate sets of 40 ampere hour multiple plate storage battery of proper voltage to operate all apparatus, including recording clock, annunciator, register, emergency bell and telephone talking and ringing circuits. Battery to be mounted on substantial iron pipe battery rack with porcelain insulators and glass sand trays

Motor Generator, No. 163320—Install a No. 163320 motor generator of sufficient capacity to charge battery at normal 8-hour rate. Motor to operate from 220 volt 3 phase power circuit — generator shunt wound.



No. 163320

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PRE-SIGNAL FIRE ALARM SYSTEM

Operation—Fire Alarm system shall be the pre-signal or dual alarm type. To sound a fire alarm, any person may break the glass in front of any station, causing door of station to fly open, exposing the pull lever inside. Pulling down on this lever shall sound on the pre-signal bells the code number of the station pulled, summoning the local fire brigade of the building. In case of serious fire, any member of the fire brigade may, by inserting a special key in station and then pulling lever, sound a general alarm on all the gongs in the buiding. The general alarm shall be one code 4-4 regardless of which station the alarm is sounded from and shall continue to ring for not less than 20 minutes.

Fire Alarm Stations—Fire Alarm Stations shall be No. 163270 pre-signal positive non-interfering type in semi-flush cases with break glass type doors. Mechanism shall be of substantial construction using heavy cut brass gears, shall be positive non-interfering and equipped with key operated general alarm device. Plain code or so-called "shunt type" non-interfering mechanism is not acceptable.

No. 163270. Fire Alarm Station

No. 151037 Electro-Mechanical Bell

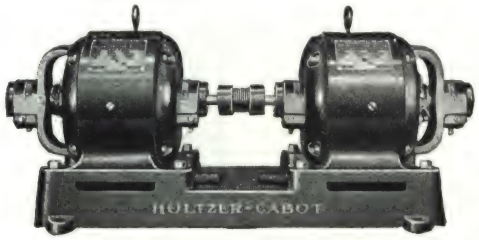
Fire Alarm Gongs—Fire Alarm Gongs shall be No. 151037 electro-mechanical type with heavy 10-in. bell metal gong and shall be of the turtle type, i.e., all mechanism shall be under the gong, and shall be capable of sounding 500 blows without the necessity of rewinding.

Control Panel—Control Panel shall be No. 1631510 mounted in flush type steel cabinet with glass paneled doors with lock and key. Panel shall be arranged for three circuits of pre-signal boxes, one circuit of pre-signal and five circuits of general alarm bells. Panel shall be closed circuit supervised type having continuous coding device for sounding general alarm for at least 20 minutes.

Battery—Battery shall consist of duplicate sets of 24 cells each of 40 ampere hour storage battery mounted on substantial iron pipe battery rack with glass and trays and porcelain insulators.

Charging Panel—Charging Panel shall be No. 1631515 arranged for charging both fire alarm and watch system battery either separately or simultaneously.

Motor Generator—Motor Generator shall be No. 163320 of sufficient capacity to charge fire alarm battery at normal 8-hour rate. Motor to operate from 220-volt 3-phase power circuit; generator shunt wound.

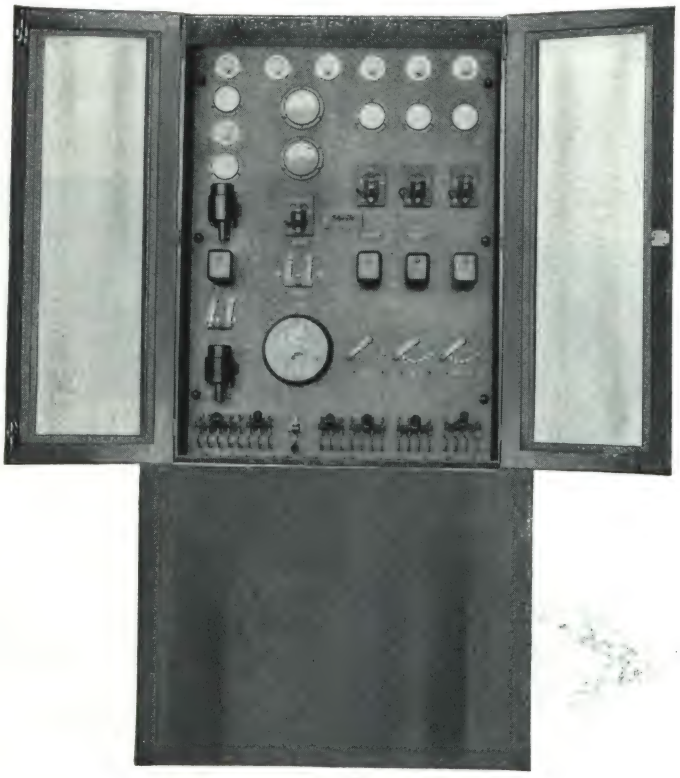


No. 163320. Motor Generator

No. 1631515. Charging Panel

Wiring—Both fire and and watch systems shall be wired complete in rigid iron conduit in exact accordance with diagram to be furnished by manufacturer.

Approval—Contractor must submit for approval six sets of cuts or drawings showing all apparatus to be installed and approval must be obtained before proceeding with manufacture of the apparatus.



No. 1631510. Control Panel

SIGNAL ENGINEERING & MFG. CO.

57 Seventh Avenue
(154 West 14th Street)
NEW YORK, N. Y.

DISTRIBUTORS

UNITED STATES

AMERICAN DISTRICT TELEGRAPH COMPANY,— and Controlled Companies
GRAYBAR ELECTRIC COMPANY, INC.,— and Other Leading Electrical Jobbers

CANADA

DOMINION ELECTRIC PROTECTION COMPANY
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EXPORT

INTERNATIONAL STANDARD ELECTRIC CORPORATION, 67 Broad Street, NEW YORK, N. Y.

Offices in All Principal Cities of the World

RENTAL INSTALLATIONS

BELL TELEPHONE COMPANIES Will Install and Maintain SIGNAL CODE CALL SYSTEMS on a Rental Basis

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Products

SYSTEMS:

Fire Alarm — Tank Alarm
Calling or Paging — Special Signal
Special Control

SIGNALS:

Bells, Horns, Special Tone Signals.

MAGNETIC RELAYS.

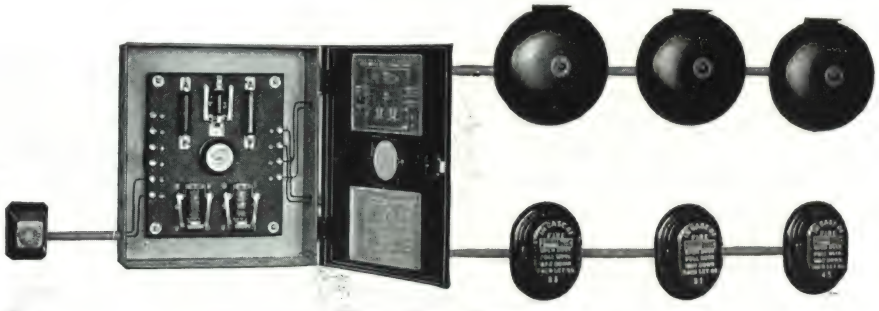
Services

SIGNAL'S Engineering Department and Laboratory services are offered in connection with developing circuits and apparatus for signaling and controls systems through relays.

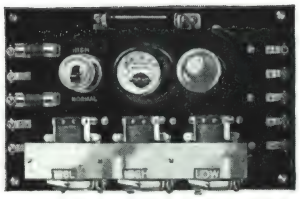
Approvals

Underwriters' Laboratories, Inc.
Factory Mutual Association, Inc.
Investigating Committee of Architects and Engineers.

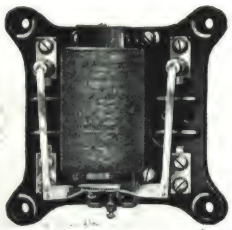
Signal Code Call System
For Complete Description, see following page



Fire Alarm System
For Complete Description, see third page following



Tank Alarm System
For Complete Description, see fourth page following



Relay
For Complete Description, see fifth page following

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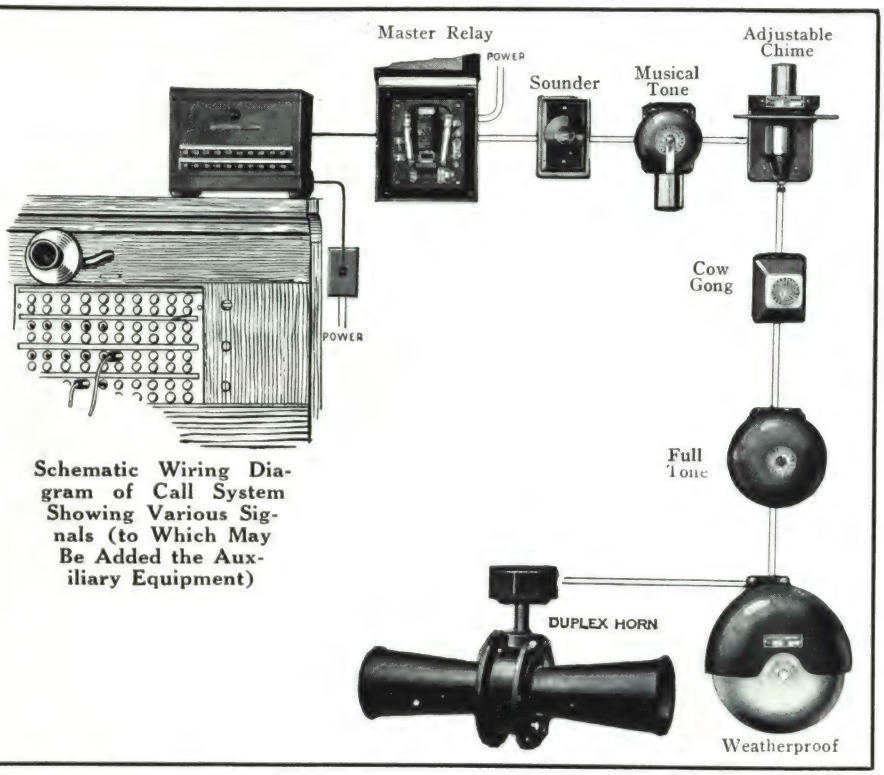
SIGNAL CODE CALL SYSTEM

More Calls Over Fewer Trunk Lines

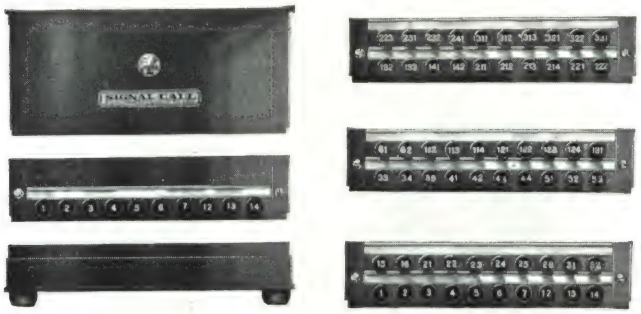
The SIGNAL CODE CALL System is primarily a means for promptly completing telephone calls by automatically reaching members of an organization and calling them to nearest branch telephone; and for broadcasting special messages or emergency signals. SIGNAL CALL service is in general use in factories, hospitals, large offices, banks, schools, garages, department stores.

Code numbers are assigned to members of an organization. When one fails to answer his desk telephone, operator presses code button, which broadcasts his number three times on Signal devices so distributed as to be heard throughout the premises. The person called steps to nearest telephone and the call is promptly *completed.*



Schematic Wiring Diagram of Call System Showing Various Signals (to Which May Be Added the Auxiliary Equipment)

Sending Station



Sectional Units

May be placed directly on telephone switchboard. Free from noise or magnetic influence

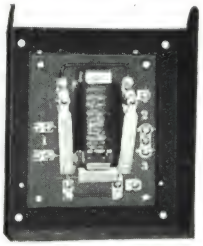
Driven by electro-magnet. Has jeweled bearings and centralized make and break. Case of solid brass finished in black enamel. (Special finish upon request.)

Furnished complete for 10, 20, 40 or 60 calls. To increase from 10 to 20, the first 20-call section is substituted for the 10-call section. To increase from 20 to 40, the second 20-call section is added. To increase from 40 to 60, the third 20-call section is added. All electrical connections are automatically made. This gives flexibility not found in other apparatus. More than 60 calls, special.

Dimensions: 10 or 20-call stations, 7¾x6½x6¼ in. Additional section 1½ in. high. Two or more sending stations may be operated in multiple without interference by using SIGNAL CALL Relays. (Wiring diagram furnished.)

Signal Call Relay

The SIGNAL CALL Relay is our standard heavy duty type adapted to the requirements. The coil is operated by the sending station, the contacts closing the signal circuit. It is thus possible to use one voltage for sending station and another for signals. Each relay will carry from 10 to 25 signals. With additional relays in multiple or connected in signal lines, the system may be pyramided to any extent. The design, rating and method of wiring this relay insures positive and continuous operation.



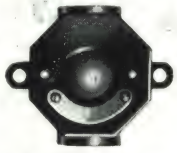
Signal Call Relay

Auxiliary Service

Automatic Time Sender

Automatic Time Sender—Operates 15 rapid signals automatically from clock or push button, to broadcast starting, stopping or other program signals.

Watchman's Call—Push button at main or other entrance broadcasts watchman's call over the system independent of the SIGNAL CALL, giving one ring for each push of button.



Weatherproof Watchman's Push Button

Night Telephone Relay—A special telephone relay furnished by local telephone companies.

When leaving switchboard at night, operator plugs into this relay line, leaving the key at a predetermined number on the SIGNAL CALL in operative position.

Telephone calls then actuate the SIGNAL CALL System to broadcast the call.

Night Telephone Relay

Continued on next page

SIGNALS

For Specifications, see Fourth Page Following

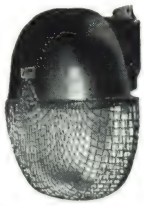
The signals illustrated are used with Signal Call, Fire Alarm, Tank Alarm and Burglar Alarm Systems, Telephone Loud Ringing Sets and any other type of electrical signal device.

Furnished to operate on all commercial voltages and frequencies from 6 to 250 volts. Variety sufficient to meet all conditions.

Bells

Diameter, 4 to 20 in. Single stroke and vibrating for indoor or outdoor, multiple or series.

Bell shells made of hot pressed steel, parkerized; cast bell metal, or special non-corrosive alloy. Special finish if specified. Mechanism of solenoid type and underdome construction. Single stroke bells have but one moving part (plunger), hence maintenance free. Coils form wound, impregnated and moistureproof. No double tapping.



Weatherproof Bells

Have rustproof bell metal gongs and cast iron shields. For use on outdoor applications. Protective guards of heavy wire, rigidly secured are also furnished when specified

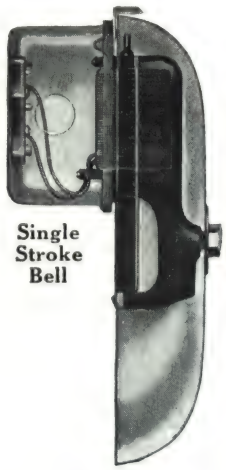
Universal Back Box

(Left)

Fits all sizes from 4 to 12 in., of Signal Engineering Indoor Bells and Chimes. Permits completion of wiring in advance of bell mounting (flush or surface). Compact and sturdy

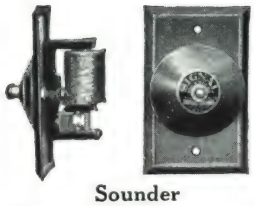
Vibrating Bell

Vibrating type of bell is primarily of single stroke construction (shown at right) with the addition of the vibrator unit shown above. Wired to operate either single stroke or vibrating, when specified



Single Stroke Bell

Special Tone Signals



Sounder

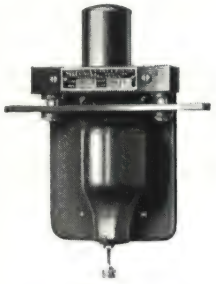
Suitable for hospital rooms, where a faintly audible signal is desirable. Plate and cone are of bakelite, of standard switchbox dimensions. Choice of four different colors. Buzzer—Same as sounder, with vibrating tapper

Cow Gong

Standard 4-in. bell mechanism with special cast bell metal gong. Gives a particularly distinctive sound

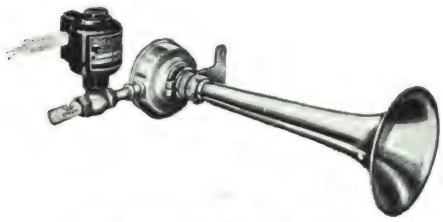
Musical Tone Bell

Same as 4-in. bell, with resonator chamber added, which mellows the tone. Suitable for hospitals, libraries and department stores, where a more musical tone is desired



Chime

Gives a distinctive musical tone of remarkable penetration. *Tone volume adjustable.* Suitable for banks, offices, stores, hospitals, etc. Olive green enamel finish. Chime bar and resonator nickelplated



Air Horn with Electric Valve

Complete with electric valves for any pipe size and pressure. Standard projectors 15 or 24 in. long. For applications requiring sound to carry approximately one mile

Duplex Horn

Has two free vibrating diaphragms with but one moving part—a sturdy, self-lubricating plunger of great wearing quality. Free from springs, vibrating reeds or other delicate parts. May be mounted in any position. If a-c., 60 cycles only. Very effective for code signaling because of distinctive vibrant sound. Two projectors send sound in opposite directions with carrying capacity of two horns. Volume control adjustable by means of thumbscrews. Also furnished with single projector

Steam or Air Whistle with Electric Valve

For air or steam pressures up to 200 lb., complete with electric valve for any pipe size. Whistle chambers furnished for any diameter as specified. Particularly recommended in the small sizes for industrial installations

Continued on next page

MAGNETIC RELAYS

General

Signal Engineering Relays are made in the standard models illustrated, to meet practically all types of signaling applications.

Coils—Form wound, self-supporting, impregnated, baked and are interchangeable.

Cores—Built up of laminated silicon steel.

Contacts—Silver, copper or carbon, depending on use and rating.

Shading Coils—For alternating-current relays, eliminating humming.

Contact Arms—Made of phosphor bronze designed to insure wiping action and deadbeat to prevent chattering.

All Metal Parts—Either cadmium or nickel plated.

Housings

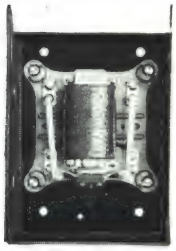
Type G—Made of stamped steel with hinged cover, knockouts on four sides. Dimensions are 4½x6x2⅝ in. This type is furnished with all light duty relays.

Type H—Same as above, except somewhat larger. Dimensions are 6x7x2⅝ in. Standard for heavy duty and two-circuit models.

Type W—Weatherproof, made of cast iron, tapped for ¾-in. conduit, both top and bottom. For use with all model relays. Dimensions are 6¼x9½x3½ in.

Bases—Made of specially compounded, cold pressed insulating material for use with all standard relays. Dimensions about 4x4 in.

Contact Circuits—All standard models are made in single or double circuit as specified. Ratings given below are for single circuits.



G

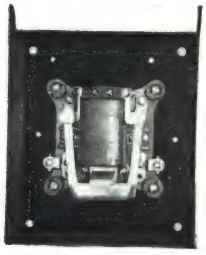
FRONT CONTACT TYPE
Contacts closed when coil is energized

Class	110 a-c.	115 d-c.
L	5 amps.	4 amps.
P	10 amps.	6 amps.
R	15 amps.	8 amps.
E	20 amps.	10 amps.

Panel Mounted

BACK CONTACT TYPE
Contacts open when coil is energized

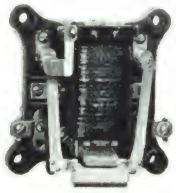
Class	110 a-c.	115 d-c.
L	5 amps.	3 amps.
R	15 amps.	6 amps.



H

FRONT AND BACK CONTACT
Front contacts close, back contacts open when coil is energized

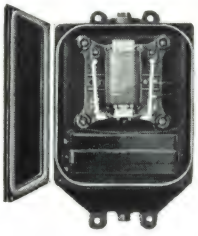
Class	110 a-c.	115 d-c.
L	F 5 amps. B 5 amps.	4 amps. 3 amps.
P	F10 amps. B15 amps.	10 amps. 6 amps.



Standard Base Mounted

THERMOSTATIC TYPE
Three-wire control circuit
Front contacts close and back contact opens when coil is energized

Class	110 a-c.	115 d-c.
M	15 amps.	5 amps



W

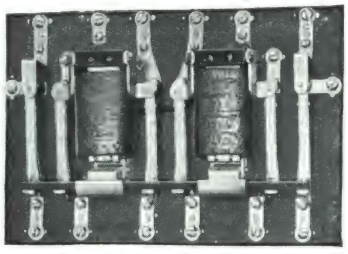
TELEPHONE TYPE
Front contact closed when coil is energized by ringing circuit. Coils of 1000 or 1700 ohms, condenser 1 or 2 mfd. when specified.

Class	110 a-c.	115 d-c.
T	5 amps.	4 amps.

Special Relays

For automatic and remote control:

Locking — electrical and mechanical.
Time Delay.
Stepper.
Automatic Interrupter.
Duplex.
Mercury Tube.
Multiple Contact.



Continued on next page

FIRE ALARM SYSTEMS

For Schools, Hotels, Hospitals, Public Buildings, Factories, Garages and Airports

Systems are listed by Underwriters' Laboratories, Inc., Fire Prevention Bureaus, and also have the approval of The Investigating Committee of Architects and Engineers.

Specification writers may use "Signal Engineering Fire Alarm System" as a standard of quality and efficiency; and with the assurance that contractors can readily obtain estimates through any of our distributors and through any of the clock, telephone or signal manufacturers whose products are being specified.

The three stages of service—engineering, selling and maintenance—are provided and will be found particularly satisfactory. A "Signal Engineering" specialist is always near and always available.

Type of Systems

Two general types of systems are provided: (1) selective code systems using pull-lever coded stations; (2) general alarm and master code systems using non-code break-glass stations.

Selective Code Systems—Are furnished in two forms—

(CA) The *Standard System,* for schools and for other buildings, where the occupancy is such that it is desirable to immediately evacuate the building in case of fire or other emergency; and

(CAD) The *Pre-Signal System,* for hospitals, hotels and other buildings where a fire squad or an emergency force is always available to respond to the first alarm sounded on signals located in their quarters, and who can sound a general alarm throughout the premises if the emergency warrants the clearing of the buildings.

In either the *Standard* or the *Pre-Signal* Selective Code System, the location of the station which has been operated is indicated by its special code sounding on the signals.

A Selective Code System consists of a control panel with trouble bell, coded pull-lever stations (break-glass type if in schools or hotels) and single stroke bells (or horns).

General Alarm Systems Are Furnished in Two Forms—

(G) The *Continuous General Alarm System,* in which the breaking of glass or opening of door of station automatically sends out, through the control panel, a continuous series of single strokes on all bells or signals, until glass is replaced and station door closed. Timing is adjustable to march time, quickstep or slow-measured signals. No winding or resetting of sender is required.

(T) The *Master Code System,* in which the breaking of the glass or opening of the door of station automatically sends out, through the control panel, four rounds of a code signal—such as 2-3 or 4-4 (state which, or order special code as required). No winding or resetting of code sender is required.

City Fire Alarm Connection—Is provided with either of the Selective Code Systems, through the use of the Signal Engineering Sentinel Panel. This panel is a small safeguard device, mounted on ebony asbestos and inclosed in a locked housing. Connection from the interior system to the municipal fire alarm box is made through this Sentinel Panel; which prevents any alarm going through to the City, except one regularly sent from a coded station of the interior system. An open or ground or other disarrangement of the interior system will not sound the City alarm.

Supervision—All systems are closed circuit type and fully supervised. Double supervision, to guard against failure of trouble bell supply, can be furnished on any system when so specified.

Control Panels—Panels are ½ in. Ebony Asbestos and equipped with milliammeters, supervisory and contactor relays, balancing resistors, time delay cutout and terminals. Regularly made in sizes from 1 to 5 signal circuits. In cases where provision is to be made for a larger system in future, the ultimate number of circuits may be provided and strapped out.

Housings—Four types are furnished, as follows:

Type F, Flush—Small window.
Type L, Flush—Full glass.
Type K, Surface—Small window.
Type M, Surface—Full glass.

Housings are constructed of code gauge steel, with removable trims, fitted with Yale locks. Finish is flat gray, to enable refinishing on the job if required.

Capacity—Any umber of stations may be used, and terminals will be provided on the panel on a basis of approximately one circuit for each twenty (20) stations. Panels are regularly furnished up to five (5) signal circuits. Capacities beyond five (5) signal circuits may be supplied on special order.

The number of signal circuits required is determined on the following basis:

110 volts, 60 cycles—10 Bells or 8 Horns to each circuit.

24 volts, d-c.—5 Bells to each circuit.

Trouble Bells—A rectangular trouble bell (FAV-4-4) is furnished for exterior mounting, and may be attached directly to the surface type housing. *Dome type* trouble bells are furnished, mounted on panels, instead of the exterior type, when so ordered. Trouble bells may be for 12 volts to 110 volts, a-c., 60 cycles, or 6 volts to 110 volts, d-c.

Stations—For *Selective Code* systems, use code-type pull-lever stations, giving four rounds of the particular code number assigned to that station. Stations may be surface or flush type; and either break-glass to open door, or plain door with handle. (See next page for types.)

For *General Alarm* and *Master Code* systems, use plain non-code break-glass types. (See following page for description and illustration.)

Signals—Single stroke bells, or horns, series-connected, as follows:

On 110-volt, 60-cycles, Bells, Type FAS(?) series, 11 volts, 60 cycles, or Horns, Type FAC-1 series, 12 volts, 60 cycles.

On 24-volt d-c., Bells, Type FBX(?) series, 4 volts d-c.

(See preceding page for descriptions and illustrations.)

FIRE ALARM PANELS

CLASS CA - SELECTIVE SYSTEMS (USING CODED STATIONS) - ALTERNATING CURRENT
CLASS CD - " " " " " - DIRECT CURRENT
CLASS G - GENERAL ALARM SYSTEMS (CONTINUOUS REPEATED SIGNALS)
CLASS T - MASTER CODE SYSTEMS (4 ROUNDS OF A FIXED CODE)
(NOTE NON-CODE STATIONS USED WITH CLASSES 'G' & 'T')

TYPE OF SYSTEM		NUMBER OF SIGNAL CIRCS	SINGLE SUPERVISED				DOUBLE SUPERVISED			
			TRBL BELL ON PANEL		EXT TRBL BELL ONLY		TRBL BELL ON PANEL		EXT TRBL BELL ONLY	
			WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH	WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH	WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH	WITHOUT PILOT & SWITCH	WITH PILOT & SWITCH
SELECTIVE CODE SYSTEMS	STANDARD	1	CA-1-B	CA-1-BV	CA-1	CA-1-V	CA-1-DB	CA-1-DBV	CA-1-D	CA-1-DV
		2	CA-2-B	CA-2-BV	CA-2	CA-2-V	CA-2-DB	CA-2-DBV	CA-2-D	CA-2-DV
		3	CA-3-B	CA-3-BV	CA-3	CA-3-V	CA-3-DB	CA-3-DBV	CA-3-D	CA-3-DV
		4	CA-4-B	CA-4-BV	CA-4	CA-4-V	CA-4-DB	CA-4-DBV	CA-4-D	CA-4-DV
		5	CA-5-B	CA-5-BV	CA-5	CA-5-V	CA-5-DB	CA-5-DBV	CA-5-D	CA-5-DV
	PRESIGNAL	1	CAD-1-B	CAD-1-BV	CAD-1	CAD-1-V	CAD-1-DB	CAD-1-DBV	CAD-1-D	CAD-1-DV
		2	CAD-2-B	CAD-2-BV	CAD-2	CAD-2-V	CAD-2-DB	CAD-2-DBV	CAD-2-D	CAD-2-DV
		3	CAD-3-B	CAD-3-BV	CAD-3	CAD-3-V	CAD-3-DB	CAD-3-DBV	CAD-3-D	CAD-3-DV
		4	CAD-4-B	CAD-4-BV	CAD-4	CAD-4-V			CAD-4-D	CAD-4-DV
		5	CAD-5-B	CAD-5-BV	CAD-5	CAD-5-V			CAD-5-D	CAD-5-DV
GENERAL ALARM SYSTEMS		2	G-2-B	G-2-BV	G-2	G-2-V	GD-2-B	GD-2-BV	GD-2	GD-2-V
		4	G-4-B	G-4-BV	G-4	G-4-V	GD-4-B	GD-4-BV	GD-4	GD-4-V
		5	G-5-B	G-5-BV	G-5	G-5-V	GD-5-B	GD-5-BV	GD-5	GD-5-V
MASTER CODE SYSTEMS		2	T-2-B	T-2-BV	T-2	T-2-V	TD-2-B	TD-2-BV	TD-2	TD-2-V
		4	T-4-B	T-4-BV	T-4	T-4-V	TD-4-B	TD-4-BV	TD-4	TD-4-V
		5	T-5-B	T-5-BV	T-5	T-5-V	TD-5-B	TD-5-BV	TD-5	TD-5-V

PANEL SIZE - 16"W x 20"H
HOUSING SIZE - 20"W x 24"H
FLUSH TRIM - 25"W x 27"H

HOUSINGS

FLUSH		SURFACE	
SMALL WINDOW	FULL GLASS	SMALL WINDOW	FULL GLASS
F	L	K	M

NOTE
NOT OVER 10 BELLS OR 8 HORNS ON 110 VOLTS A.C.
NOT OVER 5 BELLS ON 24 VOLTS

INFORMATION REQUIRED

(1) TYPE DESIGNATION
(2) OPERATING VOLTAGE (AND CYCLES IF A.C.)
(3) TROUBLE BELL " " "
(4) NUMBER & SIZE OF SIGNALS TO BE USED ON EACH CIRCUIT (SEE NOTE ABOVE)
(5) CODES FOR STATIONS ON 'C' SYSTEMS, MASTER CODE (2-3 OR 4-4) ON 'T' SYSTEMS
(6) HOUSING TYPE (ORDER AS SEPARATE ITEM)

Continued on next page

FIRE ALARM STATIONS

Open Door, Pull Lever, Code Station

Spring catch door which protects pull lever against damage. Back boxes furnished for either flush or surface mounting, and tapped for ½ to ¾-in. conduit. Shipped in advance, when desired, for installation with conduit.

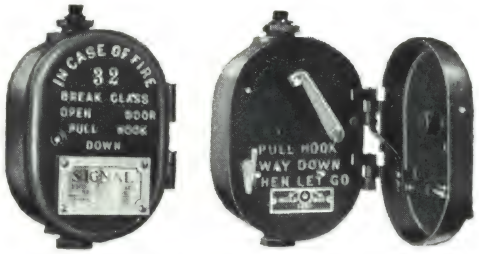
Surface Type
SP-2 Standard
SPD-2 Pre-signal

Flush Type
FP-2 Standard
FPD-2 Pre-signal

Weatherproof
SPW-2 Standard
SPDW-2 Pre-signal

Break Glass, Open Door, Pull Lever, Code Station

Designed for schools or other places where children might tamper with door.



Surface Type
SGP-2 Standard
SGPD-2 Pre-signal

Flush Type
FGP-2 Standard
FGPD-2 Pre-signal

Weatherproof
SGPW-2 Standard
SGPDW-2 Pre-signal

Vibrating Cow Gong Trouble Bell

Trouble Bells

Type FAV4-4 illustrated is used when a disarrangement signal external to the control panel is required.

Otherwise a dome type bell is supplied on the panel.

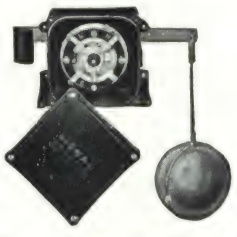
Break Glass Non-code Station

Use only with General Alarm and Master Code Systems. Breaking glass of station causes alarm to be sounded. Keys are provided for Fire Drill and Testing.

NON-CODE STATIONS*
Closed Circuit—Break Glass
SG-1 Surface Type
FG-1 Flush Type
*Fits standard single gang switch opening.
No back box furnished.

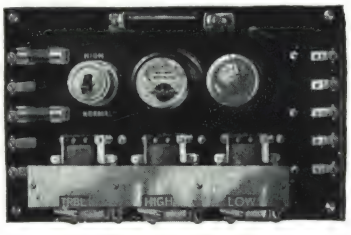
SIGNAL ENGINEERING TANK ALARM SYSTEM

The Signal Engineering High and Low Water Tank Alarm Systems indicate the water level limits in elevated water supply tanks. Equipment consists of a single copper float ball operating a high-low level tank switch, tank bell, trouble bell and an indicating control panel. This control panel is inclosed in a steel cabinet with glass door, and consists of a panelboard on which are mounted milliammeter, red lamp, transfer switch, test plugs, wire terminals, and three Signal Engineering Relays. Each of these relays has a properly worded target, which appears only when the relay is operated.



Float Controlled Switch

This system operates on a closed circuit under constant electrical supervision. Disarrangement of this system—such as a broken wire or connection—is indicated by the meter reading, the ringing of trouble bell, and by panel target reading "Trouble." Low water is indicated by ringing of the tank bell, by the lighting of a red lamp, and by a target drop reading "Low." High water is indicated by the tank bell and by a target drop reading "High." Trouble bell also rings with the high and low water indications. System is designed for operation on lighting current of 110-220 volts, a-c. or d-c.



Control Panel

Continued on next page

DATA FOR THE SPECIFICATION WRITER

Specifications for Fire Alarm Systems

The four commonly accepted types of systems are covered in the following composite specification. Paragraphs indicated by (CA) apply only to the *Standard Selective Code System;* and (CAD), (G) and (T) apply to their corresponding systems. Text in parentheses is informative only and should be deleted, together with paragraphs not applicable to the system being specified.

System

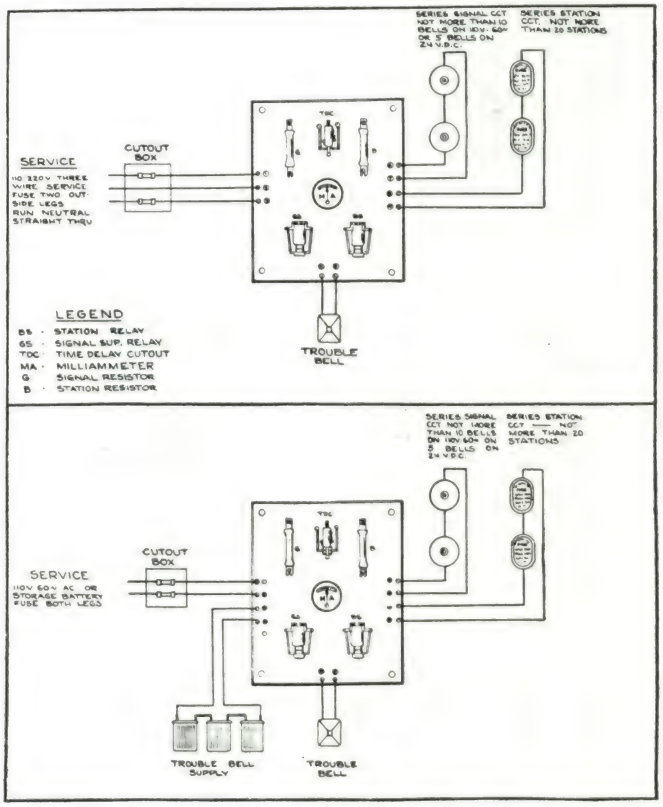
The system shall be the
(CA) *Standard Selective Code* type
(CAD) *Pre-Signal Selective Code* type
(G) *Continuous General Alarm* type
(T) *Master Code Transmitter* type
as manufactured by the Signal Engineering & Mfg. Co., or equal, as approved in writing by the Architect (or Engineer).

(CA) Operation—Pulling down the lever of any station will sound on all signals, four rounds of the code of that station. At the completion of the four rounds, the system shall automatically restore itself to normal.

(CAD) Operation—Pulling down the lever of any station will sound on the pre-signal or pilot signals, four rounds of the code of the station operated. To sound an alarm throughout the building(s), a key is inserted in the station, and lever again pulled—sounding on all signals, four rounds of the code of that station.

(G) Operation—Breaking glass or opening door of station automatically sends out, through the control panel, a continuous series or single strokes on all bells or signals, until glass is replaced and station door closed. The system must be fully automatic, requiring no winding or resetting.

(T) Operation—Breaking glass or opening door of station automatically sends out, through the control panel, four rounds of a code signal—such as 2-3 or 4-4 (specify which), sounding on all signals. The system must be fully automatic, requiring no winding or setting.



The Two Types of Service Connections, and a Signal Circuit as Used on Any System

The station circuit shown above is used only on standard selective code system

(CA) (CAD) (G) (T) Control Panel—Panel is to be located in apparatus room in basement, as shown on plans (locate in a conspicuous and accessible place). Panel is to be of Ebony Asbestos and equipped with necessary supervisory and control equipment, including milliammeter and time delay cutout, and is to be furnished and installed complete with surface (or flush) type cabinet, with window to show milliammeter (full glass door if specified). Conduits shall enter cabinet through knockouts only, on sides or bottom.

(CA) (CAD) (G) (T) Trouble Bell—Panel is to be equipped with trouble bell (an external trouble bell may be provided and located as desired, in which case the trouble bell on panel may not be necessary). Specify as indicated by conditions.

(CA) Stations—Stations are to be coded flush open-door pull-lever type, installed and connected at locations as shown on plans, and with lower part of outlet box 5½ ft. from floor. The flush back box is to be roughed-in with conduit work. *Alternate* (for schools, etc.). Add, "Stations are to be break-glass type." (Locate stations at least one on each floor and so that there will be a station within 100 ft. of any point on the floor.)

(CAD) Stations—Stations are to be coded flush open-door pull-lever pre-signal type, installed and connected at locations as shown on plans, and with lower part of outlet box 5¼ ft. from floor. *Alternate* (for hotels, etc.). Add, "Stations are to be break-glass type." (Locate stations at least one on each floor and so that there will be a station within 100 ft. of any point on the floor).

(G) (T) Stations—Stations are to be of the plain non-code break-glass type, with normally open contacts, and to fit a single gang switch opening on a standard outlet box.

(CA) (CAD) (G) (T) Signals—Bells are to be 8-inch, single stroke solenoid type, underdome, semi-flush, rust-proofed and finished in dull black. The Universal back box is to be roughed-in with conduit work. (6, 10 or 12-in. Bells (or Horns) may be specified.)

(CA) (CAD) (G) (T) Current Supply—The system is to operate from the 3-wire 110-220 volt a-c. or d-c. commercial supply. (If a 3-wire 110 volt supply is not available, specify 2-wire 110 volt, and a 24- or 6-volt direct current supply for trouble bell. If there is a 24-volt clock system, use this 24-volt supply for trouble bell. If no storage battery is available, specify four dry cells for the trouble bell supply. The whole system may be operated from 24-volt storage battery, but 110-volt service is recommended.

(CA) (CAD) (G) (T) Wiring—Provide at point near meter a locked box containing a fused cutout connected to main supply. (Neutral should not be fused if 3-wire service is used.) From this point run 3 No. 14 wires to the control panel. (If battery is used for trouble bell, specify 2-wire 110-volt supply, and a 2-wire supply from storage battery or from the dry battery. If storage battery is used for operating system, specify 4 wires from storage battery to control cabinet.)

Continued on next page

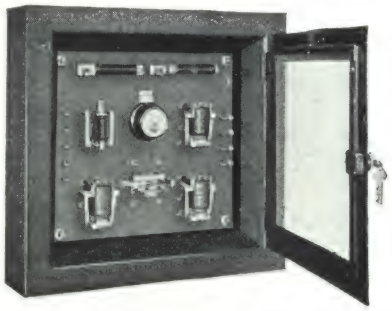
(CA) For each station circuit provide 2 No. 14 wires to form a loop on which the stations are connected in series.

(CAD) For station circuit provide 4 No. 14 wires to form two loops connected through the stations in series.

(G) (T) For station circuit: The stations are to be connected in parallel across two continuous loop circuits, starting from two of the four station terminals on the control panel; and, after connecting through all stations, returning to the other station terminals on the panel.

(CA) (CAD) (G) (T) For signal circuits provide two No. 14 wires to form a loop on which the signals of the circuit are connected in series.

Connection diagram will be furnished by the manufacturer, and all wiring is to be according to standard requirements for lighting and power, as given elsewhere in these specifications.



Typical Control Panel
Mounted in Type "M" Surface Cabinet, with full glass door.
Size 20 in. wide by 24 in. high

Optional Equipment Which May Be Specified

(CA) (CAD) (G) (T) Under "Control Panel" heading:

Pilot Lamps—Panel shall also be equipped with pilot lamp and throw-over switch to transfer trouble signal to pilot lamp. When trouble is cleared, trouble bell must resume ringing until switch is thrown back to normal position.

(CA) (CAD) (G) (T) Under "System" heading:

Double Supervision — System shall be double supervised.

City Fire Department Connection—(CA) (CAD) (Under Special Heading): The system shall be arranged to connect with an auxiliary type municipal fire alarm box—furnished by others. Contractor will provide a Sentinel Safeguard Panel, through which the interior system is to be connected by a two-wire circuit to the City box. This Safeguard Panel must positively prevent any alarm being transmitted to the City system, in case of trouble or disarrangement of the interior system; and shall allow only a regular alarm, sent from a station of the interior system, to get through to the City system. The Sentinel equipment shall include a cut-out device, to permit fire drills and tests on the interior system, without tripping the City Fire Alarm Box. (This Sentinel Panel should be located at a point near the municipal fire alarm box, and preferably in a locked closet or room.)

Specifications for Code Calling System and Auxiliary Service

Code Calling System—A complete code calling system shall be installed, as manufactured by the Signal Engineering & Mfg. Co., to operate on .... volts (specify voltage, with cycles if a-c.). It shall be complete with sending station, relay and signals.

Sending Station—Shall be so designed that additional key sections may be added to meet future requirements without necessitating changes in wiring. The mechanism shall be a jeweled magnetic movement free from any motor. It shall be inclosed in a solid brass, dustproof case with standard black (or special) finish.

Relay—Shall be capable of handling 25 signals. It shall be free from springs, and shall have a form-wound moistureproof coil.

Signals—Shall consist of Signal Engineering .... (give number of signals and type). All gongs to be electrically operated, of the underdome type, free from springs, contact points and hinges. They shall embody the solenoid principle in design and have but one moving part (the plunger) free to move up and down within a bakelite tube. The magnet coil shall be form-wound, self-impregnated and moistureproof. Bells shall be so designed as to eliminate double tapping.

Auxiliary Service—***Automatic Time Sender***—Shall be a separate unit placed in some out-of-the-way location. It shall have a jeweled magnetic movement and shall be so designed as to permit automatic broadcasting of 15 rapid signals at predetermined times.

Night Telephone Service—Shall permit incoming calls to be brought to the attention of the watchman when operator is not on duty. It shall consist of a telephone relay, which shall have a form-wound self-impregnated moistureproof coil.

Watchman's Call—Shall provide a weatherproof push button (key type contact switch) to be placed at main or other entrance. It shall sound once on all signals for each operation.

Specifications for Tank Alarm System

The contractor shall furnish and install a High and Low Water Tank Alarm System, as manufactured by the Signal Engineering & Mfg. Co., 57 Seventh Avenue, New York, N. Y. This system shall consist of a single copper float ball operating a high-low level tank switch, tank bell, trouble bell and indicating control panel. This control panel is to be inclosed in steel cabinet with glass door, and shall consist of a panelboard on which are mounted milliammeter, red lamp, transfer switch, test plugs, wire terminals, and three Signal Engineering Relays, each of these relays to have a properly worded target which will appear only when the relay is operated. This system operates on lighting current (110-220 volts, a-c. or d-c.).

Co-operation with Architects

Signal Engineering & Mfg. Co. sales representatives will co-operate with architects, engineers and owners to determine the most practical installation for requirements indicated; and will furnish without cost, specifications, layouts and estimates based on conditions and covering the installation of any service within the scope of its manufacture.

All apparatus is guaranteed to be free from inherent electrical and mechanical defects.

ESTABLISHED 1884

STANLEY & PATTERSON

INCORPORATED

Electrical Signaling Apparatus

TELEPHONE
WALKER 6000

GENERAL OFFICE, SALESROOMS, WAREHOUSE AND FACTORY
150 Varick Street, NEW YORK, N. Y.

CABLE ADDRESS
ELECLITE
All Codes Used

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Products

SIGNAL GONGS, ANNUNCIATORS, PUSH-BUTTONS, TELEPHONES, TELEPHONE SWITCHBOARDS, SMALL BELLS and BUZZERS, BATTERY SETS, POWER SUPPLY CABINETS, TRANSFORMERS, FIRE ALARM BOXES, FIRE ALARM CONTROL PANELS, REMOTE CONTROL TRANSMITTERS, BURGLAR ALARM DEVICES, RELAYS and SPECIAL SIGNALING APPARATUS of every description.

"THE BEST THAT TRADE FARADAY DEVEAU PR MARKS MONEY CAN BUY"

Systems

FIRE ALARM, APARTMENT HOUSE TELEPHONE, INTERCOMMUNICATING TELEPHONE, HOSPITAL SIGNAL, DOCTORS IN AND OUT, SCHOOL SIGNAL, HOLD-UP, BURGLAR ALARM, HOTEL SIGNAL, PAGING, DEPARTMENT STORE SIGNAL, EMERGENCY LIGHTING, TANK ALARM, SPRINKLER ALARM, STANDPIPE PRESSURE SIGNAL, etc.

Catalogs

No. 45—DeVeau Telephone Systems and Apparatus.
No. 46—Industrial Fire Alarm Systems and Apparatus.
No. 47—Municipal Fire Alarm Systems and Apparatus.
No. 48—Electric Signaling Apparatus.
No. 49—Wiring Diagrams.
No. 50—Hospital Signal Systems and Apparatus.

Engineering Service

Catalogs listed above and special bulletins, issued from time to time, cover our complete line of Electric Signaling Devices in the manufacture of which we have been engaged for more than a quarter century.

Our constant aim to produce apparatus electrically and mechanically perfect has resulted in a very general recognition of our Signaling Apparatus as *"The Best that Money Can Buy."*

Our Engineering Department will cordially cooperate with architects and engineers in planning any system to meet their requirements. This service is, of course, rendered free of charge and without obligation.

FARADAY INDUSTRIAL FIRE ALARM SYSTEMS

Listed as Standard by Underwriters

Faraday Industrial Fire Alarm Systems are designed with full consideration of the necessity that a fire alarm system must be absolutely dependable in operation and, at the same time, simple and economical both as to initial cost and maintenance.

These fire alarm systems are designed to operate from five sources of electrical energy, viz.:

(1) D-c. Light and Power Circuits.
(2) A-c. Light and Power Circuits.
(3) Storage Battery Circuits.
(4) Patterson Battery Sets.
(5) Transformers.

Classified in two general types:

(a) *Electrically Supervised Closed Circuit Code Ringing.*

(b) *Non-supervised Open Circuit Non-code Ringing.*

Electrically Supervised Systems—These systems are guarded by a continuous flow of electric current and employ pull-lever or break-glass code ringing boxes, indicating by code signals on gongs or other sounding devices origin of call. All circuits are constantly under electrical test, trouble being instantly indicated by ringing of trouble bell.

Code Ringing Semi-Flush Fire Alarm Box

Certain electrically supervised systems may be of two (2) general types or divisions according to whether:

(1) *Positive Non-interfering Code Ringing or*
(2) *Plain Type Code Ringing are used.*

Positive non-interfering boxes are employed in the better types of electrically supervised closed circuit systems and, where installed, no "jumbling" of signals can occur if two (2) or more boxes are pulled at or about the same time.

Plain type code ringing boxes may also be employed in closed circuit systems and where lever of any box has been pulled down as far as it will go, the box will transmit its code four times; no manipulation of the lever can cause confusion of signal. However, should more than one box be pulled about the same time, there *is* likely to be confusion or "jumbling" of signals.

Non-supervised Open Circuit Systems—These systems employ a simple break-glass box and vibrating gongs or other sounding devices.

Electrically Supervised Code Ringing Closed Circuit Systems

System "A"—*110-125 V. D-c. Type.*
System "F"—*100-110 V. A-c. Type.*

For factories, warehouses, lofts, schools, etc., where several floors are under one roof.

System "B"—*Storage Battery Type*—For factories, warehouses, lofts, schools, railroad yards, docks, etc., where several buildings or large areas are to be covered.

Pre-signal Systems

System "C"—*110-125 V. D-c. Type.*
System "H"—*100-110 V. A-c. Type.*
System "D"—*Storage Battery Type.*

For hotels, apartment houses, hospitals, department stores, etc., where alarm is to be sounded to a superintendent or engineer and his assistants before a general alarm is transmitted.

Single Code Ringing Systems

System "J"—*Storage Battery Type*—For schools, colleges, etc., where only one (1) code for "fire" is to be sounded.

Double Supervised Code Ringing Systems

System "K"—*Storage Battery Type*—For schools, colleges, etc., where point of origin of alarm is to be indicated. Doubly electrically supervised circuits, apparatus and batteries. Trouble of any kind indicated by trouble bell.

Non-supervised Non-code Ringing Open Circuit

System "L"—*Patterson Battery Set or Transformer Types*—For small hotels, small public institutions, lodging houses, small schools, etc., where purely for economy's sake an open circuit system is desired.

Continued on next page

Code Ringing Break-Glass Pull-Lever, F. A. Box

Code Ringing Pull-Lever F. A. Box

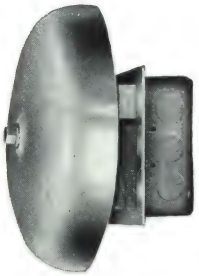
Non-Code Ringing F. A. Box

F. A. Control Cabinet

Single Stroke Underdome Gong

Vibrating Half-grid-guarded Gong

Vibrating Non-guarded Gong



Single Stroke Monitor Gong

Electro-Mechanical Gong

FARADAY SCHOOLHOUSE SIGNALING DEVICES

We have for many years specialized in the manufacture of Schoolhouse Electric Signaling Apparatus, which we can supply in accordance with any specifications to meet normal or special requirements, as follows:

Fire alarm apparatus, telephones, signal gongs for classrooms, corridors, schoolyards, etc., keyboards for the control of signal gongs, power supply cabinets, annunciators, pushbuttons, radio, etc.

Fire Alarm Systems—Range from the simple, open-circuit system, employing small "break-glass" non-coded fire alarm boxes, to the most comprehensive, doubly electrically supervised systems, with positive non-interfering code ringing fire alarm boxes, giving automatically a maximum of protection.

Telephone Systems—Vary, according to the size of the school, from a simple telephone connection between the principal and a few classrooms to the most elaborate intercommunicating system operated with switchboard and outlying stations in and throughout a high school or a number of separate buildings of a university.

Signal Gongs, Keyboards, Power Supply Cabinets, Annunciators, Pushbuttons, etc.—For all purposes, are manufactured with a full recognition of the necessity of absolute dependability to function perfectly at all times.

De Veau Dust-proof School Telephone

Center Telephone

Yard-Type Gong

Full Screen Guarded Gong

Faraday Strap Keyboard

Non-Code Ringing Fire Alarm Box

Code-Ringing Fire Alarm Box

Continued on next page

COMMON-TALKING APARTMENT HOUSE SYSTEMS

Non-Loud-speaking Systems	Loud-speaking Systems	For Service Between
"Q"	"QV"	Vestibule and suites. Superintendent can be called from vestibule only.
"PE"	"PVE"	Vestibule, suites, superintendent and tradesmen. Superintendent answers, but cannot call.
"P"	"PV"	Vestibule, suites, superintendent and tradesmen. Superintendent answers and calls.
"PA"	"PVA"	Vestibule, suites, superintendent and tradesmen. Superintendent has answering- and calling-telephone-annunciator with drop for each suite and vestibule.
"PL"	"PVL"	Vestibule, lobby, suites, superintendent and tradesmen. Superintendent and lobby answer and call.
"PLA"	"PVLA"	Vestibule, lobby, suites, superintendent and tradesmen. Superintendent has answering- and calling-telephone-annunciator with drop for each suite, vestibule and lobby.
"PX"	Not Made Loud-speaking	Lobby, suites, superintendent and tradesmen. Superintendent and lobby answer and call.

SECTIONAL-COMMON-TALKING APARTMENT HOUSE SYSTEMS

"RE"	"RVE"	Two or more vestibules, suites, superintendent and tradesmen. Superintendent has answering-telephone-annunciator with drop for each section.
"R"	"RV"	Two or more vestibules, suites, superintendent and tradesmen. Superintendent has answering- and calling-telephone-annunciator with drop for each section
"S"	"SV"	Two or more vestibules, suites, superintendent and tradesmen. Superintendent has answering- and calling-telephone-annunciator with drop for each suite and vestibule.

SELECTIVE-TALKING APARTMENT HOUSE SYSTEMS

"U"	Not Made Loud-speaking	One or more vestibules, suites, superintendent and tradesmen. Superintendent has answering- and calling-telephone-annunciator with drop for each suite and each vestibule.

SELECTIVE-TALKING APARTMENT HOUSE SYSTEMS—(Cont'd)

"UX"	Not Made Loud-speaking	Lobby, suites, superintendent and tradesmen. Lobby and superintendent has answering- and calling-telephone-annunciators with drop for each telephone.
"UL"	Not Made Loud-speaking	One or more vestibules, lobby, suites, superintendent and tradesmen. Lobby and superintendent has answering- and calling-telephone-annunciators with drop for each telephone.

SWITCHBOARD SYSTEMS

"O"	Not Made Loud-speaking	**Selective-Ringing—Selective-Talking** For service between switchboard and outlying telephones. With battery for "talking," "ringing" and lamp-signals.
"OT"	Not Made Loud-speaking	Switchboard and outlying telephones. With transformer for "ringing" and lamp-signals and with battery for "talking."

INTERCOMMUNICATING SYSTEMS

"D"	Not Made Loud-speaking	**Selective-Ringing—Selective-Talking** Full-Automatic—Intercommunicating For service between several telephones, permitting as many persons to talk as there are telephones on the system.
"M"	Not Made Loud-speaking	**Selective-Ringing—Common-Talking** Multiple Intercommunicating For service between several telephones, permitting only one conversation at a time.
"CR"	Not Made Loud-speaking	**Code-Ringing—Common-Talking** For service between three to six telephones, permitting only one conversation at a time.

MASTER AND OUTLYING TELEPHONE SYSTEMS

"J"	Not Made Loud-speaking	**Selective-Ringing—Selective-Talking** For service between master-telephone-annunciator and any number of outlying telephones. Master-telephone-annunciator has drop for each outlying telephone.
"L"	"LV"	**Selective-Ringing—Common-Talking** For Service Between Master-telephone-annunciator and any number of outlying telephones. Master-telephone-annunciator has drop for each outlying telephone.
"K"	"KV"	Master-telephone and any number of outlying telephones. Non-loudspeaking master-telephone answers and calls.

DeVeau Apartment House Telephones

Made in a Variety of Types for Suites, Superintendents and Tradesmen.

Superintendent's Answering and Calling Telephone

Surface Wall Type

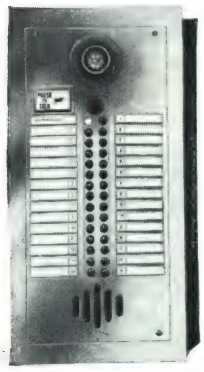
Flush Wall Type

Handphone Type on Cradle

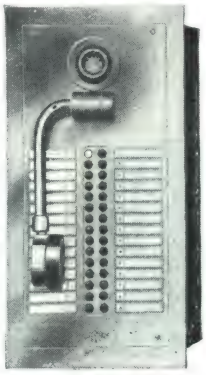
Desk Type

DeVeau Vestibule Telephones

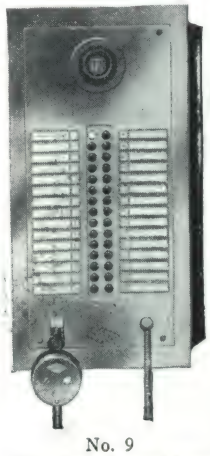
DeVeau Vestibule Telephones are designed for use with or without mailbox outfits. Made of solid brass and in various finishes; three types.



No. 8
Loudspeaking Cordless Receiver-Type



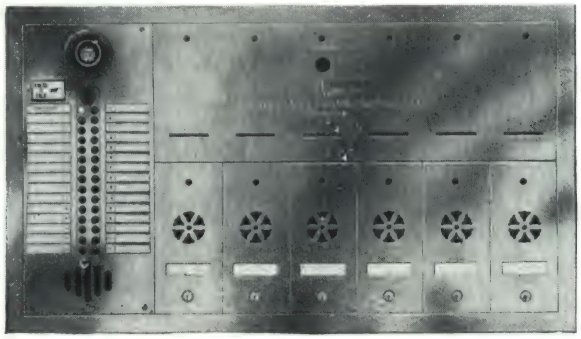
No. 10
Non-Loudspeaking Swinging-Arm Receiver-Type



No. 9
Non-Loudspeaking Armored-Cord Receiver-Type

DeVeau Approved Mail Boxes

DeVeau Approved Mail Boxes are designed for use with Vestibule Telephones or with speaking-tube compartment for use without Vestibule Telephones. They combine ample mail carrying capacity, in accordance with the new Post Office Department regulations, with economy in wall space. Made in gangs of 3, 4, 5, 6, 7 and 8 units to a gang; each unit will accommodate the mail for one tenant. By combining these gangs in various multiples, every requirement can be taken care of. Made of solid-brass, satin finish standard; other finishes to order.



Vestibule-Telephone Mailbox-Outfit

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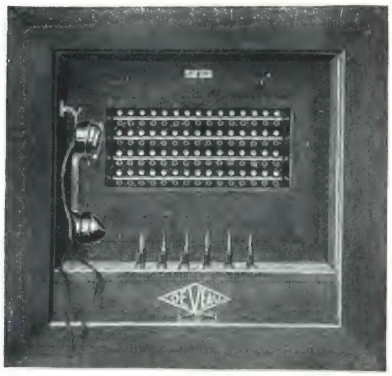
DeVeau Lamp-Signal Telephone Switchboards

Made in the following types: (a) Free-Standing, (b) Flush-Wall (Metal or Wood Cases), (c) Surface-Wall, (d) Recess and (e) Desk Type. Flush type may be furnished in Antique Carved Wood Period Cabinet and Recess type may be provided with ornamental bronze grill doors.

Free-Standing, Surface-Wall, Recess and Wood Case-Flush-Wall types furnished in any standard wood finish; Desk type in golden oak, walnut or mahogany finish.



Flush-Wall Type Switchboard

Target-Drop Telephone Switchboards

Are made in Free-Standing, Surface-Wall and Desk types.

DeVeau Superintendent's Answering and Calling Telephone Annunciators

Designed for use in apartment houses where it is desired that superintendent answer and call suites and where each vestibule can call and converse with associated suites and superintendent. Drops on annunciator indicate origin of call and remain visible until reset.

Furnished complete with operator's telephone, necessary drops, reset and calling buttons, door-opener button for each vestibule, necessary jacks and one plug and cord.

Made in all-metal cases, surface and flush types. Flush types furnished with metal back-box.

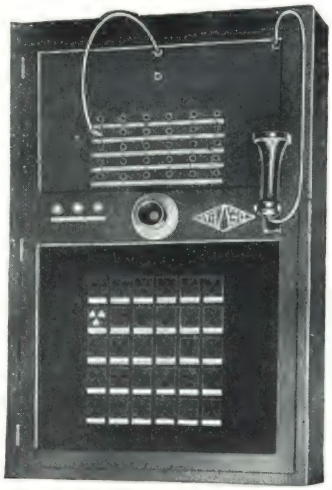
Standard Finishes—Black velvet-enamel, walnut, mahogany or golden-oak on steel, as specified.

Free-Standing Type Switchboard

DeVeau Intercommunicating Telephone Systems

When installed as an adjunct to the local outside telephone system will pay for themselves in a very short time. They save much valuable time by permitting an instant reply to be given to an outside telephone call when information must be obtained from another department, which is impossible when using the outside telephone.

Intercommunicating Telephone Systems are largely used in banks, schools, business houses, factories, private residences, etc., and vary from the full automatic type to a simple connection of two telephones.



Superintendent's Answering and Calling Telephone Annunciator

At left:

Master Telephone, Non-Loudspeaking

Handphone-type on cradle with terminal box

Telephone Power Supply Cabinets

Faraday Telephone Power Supply Cabinets are designed to supply from standard A-c. lighting circuits, 6, 8 and 24-volt D-c. current for "talking" and "ringing" telephone circuits, and will also operate annunciators, door-openers, etc., in building.

By specially constructed chokes and condenser filters, all "hum" and noise of the alternating current line is completely eliminated; the talking circuit is just as quiet as if operated from a battery.

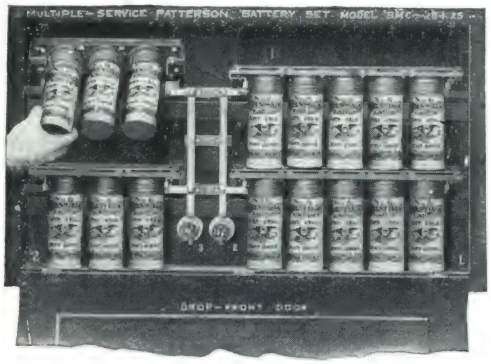
Made for operation from 110-125 volts, 60-cycle A-c., light and power circuits; not made for other frequencies.

Patterson Battery Sets

Patterson Battery Sets are made in Pressed Steel Cabinets with Individual Circuit Fuses. Save much more than they cost when important signal apparatus is to be operated from a battery installation.

They provide dependable battery power that will do the most severe work, even up to that which has heretofore required a motor generator and storage battery, and do it with absolute satisfaction at a cost of less than a third for installation and about one-tenth of its operating expense.

Made in voltages from 4 to 30-volt and in ampere capacities of 25, 50, 75, 100 and 150 amperes.



Patterson Battery Set

Split-Circuit Multiple-Service Type

Patterson Battery Sets will always prove dependable. Their life (if proper capacity outfit is selected) averages about two years. Patterson Battery Sets offer the unique advantage, never possible before with old-style battery sets, that, once the circuit wires to "talking" and "ringing" circuits are connected, they need never be disconnected. The cells can easily be renewed with either binding post or screw type batteries.

Patterson Transformer Battery Sets

Patterson Transformer Battery Sets are adapted for telephone systems where dependable alternating current is available. They are equipped with batteries for the "talking" circuit and with a 50-watt 8-16-24-volt Heavy-Duty Bell-Ringing Transformer for the "ringing" circuit, both mounted in the same cabinet.

They are extremely advantageous because, aside from the "talking" circuit batteries, nothing requires renewal, and no circuit wires have ever to be disconnected, once the battery set is installed.

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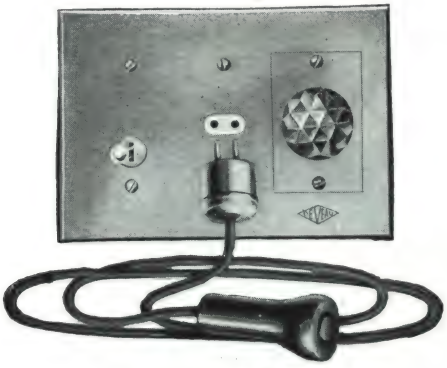
FARADAY HOSPITAL SIGNAL SYSTEMS

(N. E. C. Standard)



Ward-Calling Station

Dome Lamp Corridor Pilot

Illuminated Unit Lamp Annunciator

Nurses' Calling Systems

For operation on low-voltage (18-24 volts) circuits and 110-125 volts A-c. or D-c. light and power circuits.

Faraday Nurses' Calling Systems—Provide a dependable silent call of the locking type, which remains visible until reset at the point of calling. They are so arranged, however, that audible signals can be added if and whenever desired.

Resetting the signal can only be done at the station where the call originates. Flexible cords have outside covering of waterproof gum-rubber; they may therefore be disinfected whenever desired without damage to conductor.

Dome Lamp Corridor Pilot Stations—Are very generally used in connection with Nurses' Calling Systems. Usually placed in corridors above the entrance to wards and private rooms to indicate, when lighted, the origin of call.

In addition to the Nurses' Calls there may also be installed emergency calling devices which permit the nurse to summon assistance, doctors, etc., and by the use of an Elapsed Time Recorder a permanent record may be obtained of the origin of the call and the elapsed time before the call was answered.

Besides Nurses' Calling Systems the following Signaling Systems are generally installed in hospitals: Doctors' "In and Out" Systems, Doctors' Paging Systems, Intercommunicating Telephone Systems and Fire Alarm Systems.

We issue a special Catalogue on Faraday Hospital Signal Systems which will be promptly sent upon request.

FARADAY ANNUNCIATORS

Faraday All-Metal Case Annunciators

Faraday All-Metal Case Annunciators are manufactured by us in many types to meet all practical conditions and requirements, and excel by their superior construction and workmanship. Cases are made of heavy pressed steel. The principal types are: (a) Hand Reset Gravity Drop. (b) Electric Reset Drop. (c) 5-in. Opal Lamp Patterns. (d) 1¼ and 2½-in. Illuminated Unit Lamp Patterns.

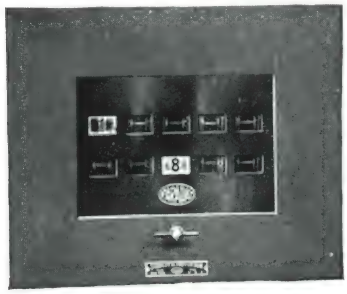
Hand Reset Gravity Drop Annunciators—Are used in apartment houses, small hotels, homes, elevators, etc. Will not stand up as well as electric reset, as the constant jar caused by hand resetting will eventually rack to pieces the sturdiest mechanism—no matter what make it may be. Hand Reset Gravity Drop Annunciators are made in surface and flush patterns, as also for elevator use in single and double-row models.

Electric Reset Annunciators—Are rapidly coming into universal use in all buildings where severe service conditions require the installation of an annunciator which will not get out of order. They are made in surface, flush and desk patterns, as also for elevator use in single and double-row models.

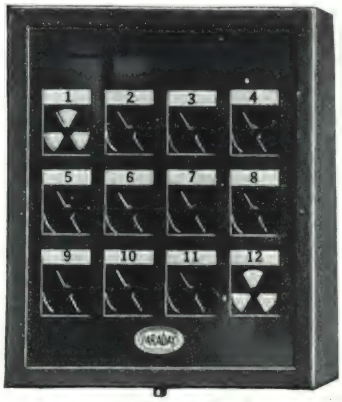
Return-call Faraday Annunciators—Are designed for use in colleges, schools, Y. M. C. A. dormitories, nurses' and fraternal homes, etc., where it is desired that a call be answered by a return signal, or where a call received at the annunciator is to be answered by a return signal.

⅝-in. Opal Lamp Annunciators—Are designed to meet the demand for an annunciator accommodating the largest number of signals in the smallest possible space, yet having the advantage of greater visibility than that of drop annunciators.

⅝-in. Opal Lamp Annunciators are furnished in the following patterns: (a) Surface; (b) Flush; (c) Desk; (d) Pigeonhole.

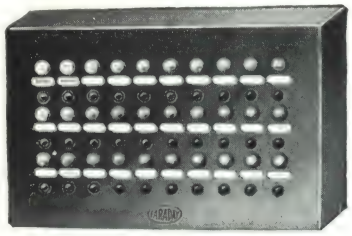


Hand-Reset Flush Annunciator



Electric-Reset Surface Annunciator

1¼ and 2½-in. Illuminated Unit Lamp Annunciators—Have won favor as signaling devices in places where greatest visibility is of vital importance and where, on the other hand, an audible signal—buzzer or bell—is less desirable, though they may be equipped with such if desired. They are most frequently used in hospitals, institutions, hotels, public libraries, department stores or for calling systems. Furnished in the following patterns:



⅝-in. Opal Lamp Annunciator

(a) Surface; (b) Flush; (c) Double-face, for mounting suspended from ceiling, or against side wall.

Furnished with relays for use with Momentary Contact Push Buttons; also, without relays for use with Faraday Locking Directory Push Buttons.

FARADAY DIRECTORY PUSH-BUTTONS

Suitable for all high-class work. Have felt-covered removable weighted bases, perfect mechanical action, phosphor-bronze springs insuring positive contacts and machine-screw connections. Furnished with removable, interchangeble name plates numbered from 1 up.

Standard button arrangement on Directory Buttons is 1 to 7 buttons single row, above 7 buttons double row. Regularly furnished with black buttons. When specially ordered, furnished with pearl buttons.

Standard finish of all buttons, golden oak, walnut or mahogany with polished nickel trimmings.

Faraday Directory-Push Inclined Desk Type

Faraday Directory-Push Surface Wall or Desk Type

USEM CO.

Electrical Signaling Apparatus, Low Voltage Power Plants

515 West 29th Street, NEW YORK, N. Y.

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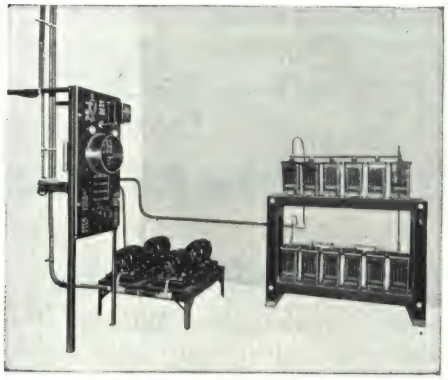
DETROIT, MICH., Thomas W. Butler, 3270 Columbus Avenue
PHILADELPHIA, PA., Herbert Bryan, The Bourse
SEATTLE, WASH., Fred W. Carlson, 220-22 Ninth Avenue, No.

Products

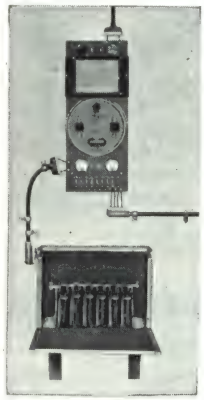
Usem "Potentiostat," a Low Voltage Power Plant.
Usem "Surelite" for Emergency and Exit Lighting.
Usem "Waterwatch" for Sprinkler Supervision Systems and Standpipe Tank Alarm or Telltale Systems.
Usem Local or Interior Fire Alarm Systems.
Also Usem Non-grounding Midget Push Buttons and Special Signal Systems of every description.

Usem* "Potentiostat," an Automatic Power Plant

This universal device supplies low voltage current for bells, fire alarms, annunciators, elevator signals, program clocks, telephones and all low voltage apparatus. It is built in a variety of capacities for operation on a primary source of direct or alternating current.



Type MG with Reserve Motor Generator



Type DCG for Direct Current

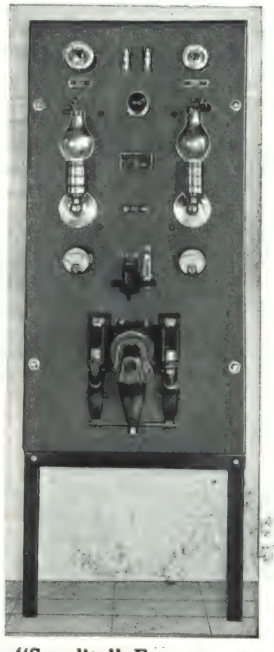
Usem Potentiostat

The "Potentiostat" consists of a storage battery and automatic control board for keeping battery charged, for supervising the system and reporting trouble promptly. The storage battery has sufficient reserve capacity to supply current for a considerable time should the primary source be interrupted. Several different voltages may be obtained simultaneously from the same "Potentiostat."

Usem* "Surelite" for Emergency and Exit Lighting

An automatic source of power, independent of main supply, for emergency lights for a factory, school, theater or other public building. Serves lamps in all exit lanterns and a sufficient number in auditorium, foyer, etc., to prevent panic in case of failure of the main supply.

Lamps may be independent of main circuits or supplied, under normal conditions, from the general source. In event of failure of normal supply, they are instantly and automatically transferred to the Usem "Surelite" supply and the house is not left in darkness. This automatic throwover feature eliminates delay and possible panic. Made in standard sizes for 10 lights and upward. Any capacity can be built to meet special requirements.



"Surelite" Emergency Lighting System

*Reg. U. S. Patent Office

Usem* "Waterwatch"

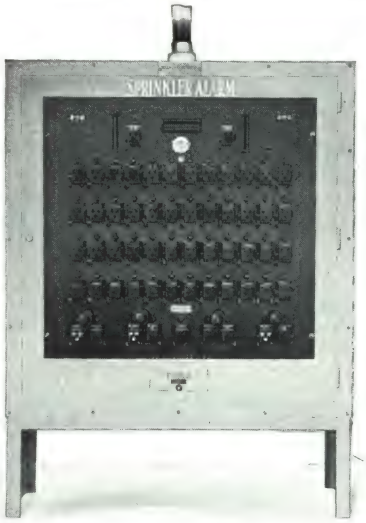
Closed Circuit Local Sprinkler Supervision and Automatic Local Fire Alarm—Has great flexibility and may be used for the supervision of alarm valves alone or in combination with gravity, pressure or standpipe tank. The supervision is complete and includes alarm valve contacts, pressure gauge contacts and gravity float contacts.

Separate local supervision is provided for alarm device circuits at the control panel, arranged to give an audible and visual alarm when a sprinkler head goes into action and for high or low water or pressure in tanks.

Being a closed circuit system any fault is instantly detected. It has stood the test of extended service and performance has proved its reliability and value.

May be installed complete or the central panel installed in connection with existing systems and the alarm valves, gauges and floats converted for use on the Usem "Waterwatch." It operates directly from the lighting circuit.

It is approved by the Underwriters Laboratories, Inc., the Associated Factory Mutual Insurance Companies and the New York Fire Department.



Closed Circuit Tank Alarm—The Usem Waterwatch closed circuit tank alarm system has been developed to meet the need of an absolutely dependable high and low alarm for general tank service.

Usem Local or Interior Fire Alarm Systems

Usem Local Fire Alarm Systems are made in a variety of types to meet different conditions.

Standardized closed circuit systems are available for single and multiple box and gong circuits for operation on 110-220 volt, three-wire system either direct or alternating current. Also presignal or dual-operating systems. They can also be furnished with battery operated trouble bell for two-wire circuits.

These are code ringing systems and are provided with time limit cut out to protect gongs.

Special low voltage systems can also be supplied for operation from either storage or primary batteries and using electro-mechanical gongs.

All systems are designed to give trouble bell signal in case of grounds or open circuits on either box or gong circuits.

AMERICAN DISTRICT TELEGRAPH COMPANY

155 Sixth Avenue, NEW YORK, N. Y.

A. D. T. SERVICES AVAILABLE IN THE FOLLOWING CITIES AND ADJACENT COMMUNITIES

AKRON, OHIO
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ANDERSON, IND.
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BOSTON, MASS.
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BROOKLYN, N. Y.
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CANTON, OHIO
CEDAR RAPIDS, IOWA
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CINCINNATI, OHIO
CLEVELAND, OHIO
COLUMBUS, OHIO
DALLAS, TEX.
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PITTSBURGH, PA.
PORTLAND, ME.
PORTLAND, ORE.
QUINCY, ILL.
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WAUSAU, WIS.
WICHITA, KAN.
WORCESTER, MASS.
YOUNGSTOWN, OHIO
ZANESVILLE, OHIO

If Our Name Is Not in the Telephone Directory, write the Home Office for Name of Operating Company

For A. D. T. Protection Service, see Manufacturers' Index

Central Station Systems (Available in Above Cities)

The following systems are owned, installed, operated and maintained by the A. D. T. Company on a fee or contract basis:

CENTRAL STATION NIGHT WATCHMAN SUPERVISION.
CENTRAL STATION MANUAL FIRE ALARM.
CENTRAL STATION AUTOMATIC FIRE ALARM.
CENTRAL STATION AUTOMATIC SPRINKLER SUPERVISION.

Also Central Station Mercantile Burglar Alarm; Central Station Bank Vault Burglar Alarm and Central Station Police Call Systems.

Local Systems (Available Anywhere)

The following systems are sold outright and can be installed by the A. D. T. Company if desired:

A. D. T. PROPRIETARY (Local) NIGHT WATCHMAN SUPERVISION and FIRE ALARM.

A. D. T. PROPRIETARY (Local) AUTOMATIC SRINKLER SUPERVISION.

Also Local Mercantile Burglar Alarm and Signal Call Paging Systems; Local Bank Vault Burglar Alarm and Holdup Alarm.

WATCHMAN'S COMPULSORY TOUR AND MANUAL FIRE ALARM SYSTEMS

Watchman's Compulsory Tour System

The A. D. T. Watchman's Compulsory Tour System supplies a means of maintaining a constant check on the performance of the watchman's patrol. It compels the watchmen to visit each of their stations in a prescribed sequence and to signal from certain of the stations which are electrically connected to the Central Office.

At the start and finish of each round or series of stations, the watchman is required to signal from a transmitting box which can only be actuated by means of the watchman's register. The latter consists of a locking device, which is set up in definite combinations by inserting it in each and every "preliminary" station. Further, the watchman must visit each and every station in correct sequence in order to step up the register for use in succeeding stations and final actuation of the transmitting station. Signals to the Central Office are transmitted over circuits operated on the McCulloh principle—so arranged that even if open or grounded, signals will still be transmitted pending repairs.

Manual Fire Alarm System

Manual fire alarm boxes are usually installed in conjunction with the Watchman's Compulsory Tour System and on the same electrical circuit. They provide a means whereby employees may turn in an alarm at any time.

Operating one of these boxes sends a coded alarm to the fire department through the Central Station, giving the exact location of the fire. At the same time, roundsmen are dispatched to the scene and the owner notified by the Central Station operators.

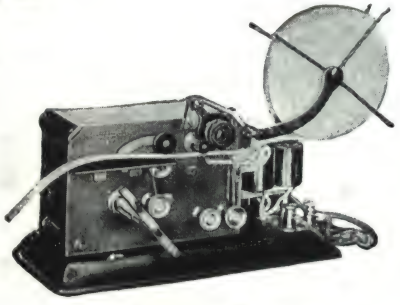
When desired a local interior fire alarm system may be installed to operate in conjunction with the Central

Signal Transmitting Station

Fire Alarm Box

Watchman's Register

Preliminary Station



Central Station Registering Instrument

Continued on next page

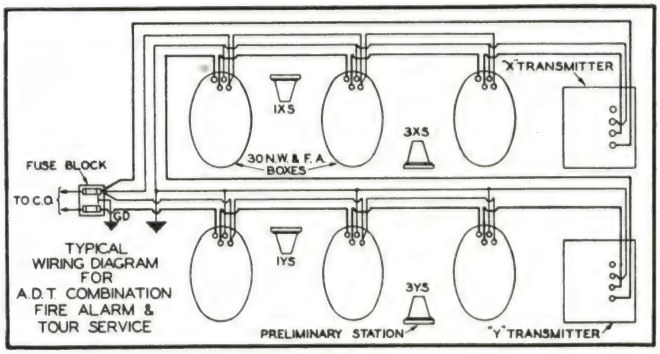
Station Manual Fire Alarm System. In this case the fire alarm box is designed so that when it is operated it will signal the Central Station and at the same time sound its code on the local gong system.

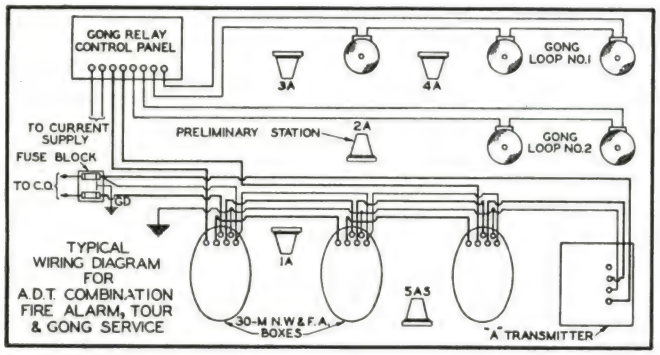
Types Available

The above systems can be obtained in either of the following types of installation:

Type (1) Central Station System—A system or group of systems, the operation of which is signaled to, recorded in, maintained and supervised from an A. D. T. Company's Central Station, a disinterested organization in which are competent and experienced observers and operators in attendance at all times whose duty is to check the performance of the watchmen and investigate their delinquencies. Installed on a fee or contract basis.

Type (2) Proprietary System—A system or group of systems operated from a local office and having its operations under the control and domination of the owners or others interested in the property to be protected. This requires equipment on the owner's premises for the accurate recording of signals. Experienced operators must be on constant duty in accordance with the Underwriters' requirements. Sold outright.





SPECIFICATION FOR A. D. T. WATCHMAN'S COMPULSORY TOUR AND MANUAL FIRE ALARM SYSTEM

General

There shall be installed the necessary equipment for a complete Underwriters' approved Watchman's Compulsory Tour and Manual Fire Alarm System meeting all requirements of insurance organizations having jurisdiction.

This system shall be arranged to operate through a Central Station (established exclusively within the protected premises) of the American District Telegraph Company and is to include the necessary devices and connections to transmit coded signals to the Central Station.

Watchman's Compulsory Tour System

Equipment—The equipment shall consist of the required number of [flush] [surface] type preliminary stations [flush] [surface] type transmitting stations and watchman's registers.

The preliminary stations are to be entirely mechanical and not connected to the electrical circuit. The transmitting stations shall be wired to the Central Station, and when actuated by means of the watchman's register shall transmit a coded signal indicating the particular station visited by the watchman.

There shall also be installed one or more emergency transmitting stations located as designated and connected to the Central Station circuit.

The watchman's register shall consist of a locking device which must be inserted in each of the preliminary stations in sequence before it will actuate a transmitting station.

All preliminary and transmitting stations are to be of polished aluminum and shall bear the Underwriters' label of approval.

Operation—The stations shall be so arranged as to make it necessary for the watchman to follow a prescribed route through the premises, actuating the tour register at each of the preliminary stations in consecutive order, and in turn actuating the tour transmitting stations at regular intervals.

The design of the system is to be such as to make it impossible for the watchman to actuate the register unless he follows the prescribed route. The neglect to do so shall result in the non-transmission of the signals to the Central Station, thereby causing an investigation to be made.

Installation—[Flush] [surface] type preliminary tour stations and [flush] [surface] type tour transmitting stations (together with back shells) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company.

These are to be set in place by the electrical contractor who shall provide and install a line of conduit to contain four (4) No. 16 rubber-covered copper wires between the A. D. T. service entrance and the tour transmitting stations.

Tour registers shall be furnished by the *(Name of Controlled Company of A. D. T.)* Company at the time the service is placed in operation.

Fire Alarm System

Fire Alarm Boxes—Fire alarm boxes shall consist of the required number of type No. ..... (No. 30, 30-CF) boxes designed for [flush] [surface] mounting and equipped with break glass door to permit access to the fire alarm lever.

The mechanism shall include code wheels for normal and McCulloh operation respectively, and also a shunt cam wheel for the purpose of shunting out the more remote boxes in the event of simultaneous operation.

When operated for fire, the boxes shall cause an alarm to be transmitted to the Central Station.

Boxes are to be finished in red enamel and shall bear the Underwriters' label of approval.

Installation—Fire alarm boxes (and back shells) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company and shall be set in place by the electrical contractor who is to install a line of conduit containing four (4) No. 16 rubber-covered copper wires between the A. D. T. service entrance and the fire alarm stations. Conduit and wires may be the same as used for the Watchman's Compulsory Tour System.

Fire Alarm System Including Local Gongs

(*Note:* Use the following specification when it is desired to operate a system of interior fire alarm gongs in conjunction with the Central Station Fire Alarm System.)

Fire Alarm Boxes—Shall consist of the required number of type No. ..... (No. 30-M, 30-CFM, 30-JM, 30-CFJM) boxes designed for [flush] [surface] mounting equipped with break glass door to permit access to the fire alarm lever.

The mechanism shall include code wheels for normal and McCulloh operation respectively, and, in addition, a code wheel and associated contacts for the purpose of operating a system of local gongs installed within the premises. A shunt cam wheel shall be provided for the purpose of shunting out the more remote boxes in the event of simultaneous operation.

When operated for fire, the boxes shall cause an alarm to be transmitted to the Central Station, and five (5) rounds of coded signals to be sounded on the local gongs.

(Include the following only when Pre-signal operation is desired.)

Boxes shall include a pre-signal switch so connected that when the box is first operated for fire, an alarm will be sounded on a system of pilot bells only. When a key is used in the box and it is again operated, the arrangement shall be such that a general alarm will then be sounded on all gongs throughout the premises.

Control Panel (for local gong system)—Shall be type No. ..... for operation from ..... (specify voltage and current) supply taken from [commercial lighting or power circuit] [storage battery].

The system shall be designed to accommodate ..... general alarm circuits, and ..... pilot circuits.

The panel is to be of approved ebony asbestos, equipped with the necessary relays, milliammeters, and devices required for operation.

The panel shall be securely mounted in a steel housing, having a small glass panel in door for reading of meter, and equipped with a suitable lock.

The trouble bell is to operate from [same] [separate] power source.

Test Box—One No. 105 test box shall be furnished for sounding a test signal on the local gongs and signaling the Central Station.

Drill Key—One No. 107 drill key shall be furnished for sounding any desired code on the local gongs for fire drill purposes.

Fire Alarm Bells—The bells shall be of underdome construction, equipped with a special hot pressed alloy steel gong having a black rust-resisting finish. All moving parts are to be concealed under the bell shell. The movement is to be of the solenoid type. The coils are to be form wound and moisture proof.

Universal outlet boxes are to be provided for all bells so that sizes may be interchanged without removing the outlet boxes. One-half inch knockouts are to be provided on all sides.

Installation—The necessary tour preliminary and transmitting stations, fire alarm boxes, gongs, trouble bells, and control panel with back shells (if required) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company.

These are to be set in place by the electrical contractor who shall provide and install the necessary conduit to contain the wires.

Continued on next page

SPRINKLER SUPERVISORY AND VALVE ALARM SYSTEM

The reliability and efficiency of sprinkler systems depend upon careful supervision. This supervision can be obtained through either of the following types of installations:

Type (1) Central Station System—A system, the operation of which is entirely maintained and supervised from an A. D. T. Company's Central Station (a disinterested party). Installed on a fee or contract basis.

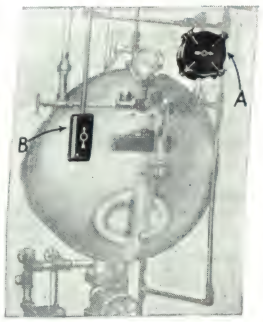
This system effects economy in protecting premises by eliminating personnel required for inspecting the sprinkler system and detecting fires.

In many cases, such supervision is accepted by insurance interests in lieu of the watchman.

Type (2) Proprietary System—A system operated from a local office under the control and responsibility of the owners' employees.

Also requires additional equipment on the premises and experienced operators on constant duty.

Installed and sold outright.



Pressure Tank Supervisory Devices

What a Sprinkler Supervisory Service Does

The more important functions performed by a supervisory service are:

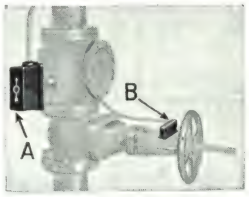
(1) Immediately transmits alarm of fire to the Central Station and through it to the fire department, the fire insurance patrol and the owner.

(2) Immediately warns when any valve is closed.

(3) Immediately warns if water in gravity tank is too low.

(4) Immediately warns if temperature of the water is too low and the water likely to freeze.

(5) Immediately warns if air pressure (in a dry system) is too high or too low.



Wet System Supervisory Alarm and Gate Valve Supervision

(6) Immediately warns when water in pressure tank is too high or too low or when the air pressure in tank is too high or too low.

(7) Immediately warns when power supply for the fire pump fails.

(8) Immediately warns in case of accidental leakage of water.

(9) Keeps Underwriters informed daily of conditions of the sprinkler system.

(10) Inspects equipment periodically, assuring its operation in emergency.

(11) Provides adequate intelligence service by telephone and runner.

When an alarm is received indicating trouble, the owner is called by telephone and a runner is immediately dispatched to investigate.

In emergency conditions, the fire department and insurance patrol are also advised.

Equipment consists of especially designed actuating and transmitting devices, so connected that any departure from normal conditions will cause a signal to register in the Central Station.

Sprinkler Supervisory Annunciator

The A. D. T. Sprinkler Supervisory Annunciator may be installed in connection with the Central Station System or Proprietary System, to provide a local indication whenever an abnormal condition of the system exists.

The panel is enclosed in a steel cabinet with glass door and consists of a panelboard of approved insulating material, on which are mounted a milliammeter, red lamp, transfer switches, relays equipped with targets, resistances and terminals.

Each target is labeled to indicate the nature of supervision.

SPECIFICATION FOR A.D.T. SPRINKLER SUPERVISORY AND VALVE ALARM SYSTEM

General

There shall be installed a complete Underwriters' approved Sprinkler Supervisory System for supervision of all alarm valves, shut-off valves, tanks and other points of the sprinkler system, as required by the regulations of insurance organizations having jurisdiction.

This Sprinkler Supervisory System shall be installed to operate through a Central Station (established exclusively within the protected premises) of the American District Telegrah Company and all wiring and devices installed within the premises are to be of a type approved for connection to the Central Station circuits.

Equipment

The equipment shall be furnished by the American District Telegraph Company and is to consist of the necessary supervisory actuating devices, transmitters and power supply equipment.

Actuating Devices—Actuating devices for wet alarm valves shall consist of a switch mechanism held in place by the valve clapper in such a way that it will be released when the clapper is lifted from its seat by a flow of water in the system.

Actuating devices installed on the dry valves shall be of the type which operates due to an increase in pressure in the intermediate chamber of the valve caused by tripping of the valve due to the opening of a sprinkler head or otherwise.

Pressure switches are to be installed on all dry pipe risers, and shall be designed to operate when there is an increase or decrease of pressure beyond permissible limits.

Gate valve devices shall be mounted on the frame or yoke of the gate valve and are to consist of the necessary contact springs and plunger arranged to operate between the first and second revolution of the hand wheel.

Gravity tank devices shall consist of the necessary float and switch contacts, arranged to operate when the water level is low, and a mercurial thermometer equipped with the necessary contacts for indicating high or low temperature of the water within the tank.

Pressure tank devices shall consist of the necessary float and switch contacts to operate when the water in the pressure tank is abnormally high or low and a pressure switch which will operate on an increase or decrease of pressure beyond permissible limits.

When required, pressure switches are also to be installed for supervision of the steam pressure on the fire pump and pressure of the water in the city supply.

If an electrically driven pump is installed, a current supervisory relay is to be connected to the line side of the current supply at the main switch and circuit breaker of the starting panel so that an alarm will be transmitted if the current supply is cut off, reduced or reversed.

Sprinkler Supervisory Transmitters—Transmitters for water flow alarms shall be of the retard type consisting of two independent clock movements and a retard magnet movement. The retard movement shall be adjusted to delay the transmission of signals approximately ten seconds to overcome momentary movements of the water in the system.

Water flow transmitters shall transmit a trouble signal, a water flow signal and a restoration signal, the latter indicating that the fire alarm side of the transmitter has been rewound.

Water flow transmitters are to be mounted in individual wooden cabinets, equipped with tamper switches arranged so that a signal will be transmitted when the cover is removed or replaced.

Supervisory transmitters shall consist of a single clock mechanism arranged to transmit signals when the circuit is opened through the functioning of the actuating devices.

Supervisory transmitters are to transmit a trouble signal upon the operation of the actuating devices or trouble on the circuit and an "O. K." signal when conditions are restored to normal.

The transmitters are to be mounted in combinations in a wooden cabinet equipped with tamper springs arranged to transmit a signal when the cover is removed and replaced.

Both water flow and supervisory transmitters are to be equipped for McCulloh operation, so that signals will be recorded in the Central Station even though the circuit is open or grounded or both open and grounded.

A suitable clear, clean, dry space shall be provided on a solid wall for the mounting of the transmitters and power equipment—preferably in the basement or on the first floor of the building.

Current Supply—The current supply for the local circuits shall be obtained from a storage battery of proper capacity, which shall be maintained on a floating charge by means of a suitable charging device.

The battery and charging equipment is to be housed in a metal cabinet equipped with the necessary switches, fuses and terminals. One charging unit shall be provided for each group of transmitters installed within the premises.

If a direct-current lighting or power source is available, the local circuits may be energized direct by means of a suitable resistance unit enclosed in a metal cabinet equipped with the necessary fuses and terminals.

The current supply for the Central Office circuit is to be furnished by a battery maintained in the Central Office.

Installation

Installation of the necessary actuating and transmitting devices and all wiring and connections will be made by, or upon, order of the American District Telegraph Company, who will provide all the necessary installation diagrams and details together with the necessary supervision of the installation. The conduit is to be furnished and run by the electrical contractor.

Upon completion, the entire system shall be tested out to the satisfaction of the insurance organizations having jurisdiction, and arrangements shall be made for periodical testing thereafter.

Specifications for A. D. T. Sprinkler Supervisory Service are conditional upon the sprinkler system being in good condition, tight and free from leaks, equipped with approved alarm valves and where necessary having provision for the introduction of excess pressure protecting alarm valve against water hammers due to fluctuation of city pressure.

Continued on next page

SPECIFICATION FOR PROPRIETARY CENTRAL OFFICE EQUIPMENT

This specification is to be used in conjunction with specifications for Watchman's Compulsory Tour and Manual Fire Alarm System and specifications for Sprinkler Supervisory and Valve Alarm System when signals are to be recorded in a local central office established exclusively within the protected premises

General

All signals from watchman's stations, fire alarm boxes and sprinkler supervisory devices shall be recorded in the local central office where attendants are to be constantly on duty for the purpose of checking the signals and investigating delinquencies.

The system shall be arranged for operation in accordance with the McCulloh principle, which provides a means whereby signals may be received and recorded when the central office line is open or grounded, or both open and grounded.

Equipment

The equipment for the local central office shall consist of the following: central office switchboard for mounting all necessary supervising and control relays, meters, etc.; charging panel and all necessary devices for charging from [a-c.] [d-c.] supply; recording register, take-up reel and associated equipment; timing apparatus, including time stamp and master clock, etc.; storage batteries, rectifier (when batteries are charged from a-c.). (List any other miscellaneous equipment that may be required, such as timing tables, gong control panels, telephone control units, etc.

Recording Apparatus—The recording apparatus shall consist of the necessary number of (single circuit) (double circuit) recording registers of the (ink writing) (punching) type with take-up reels and automatic time stamp mounted under a glass cover. The recording apparatus is to be mounted on a mahogany base and the cover equipped with a suitable lock.

Master Clock—An electrically wound master clock shall be provided for control of the automatic time stamp. This shall be the No. 029 type as manufactured by the Self Winding Clock Company of New York, N. Y. This clock is to be equipped with suitable contacts and relay for sending out minute impulses to the recording apparatus.

Battery and Charging Equipment—The storage battery for the system shall consist of ..... cells, ... volts, type..... It is to be of the (portable) (sealed glass jar) type with cells completely charged and ready for service. The battery is to be of sufficient capacity for satisfactory operation of the system. Suitable apparatus shall be provided for charging the battery from the available power source.

Switchboard—The control devices for watch, fire alarm and battery charging are to be mounted (on a standard No. 295 switchboard section) (in a metal cabinet equipped with glass paneled door). Panels shall be of ebony asbestos or other approved insulating material.

The watch control equipment shall consist of the necessary number of No. 302 McCulloh circuit panels, supervising relays, switches, milliammeters, voltmeters, jacks, pilot lamps, resistance tubes and terminals.

The control devices for the local gongs shall be type ..... for operation from ..... (specify voltage and current) supply taken from (commercial lighting or power circuit) (storage battery).

The necessary relays shall be provided for ..... general alarm circuits and ..... pilot circuits. Also the necessary milliammeters, time delay cutouts, balancing resistors and terminals.

The devices for control of the charging equipment shall include the necessary rheostat, circuit breaker, switches, meters and terminals.

Installation

The equipment is to be installed complete by the electrical contractor under the supervision of the *(Name of Controlled Company of A. D. T.)* Company, who will furnish the necessary conduit and wiring diagrams.

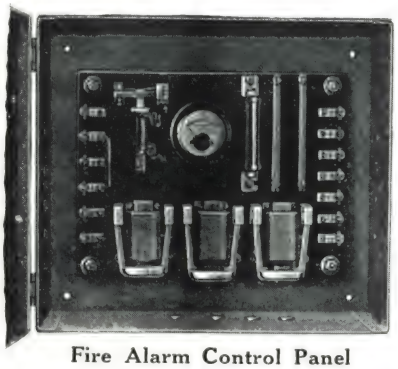
A.D.T. INTERIOR FIRE ALARM SYSTEM

Description

This system may be installed independently or in conjunction with either Central Station or Proprietary Systems.

It is provided to give a coded alarm on a system of local gongs installed throughout the premises to permit prompt evacuation of the building and, at the same time, to give the local fire patrol the exact location of the fire.

Manual fire alarm boxes of the coded type are installed in accordance with requirements. In addition, equipment consists of the necessary number of gongs or signals, control panel and trouble bell. The gongs may be energized direct from the alternating or direct-current commercial lighting or power supply, if reliable, otherwise a storage battery should be provided.



Fire Alarm Control Panel

Systems are furnished for either general alarm or pre-signal operation. The general alarm type sounds all the gongs throughout the premises immediately upon the first operation of the fire alarm box. The pre-signal type sounds an alarm first on a system of pre-signal or pilot gongs, audible only in certain locations. If upon investigation it is desired to sound a general alarm the use of a special key in the fire alarm box permits all gongs to be sounded when the box is again operated.

The system is of the closed circuit, electrically supervised type. Provision is made for testing all local circuits and box mechanisms.

Signal Box No. X46-CF

Specification

General—Furnish and install an approved closed circuit, electrically supervised local Fire Alarm System of the (general alarm) (pre-signal) type as furnished by the *(Name of Controlled Company of A. D. T.)* Company. This system to be arranged for operation on ..... (specify voltage and current).

Equipment—*Fire Alarm Boxes*—Shall be of the (open door) (break glass door) type designed for (flush) (surface) mounting.

A.D.T. Single Stroke Gong

(Note: Include the following only when pre-signal operation is desired.)

Boxes shall include a pre-signal switch so connected that when the box is first operated for fire, an alarm will be sounded on a system of pilot bells only.

When a key is used in the box and it is again operated for fire, the arrangement shall be such that a general alarm will be sounded on all gongs throughout the premises.

Control Panel—Shall be designed for operation from ..... (specify voltage and current) supply taken from (commercial lighting or power circuit) (storage battery).

The system shall be designed to accommodate ..... general alarm circuits and ..... pilot circuits.*

The panel is to be of approved ebony asbestos equipped with the necessary relays, milliammeters, and other devices required for operation.

It shall be securely mounted in a steel housing, having a glass panel in door for reading of meter, and equipped with a suitable lock.

The trouble bell is to operate from (same) (separate) power source.

Fire Alarm Bells—The bells shall be of underdome construction, equipped with a special hot pressed alloy steel gong having a black, rust-resisting finish.

All moving parts are to be concealed under the bell shell. The movement is to be of the solenoid type. The coils are to be form-wound and moistureproof.

Universal outlet boxes are to be provided for all bells so that sizes may be interchanged without removing the outlet boxes. One-half inch knockouts are to be provided on all sides.

Installation—The necessary fire alarm boxes, gongs, trouble bells, and control panel with back shells (if required) are to be furnished by the *(Name of Controlled Company of A. D. T.)* Company.

These are to be set in place by the electrical contractor who shall provide and install the necessary conduit to contain the following wires:

From control panel to and through each fire alarm box (general alarm), 2 No. 14 wires.

(Pre-signal),* 4 No. 14 wires.

From control panel to trouble bell, 2 No. 14 wires.

From control panel to each group of pilot gongs,* 2 No. 14 wires.

From control panel to each group of general alarm gongs, 2 No. 14 wires.

From control panel to power source, 2 No. 14 wires.

(If trouble bell is energized from third wire of three-wire system, 3 No. 14 wires.)

Group of bells—10 or less a-c., 14 or less d-c.

**Include only if pre-signal operation is desired.*

Signal Box X-46-ACF

Continued on next page

AERO AUTOMATIC FIRE ALARM SYSTEM

The "Air Tube" System is a Scientific Application of Nature's Law

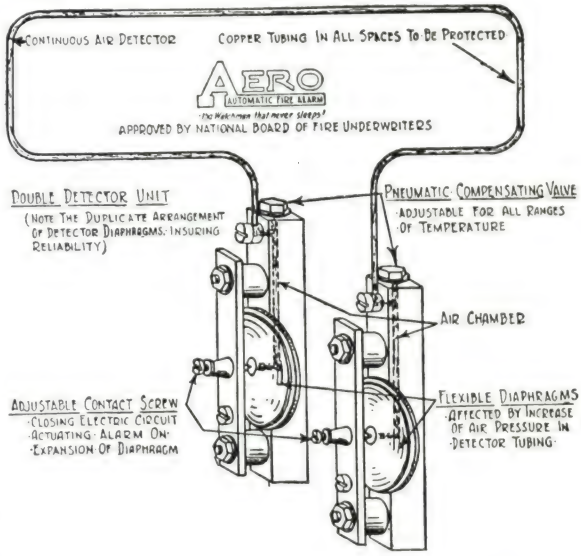
Aero is the result of extensive scientific research and operates on the fundamental law of nature that heated air expands. Air is one of the most fire-sensitive elements. This never-failing law has been utilized as the basis of the *Aero* System of fire detection.

Description

The sensitive, fire-detecting element is a very small copper tube, less than $\frac{1}{2}$-in. in diameter, which is attached to the ceilings or roof of the premises to be protected. The tubing contains nothing but air at ordinary atmospheric pressure. In case of fire the contained air becomes heated and expands.

At each end of the tube is a diaphragm or small metal box with very thin sides capable of being bulged outward by air pressure. The bulging of the diaphragm closes electrical contacts which operate a transmitter, automatically sending the alarm. An annunciator indicates the floor or section of the building where the fire originated and a local alarm is sounded on gongs.

All parts of the system can be tested for operation as frequently as desired and no part or device has to be renewed after a fire call has been sent in order to replace the system in service. This applies not only to the electrical parts but to the tubing circuits as well.



Apparatus

The apparatus installed on the premises consists of one or more *Aero* circuits, each connected to a detector unit, one or more manual stations, a control panel with transmitter and relay, an annunciator and local alarm bell. A local source of electrical energy is also provided, together with necessary wire, conduit and miscellaneous fittings.

Aero Tubing—Pure drawn copper. Outside diameter approximately $\frac{1}{2}$-in.

Detector Unit—One required for each tube circuit, both ends of tubing terminating in the unit which contains, on a small bakelite panel, an assembly of the necessary devices for operation of the circuit.

Manual Fire Alarm Stations—These are of the "one operation break glass" type and designed so that they can be assembled onto any detector unit.

Control Panel with Transmitter and Relay—Consists of two clock-driven transmitters with a retard and associated relay. One transmitter is used to give trouble signals and the other operates for fire alarm signals.

Annunciators and Bells—The annunciator operated from the unit detector sets is used to show the exact location of the fire. Usually placed on the outside of the building but an interior type can be provided. The local alarm bells are of the single or double vibrating type, located so as to give a general alarm throughout the building.

Source of Energy—Current is supplied from a storage battery with an automatic charger where a-c. is available, otherwise a suitable storage battery is used.

Types of Aero Alarm Service

The *Aero* Automatic Fire Alarm System is used in the following four classes of service:

A. D. T. Central Station Service Direct-to-Fire Station Service; A. D. T. Proprietary Service; Local Service.

SPECIFICATION FOR CENTRAL STATION AERO AUTOMATIC FIRE ALARM SYSTEM

General

There shall be installed the necessary equipment for a complete Central Station *Aero* Automatic Fire Alarm System meeting all requirements of insurance organizations having jurisdiction.

The system shall be of the *(Aero)* pneumatic-electric "rate of rise" type. It shall be arranged to operate through the Central Station of the *(Name of Controlled Company of A. D. T.)* Company, and shall include the necessary devices and connections for the transmission of coded signals from the protected property to the Central Station.

The fire detecting system shall consist of the required number of *(Aero)* detector units and tube circuits, distributed throughout the entire property in such a manner as to ensure a prompt and reliable operation in event of an outbreak of fire at any point in the building (or plant).

It shall include as part of the equipment, a means whereby the fire detecting devices may be tested for operation periodically, without necessitating replacement of devices or parts as a result of such tests.

A means whereby the system may be set in operation manually shall also be included as part of the system.

Operation

The system shall be so arranged that when it operates automatically as a result of a fire condition, or is operated manually, a distinctive coded signal shall be transmitted to the Central Station. Such operation shall also cause a local signal to be sounded on a gong (or gongs), and shall indicate on a centrally located annunciator the location of the fire condition causing the operation of the system, or the manual station operated.

The fire alarm circuit and devices shall be electrically supervised, and so arranged that failure of the source of energy, or disarrangement of the electrical wiring shall cause a distinctive signal, indicating a trouble condition, to be transmitted to the Central Station.

Equipment

Tubing—The pneumatic tube installed as part of this system shall be of commercially pure copper, drawn to an outside diameter of 0.080 in., with an internal diameter of 0.050 in. It shall be seamless, and free from splits or cracks. It shall be thoroughly annealed, and free from scale inside and out.

All joints in the tube shall be brazed with silver solder and each continuous length shall be tested to hold an air pressure of sixty (60) lb. per sq. in.

Detector Units—The detector units shall include all the devices necessary for the operation of each tube circuit, said devices consisting of the detector diaphragms and compensating vents, a test valve, a test switch, annunciator relays, and the necessary electrical connections and terminals. These devices shall be trical connections and terminals. These devices shall be assembled on a bakelite panel, the entire assembly being enclosed in an enamelled steel housing provided with a special lock and key to prevent tampering.

Tapped conduit openings shall be provided at the top and bottom of the steel housing.

Where manual stations are required, detector units shall be provided with a break-glass manual fire alarm attachment. Such detector units shall be enamelled red, and a brass plate shall be attached to the front, on which the words "In Case of Fire Break the Glass Rod" shall be etched.

Transmitters—The transmitter shall be of the retard type, and shall consist of trouble and fire alarm transmitters and a retard magnet.

The retard shall be arranged to delay the transmission of fire alarm signals for approximately ten (10) seconds, to prevent such signals resulting from momentary local heat conditions.

The transmitter shall transmit fire alarm, trouble, and restoration signals, the latter to indicate that the system has been restored to its normal condition after the transmission of a fire alarm signal.

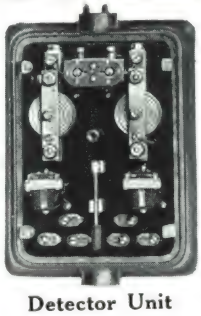
The entire transmitter assembly shall be enclosed in a dustproof case, with a special lock and key to prevent tampering.

Alarm Gongs—The local alarm gongs shall be of the vibrating type, and the frames of the gongs shall be provided with a tapped opening to take $\frac{1}{2}$-in. conduit.

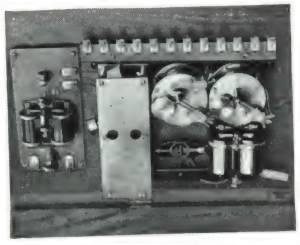
Annunciator—The annunciator shall be of the electrically restored type. It shall be enclosed in a weatherproof cast iron housing, enamelled red, and provided with brass designation plates on which the necessary indications will be stamped. The annunciator case shall be provided with tapped conduit openings at top and bottom.

Power Supply—Energy for the supervision and operation of the system shall be supplied by a suitable type storage battery. A suitable battery charger shall be furnished, and arranged to provide a continuous charge at a sufficient rate to maintain the battery in a fully charged condition at all times.

The battery and charger shall be enclosed in a locked sheet steel cabinet, the inside of which shall be finished with asphaltum base paint.



Detector Unit



Control Panel with Transmitter Relay

Annunciator

Installation

All the necessary devices and material for this system shall be furnished by the *(Name of Controlled Company of A. D. T.)* Company.

The entire system shall be installed in conformity with the Rules and Regulations of the National Board of Fire Underwriters for such systems.

All electrical conductors shall be installed in rigid conduit, and both conduit and wire shall conform to the requirements of the National Electric Code for systems of this type.

INTERNATIONAL FIRE EQUIPMENT CORPORATION

West New Brighton, STATEN ISLAND, N. Y.

Products

SHUR-ALARM DETECTOR SYSTEM.

Also twelve styles of Automatic Fire Extinguishers for use in dwellings, public buildings or industrial plants. These extinguishers require no servicing or refill expense until used on a fire, are always ready and will operate when no one is present.

Shur-Alarm Fire Detector System

Description

SHUR-ALARM is a thermostatically controlled, electrically operated fire alarm system designed to sound an alarm automatically, either on a sudden rise in temperature or on a slow rise to a pre-determined temperature.

In its simple form a SHUR-ALARM System consists of the required number of detectors, a transformer, an alarm bell, a test botton and the required footage of wire. To this simple form additional equipment, such as annunciators, weatherproof bells, sirens, etc., may be added when required.

When more elaborate systems, including automatic supervision, are desired, a special combination of the open and the closed circuits is employed.

Architects are invited to consult us with reference to the adaptation and installation of SHUR-ALARM Systems and equipment. On receipt of complete information, recommendations will be made as to the most appropriate and effective type in each case.

Circuit

The circuit employed is the "open" type. This circuit has several advantages over the closed type, among which may be enumerated:

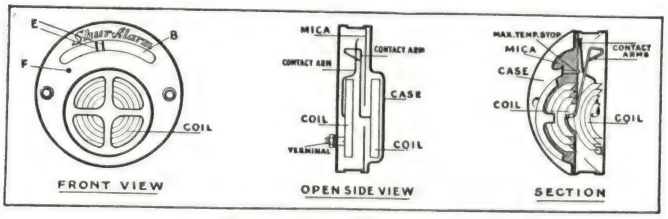
(1) Lower cost of both equipment and maintenance.

(2) A short circuit will cause the alarm to sound giving notice of trouble whereas on a closed circuit that part of the system beyond the short becomes inoperative. A broken wire, on the other hand, does not sound an alarm on an open circuit but it does on a closed. There are, however, many more instances of short circuits in electrical work than of broken wires.

(3) Closed circuit systems operate at a fixed temperature.

Detector

The heart of the system. A precision instrument consisting of an outer shell of bakelite with a heavily chromium plated brass face enclosing two metal coils, one behind the other and separated by a perforated mica disc. Each coil is adequately protected and consists of a bi-metallic strip made by permanently welding two metals having widely different coefficients of expansion, the metal having the lesser coefficient of expansion being Invar steel and the other a special brass.



Shur-Alarm Detector

Under the influence of heat a definite and regular distortion occurs in these coils and when normal temperature returns they assume their regular shape.

These coils are mounted within the case in such a manner that the outer ends of the coils are fastened to the terminals which protrude through the back of the case. The free ends in the center of the coils have silver wire contact arms (E), the arm on the inner coil being slightly ahead of that on the outer coil, the difference being approximately 5/64 in.

When an open fire starts a rapid rise in temperature results which first affects the outer coil causing an expansion which results in a contact after a temperature rise of approximately 15 degrees in one minute.

A gradual rise in temperature affects both coils, the perforations in the mica disc making this possible. In this case equal distortion of the two coils keeps the arms in their same relative position but provision is made for the sounding of the alarm at approximately 135° F. by a stop pin (F) fastened to the inside of the bakelite case. The contact arm of the inner coil strikes this pin closing the circuit.

There are two types of detectors, surface and flush. They are identical insofar as the operating mechanism is concerned but are arranged for installation as their designation implies. The *surface type* consists of the detector, a nickeled brass two prong bracket and two round head nickel plated wood screws. Metal expanding shields are furnished for mounting in masonry when desired. The *flush type* consists of a detector, one brass plate and one metal wall case with the necessary screws for proper fastening. This type can be used with any type of electrical fitting designed for switches or receptacles. The brass plates are of the same dimensions as any standard receptacle plate. The detector is mounted on the back of the plate in a manner to hold it securely in place and still be readily removable.

Transformer, Alarm, Wire and Test Buttons

Transformer—A transformer of the proper capacity is supplied wherever alternating current is available. If alternating current is not available batteries may be substituted.

Alarm—The alarm bell furnished with standard systems is of the vibrating type and specially designed. Where desired a weatherproof bell or siren can be furnished.

Wire—The wire for the SHUR-ALARM System is specially made 18-gauge twisted pair, solid conductor copper, with a 7/64-in. rubber insulation and olive green cotton covering. It is designed for surface wiring with the use of insulated tacks but it can be used to good advantage for concealed wiring as its tough outer coating resists abrasion.

Where specifications call for conduit installations an 18-gauge black rubber covered wire will be furnished.

Test Button—A test button should be installed at the end of each circuit and taps in a SHUR-ALARM installation and should be used at regular intervals for tests and fire drills.

Other Shur-Line Products

Other Shur-Line Products include the Automatic Fire Extinguishers referred to above. These extinguishers are unexcelled because of their simplicity, dependability, effectiveness, low cost and automatic operation.

The outstanding feature of SHUR-LINE Extinguishers is the use of glass hermetically sealed as a container for 99.9% pure carbon tetrachloride, thus preventing leakage, evaporation or deterioration and making it possible to determine at a glance that the extinguisher is full, and doing away entirely with periodic inspection and servicing.

Carbon tetrachloride is one of the best chemical extinguishing agents known and is harmless externally to persons and materials.

The low boiling point of 168° F. makes possible vaporization as soon as contact with heat is made—the actual extinguishing being accomplished by smothering. The volume of the vapor is about 500 times that of the liquid and the weight 5½ times that of air.

SHUR-LINE Products are especially suitable for hazards involving the storage or use of dangerous combustibles or materials which water will damage. They are particularly effective against such types of fires as gasoline, oil, electrical, etc.

The Investigating Committee of Architects and Engineers has granted full approval to SHUR-STOP and SHUR-ALARM Equipment.

The purchaser of SHUR-LINE Products has an unusual feeling of security based on the experience of the general public, from whom have been received reports of over 7000 emergency fires on which SHUR-LINE products have been used with a record of 92.5% successful performance.

Through our distributor organization we are prepared to co-operate with architects in making surveys and recommendations

TELETYPE CORPORATION

FORMERLY MORKRUM-KLEINSCHMIDT CORPORATION

Printing Telegraph Equipments

FACTORY AND HOME OFFICE
1400 Wrightwood Avenue, CHICAGO, ILL.

NEW YORK, N. Y., 1020 World Building
DETROIT, MICH., 705 Ford Building
LOS ANGELES, CAL., 445 So. San Pedro Street
SAN FRANCISCO, CAL., 361 Ninth Street
SEATTLE, WASH., 215 Second Avenue
WASHINGTON, D. C., Ouray Building

ASSOCIATED COMPANY FOR CANADA: Northern Electric Co., Ltd., 637 Craig Street, West, MONTREAL, QUE.

Products and Services

Manufacturers of the Teletype Printing Telegraph Equipments for Communication Purposes in hotels, banks, offices, industrial plants, etc., where accurate, recorded messages are necessary between the various departments.

TELETYPE

TRADE-MARK

The Teletype

The Teletype is a simple printing telegraph system, operated just the same as an ordinary typewriter. The depression of a key at the transmitting point will cause the corresponding letter or character to be typed on the transmitting machine,

Teletype Sending-Receiving Machine

and at the same time the message will be reproduced in legible, accurate typewritten form on any distant machines connected to the transmitting machine.

The various stations may be located within the same building, or separated by great distances.

Two general types of Teletypes are now in use (both operating in practically the same manner); one, the Tape Teletype, typewriting on a narrow paper tape, and the other, the Page Teletype, which typewrites on a standard 8½-in. sheet. The Tape Teletype is best adapted for general use, the illustrations shown here being of this type.

Wiring

Teletypes are interconnected by a system of wires, the kind and number of wires depending upon the voltage used and the circuits desired. The Teletype Corporation will furnish free of charge, all necessary specifications and wiring diagrams for specific installations.

Switching

Almost any combination of interconnections may be provided for. A sending-receiving machine can be connected to a receiving-only machine for one-way service, two sending-receiving machines can be interconnected to provide for two-way communications; or a sending-receiving machine may be connected to groups of machines.

Sample of Printed Tape

The switching can be accomplished by use of cam keys, or in the case of large installations, through the medium of small switching units, or a Teletype automatic switchboard. Where automatic switchboards are used, a dialing unit similar to the dial used on automatic telephones is provided at each transmitting point.

Power

Small electric motors, 1/30 hp., are used for driving the Teletype transmitting and printing mechanisms. Motors are provided which will operate on the kind of power available (110 or 220-volt d-c. or a-c. of any frequency).

For the operation of the small selecting magnets there is required 110 or 48 volts d-c., the wattage being very small, depending upon the number of machines and circuits on the system.

When Teletype automatic boards are used, 48 volts d-c. is required for the operation of the selectors on the board and the operation of the selecting magnets on the Teletypes. If no direct current is available, motor-generators can be used for supplying this power.

Operation of System

On simple circuits, that is, where several machines are interconnected, the depression of a key will start up the motors on selected machines as well as the calling machine. Messages can then be transmitted to all machines connected to the calling machine. A restoring key is depressed to restore the system to normal.

Where a Teletype automatic switchboard is used, a cam key is thrown and two digits dialed. If the called station or stations are not busy the connections will be automatically established through the medium of the switchboard in a manner similar to that of an automatic telephone connection. If the called station is busy, the calling station will receive a busy signal, and the calling machine will be automatically locked out in that it will be impossible to operate the keyboard should the busy signal be disregarded.

Teletype Receiving-Only Machine

Information Required for Specifications

Specifications will be furnished on request for any particular installation.

The Teletype Corporation should be furnished with the following information:

(1) Name of customer. (2) Address of customer. (3) Kind of business. (4) What means of communication is now used (if any). (5) A definite, detailed description of the services to be handled. (6) Kind of apparatus—Tape or Page. (7) Number of transmitting-receiving machines. (8) Number of receiving-only machines. (9) Ultimate requirements. (10) Location of machines—architect's drawings showing these positions, if possible. (11) Power available at Teletype position and switchboard: 48-volt d-c., 110-volt d-c., 220-volt d-c., 110-volt a-c. .... cycle, 220-volt a-c. .... cycle. (12) Present wire facilities (if any).

AUTOMATIC ELECTRIC INC.

Telephone, Signal and Communication Systems

FACTORY AND HOME OFFICE
1033 West Van Buren Street, CHICAGO, ILL.

SALES AND SERVICE OFFICES IN THE FOLLOWING CITIES

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CLEVELAND, OHIO, 515 Cuyahoga Building, 216 Superior Street
DETROIT, MICH., 816 Ford Building, 601 Griswold Street
KANSAS CITY, MO., 421 Commerce Building
LOS ANGELES, CAL., 1112 Pacific Finance Building, 621 South Hope Street
NEW YORK, N. Y., Room 806, 21 East 40th Street
PHILADELPHIA, PA., 920 Lafayette Building, 5th and Chestnut Streets
ST. PAUL, MINN., 1510 Merchants Bank Building

Products

STROWGER AUTOMATIC DIAL SYSTEMS

PRIVATE DIAL TELEPHONE SYSTEMS (P-A-X).

INDUSTRIAL FIRE ALARM SYSTEMS.

THEATER SIGNALING SYSTEM (Tele-chec).

Also Public Automatic Telephone Systems, Watchman's Supervisory Systems, Code Signaling Systems (Visual and Audible), Miscellaneous Telephone and Signal Accessories.

History

While Strowger products now embrace the entire field of telephone, signaling and communication devices, all of these are the outgrowth of the Strowger Automatic Telephone System which, first installed for public service in 1892, has since been developed and expanded in application until it has become a standard for public and private exchange service in practically every country in the world.

Strowger P-A-X System

General—Strowger P-A-X is primarily an automatic interior telephone system of the familiar dial type, consisting of as many dial telephones as may be required, an automatic switchboard for setting up the connections, the necessary wiring for connecting the telephones to the switchboard, and a storage battery and charging device. Only one pair of wires is needed for connecting each telephone to the switchboard.

Strowger P-A-X is intended for use as an isolated system for interior communication service only, having no connection with the public telephone service.

Telephones—The telephones of the P-A-X are similar to the automatic telephones used for ordinary public exchange service. Each telephone is equipped with a calling dial 3 in. in diameter, which has a disc perforated with 10 finger holes, numbered from 1 to 0. Telephones are furnished in the conventional wall and desk types and in the popular cradle types, such as those illustrated.

There are also types for special purposes, such as mine telephones, hand telephones, flush telephones, etc.

Automatic Switchboards—This apparatus automatically sets up the telephone connections. It may be placed in any convenient or available place, the size of which depends upon the size of the system. The apparatus is entirely self-contained and sufficiently attractive in design and finish to warrant installation in a conspicuous place.

The switchboard is furnished in a number of sizes, depending upon the ultimate capacity required. The larger installations are capable of indefinite expansion without change in original installation.

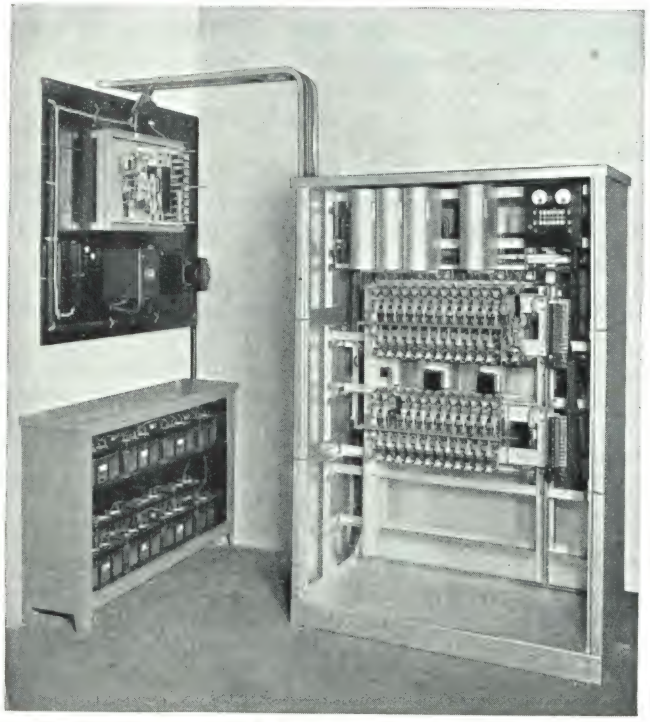
Type 1-A

Type 2

P-A-X Monophones

Special Services—In addition to interior telephone service, certain types of Strowger P-A-X may be equipped to render affiliated services, all controlled and operated by the automatic switchboard and involving but slight extra wiring or expense. Any or all of these services may be included in the initial installation or added later as required.

These services include code call (to send audible signals to all parts of an establishment to locate a person not at his desk); conference wire (providing for a telephone conference); emergency alarm (for fire or other emergencies); and watchman supervision (for recording and supervising the movements of watchmen).



A Typical P-A-X Installation with All Covers Removed
Capacity 50 lines

Continued on next page

General Descriptions of Types—The following descriptions will enable the architect to determine the type number of the P-A-X best suited for any project under consideration:

Type 10-A—10 lines, two simultaneous conversations.

Type 1—Common talking, selective ringing. Any number of telephones but only one conversation at a time.

Code call if desired.

Type 2—25 lines, three simultaneous conversations.

Type 25—25 to 50 initial lines, 7 simultaneous conversations.

Code call and other special services. Expandable

Type 5—50 to 100 initial lines, 10 or more simultaneous conversations.

Any combination of special services. Expandable without limit.

Type 7—Engineered to meet needs of client. Any combination of special services. Unlimited facilities for expansion.

Method of Operation—The person calling lifts the receiver in the customary manner and the connection is then made by rotating the dial. If station 65 is wanted, the finger is placed in the dial hole over the figure 6 and drawn around to the finger stop. The finger is then removed, and the dial turns back to its original position. This operation is repeated for the figure 5.

The bell at station 65 then rings at intervals until the called station answers or until the receiver is hung up at the calling station. If the station wanted is engaged, a distinctive buzz is heard by the person calling, connection may then be released by hanging up the receiver.

Typical Specifications for Automatic Interior Telephone System (Full Intercommunicating)

Under these specifications shall be furnished and installed a complete Automatic Interior Telephone System as manufactured by Automatic Electric Inc., or equal, including all cable, wire and runways for interconnecting the telephones with the switches, and the switches with the power plant.

General—The system shall provide for the following features:

(1) All stations shall be able to communicate with each other, the connections being established by means of switching apparatus controlled by a calling dial mounted on each telephone.

(2) Any two stations shall be able to communicate without the possibility of being overheard or interfered with by a third station.

(3) Access to any station already in use shall be automatically prevented, and when attempted, a distinctive tone shall be automatically transmitted to such station making the attempt.

(4) Equipment shall be of such design that only a single pair of wires is required between each station and the switchboard.

Switchboard—The switchboard shall have a capacity of ... individual lines and ... connecting units. For economy and to facilitate additions, the switchboard shall be furnished with ... positions reserved for the ultimate equipment, completely wired and equipped with switch jacks and multiple cable so that station or trunking apparatus can be added by simply placing the required apparatus in the jack.

Telephones—The telephones shall be of the following types:

.....Wall Telephones
.....Desk Telephones
.....Monophone Sets Type.....
.....Monophone Sets Type.....

All telephones shall be of the highest quality and, in design, construction and performance, the equal of telephones used by public telephone companies.

Each telephone shall be equipped with a standard ten-hole calling dial of the type used for public telephone service.

All telephones shall be equipped with bakelite receiver shells, caps and mouthpieces, and shall have ringers of the polarized, double gong type.

Storage Battery—An approved storage battery of proper voltage and capacity shall be furnished, such battery to have glass jars and to be installed in an enclosed type cabinet.

Charging Device—A charging device of the tube rectifier type shall be furnished, designed to operate on .... volts, ...cycle, ... phase, the rectifier to be of sufficient capacity properly to charge the storage battery at the normal charging rate.

Miscellaneous—The switchboard and power equipment shall be enclosed in substantial steel cabinets designed to be as dustproof as practicable.

A suitable set of wrenches, pliers and other tools, including a hand test telephone for testing, are also to be furnished together with a set of circuit and wiring diagram blue prints, and a complete set of adjustment specifications covering the relay and mechanical equipment.

Strowger Fire Alarm Box
Weatherproof type

Strowger Fire Alarm System

This system has been especially designed to meet the fire protection requirements of manufacturing plants and other private enterprises.

It differs from ordinary fire alarm systems in that each reporting station has its own line, so that a fault on one line can affect only one station instead of a number of stations.

The reporting stations are of the break-glass type, but contain no coding mechanism. The turning in of an alarm requires only the breaking of the glass. There are no handles to turn or levers to pull. There is one common coding machine for the entire system and this is placed under the direct supervision of the fire chief or head watchman. However, all equipment is furnished in duplicate so as to provide an additional set for emergency purposes at all times.

Typical Specifications for Fire Alarm System

Under these specifications shall be furnished and installed a complete Fire Alarm System, including alarm boxes, coding equipment and wiring, as manufactured by Automatic Electric Inc., or equal.

General—The system shall provide for the following features:

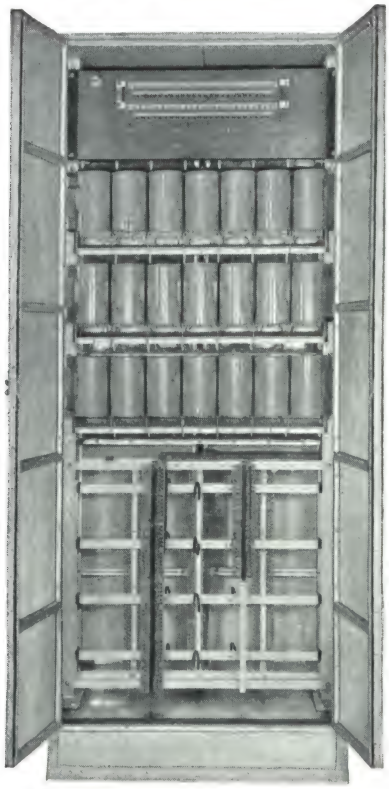
(1) The lines shall operate with normally closed circuits, shall be supervised against open circuits, and shall be so ar-

Continued on next page

ranged that short circuiting of a line will not prevent operation.

(2) The system shall be of a type in which destruction of or damage to any alarm box or alarm box circuit will not cause any other alarm box or alarm box circuit to be inoperative.

(3) There shall be associated with each alarm box circuit, at the location of the fire chief, a lamp to indicate the location of the alarm box originating the alarm. This lamp shall be arranged to light even though the code should fail to sound or even though the coding machine is engaged in sending an alarm at the time.



Central Coding Equipment for the Strowger Fire Alarm System

(4) The alarm boxes shall be of the break-glass type.

(5) The system shall be so designed that any or all boxes may be operated simultaneously without interference or mutilation of the codes.

Equipment—Central station equipment shall have all vital contacts arranged in duplicate. All relay equipment shall be provided with metal dustproof covers of a slip-on type.

A cabinet for the fire chief shall be furnished and installed in fire headquarters and equipped with keys and lamps for each fire alarm station. This apparatus shall be so arranged that, whenever an alarm box is operated, the associated lamp will light showing the location of the station reporting, this lamp to remain lighted until the glass in the alarm box is replaced. The equipment shall also include keys that permit the fire chief to test any or all lines. There shall also be furnished and installed at the location of the fire chief a punch register and time stamp which provides a permanent record on a paper tape showing the alarm codes as sent in.

The fire chief's equipment shall include a supervisory lamp associated with each alarm box circuit, so arranged that if an alarm box line becomes open, the corresponding supervisory lamp will light. The circuit shall be so arranged that an open circuit condition will not cause the sending of a false alarm, but will merely operate the supervisory lamp, advising the fire chief of an unstandard condition on that line.

The system shall be so arranged that the operation of an alarm box will cause the central station apparatus to perform the following three functions:

(1) Send out a coded audible alarm at the supervisor's location. The supervisor shall be able, by operating a key, to sound the coded alarm on all signals in the premises or only those in certain sections, as desired.

(2) Send the codes of the alarm boxes without interference or mutilation.

(3) Light the lamps associated with the stations originating the alarms at the fire chief's desk, giving an immediate indication of the location of each box originating an alarm, the audible and the visual signals being totally independent of each other.

The system shall be arranged for an ultimate capacity of 86 alarm stations and all codes on the alarm signals shall be of two digits, from 1-1 to 9-9. The coding equipment shall be so designed that whenever an alarm box is operated, the code will be sounded at least four times.

Power Plant—The system shall be designed to operate from storage batteries furnished in duplicate. Each battery shall be capable of operating the system for a period of not less than 60 consecutive hours without recharging. All alarm box circuits shall be protected individually with an alarm type fuse.

Alarm Boxes—The alarm boxes shall be designed to be dustproof and wetproof and arranged for either flush or surface mounting. The box shall be constructed of brass or other non-corrosive malleable material. All boxes shall be finished in vermilion enamel and distinctly numbered to correspond with their respective codes.

Strowger Tele-Chec System

The purpose of the Strowger Tele-Chec System is to enable the management of a theater to make as full use as possible of the entire seating capacity, by maintaining constant contact between the various parts of the body of the house and the main entrance.

The system consists, in general, of a number of dial sending stations located in the various aisles, and a receiving station at the main entrance or in the main lobby. By operating the dial at the sending stations, the ushers in any aisle may signal the number of seats available in that aisle to the usher at the main entrance or lobby, the signals appearing visually in the form of illuminated numbers on a display panel.

The system is available in a number of types to meet the requirements of theaters of various sizes.

Typical Specifications for Tele-Chec System

Under these specifications shall be furnished and installed a complete Theater Signaling System as manufactured by Automatic Electric Inc., or equal.

Each sending station shall consist of a dial of the same type as used in connection with public automatic telephone systems, two electrical indicating units, a dial lamp with an amber jewel that will glow as long as a call is in from that particular station, a release button and a push button. The circuit shall be so arranged that it will be necessary to push the button before transmitting a number and so that, after the completion of a call, no change in the number can be made without re-setting. The number sent shall be indicated on the two electrical indicating units.

The receiving stations shall be of the proper number of receiving units grouped in one assembly. Each unit shall be of the indicator lamp type and arranged for flush mounting. The numbers shall be invisible except when illuminated by the corresponding lamp from behind. Above each unit shall be mounted a lamp with a green jewel that will glow and operate a buzzer for a predetermined length of time after a new call has been set up on that particular unit. Each receiving unit shall be equipped with a push button for releasing the call.

The switching equipment shall consist of standard switching units properly mounted in a code steel cabinet, arranged for flush or surface mounting. The operation of the dial at the sending station shall cause the proper number to be illuminated at the receiving station and remain so illuminated until released by the operation of the release button at either end.

Power for the operation of the above system shall be secured from a set of storage batteries of 24-ampere hour capacity, provided with a trickle charger of suitable capacity to float the battery on the line and keep it fully charged at all times.

S. H. COUCH COMPANY, INC.

Private Telephone Systems, Apartment House Mail Boxes

NORFOLK DOWNS, MASS.

SALES OFFICES

ASHEVILLE, N. C., L. E. Perrault
BOSTON, MASS., 170 Purchase Street
CHICAGO, ILL., S. H. Couch Telephone Sales Corp., 809 West Jackson Boulevard
CLEVELAND, OHIO, C. H. Van Der Bloom
DALLAS, TEX., Lighting & Specialty Co.
DENVER, COLO., George Hamburger Co.
DETROIT, MICH., Walker Calderwood Co.
LOS ANGELES, CAL., Sierra Equipment Corp.
MONTREAL, P. Q., Franke, Levasseur & Co., Ltd.
NEW YORK, N. Y., S. R. Philips, 487 Broadway
PHILADELPHIA, PA., John R. Hollingsworth
ST. LOUIS, MO., Geo. H. Stienhans
SAN FRANCISCO, CAL., Sierra Equipment Corp.
SEATTLE, WASH., Sierra Equipment Corp.
TAMPA, FLA., Ernest D. Gruppe
TORONTO, ONT., Canadian Telephones & Supplies Ltd.

Products

Private Telephone Systems for commercial, industrial, educational and residential buildings.

Post Office Approved Mail Boxes and Telephone Equipment for apartment houses.

Electric Reset Annunciators; Push Buttons; "Autophone" System of Automatic Telephones.

Experience

Manufacturers of telephones, etc., since 1894.

Private Telephone Systems

Owing to the wide range of systems that we manufacture it is impossible to list even a representative selection here. Ask our nearest sales office for bulletins, specimen specifications and engineering data.

Intercommunication Telephones

Full range in 4, 8, 10, 12, 16 and 20-button capacities
Listed in Couch Bulletin No. 90

Surface Mounted Annunciator

"Cotelco" Annunciators

We manufacture a complete range of electric reset annunciators for surface, flush or desk mounting.

Ask our nearest office for specimen specifications covering any class of annunciator system.

Bulletin, free on request, also lists a wide range of push buttons.

Couch "Autophone" System

An automatic exchange system for installations up to 100 lines. Switchboards made in 30, 50 and 100-line capacities.

Offers the following unique features:

Instant Intercommunication—At all times without the employment of a switchboard operator.

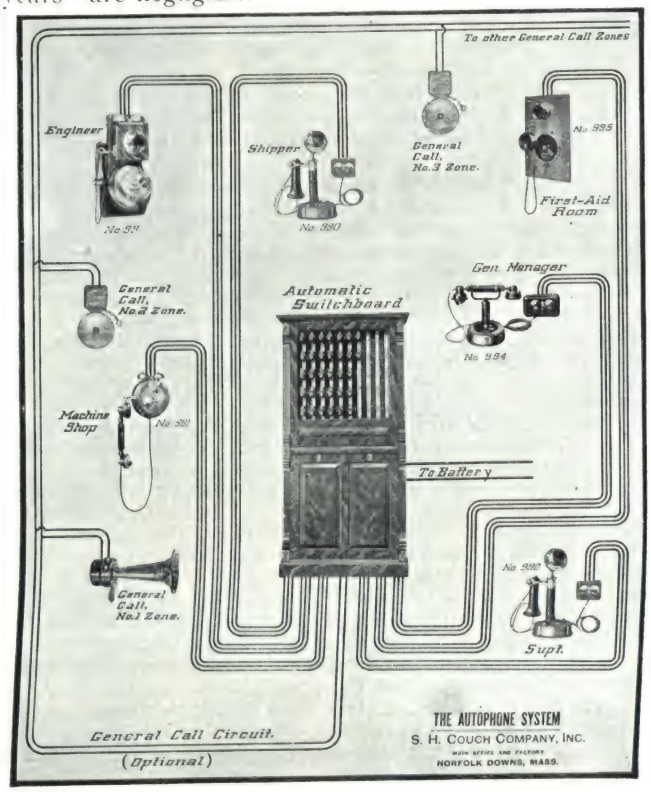
Absolute Secrecy—If a busy line is called, a "busy signal" is heard in the receiver.

General Call Feature—By means of code calling any individual may be located at once. The called party may communicate with the caller from any Autophone station.

Conference Service—Any desired number of stations may get in on a conference. This in no way interferes with the secrecy feature.

100% Capacity—Any number of conversations may take place up to the full capacity of the system.

Reliability and Low Maintenance Costs—Owing to standardization of parts and perfect design and manufacture, maintenance costs—even over a long period of years—are negligible.



Graphic Layout of "Autophone" System

Showing a 50-line switchboard equipped for 32 lines
Five types of autophone instruments and a general call circuit are shown

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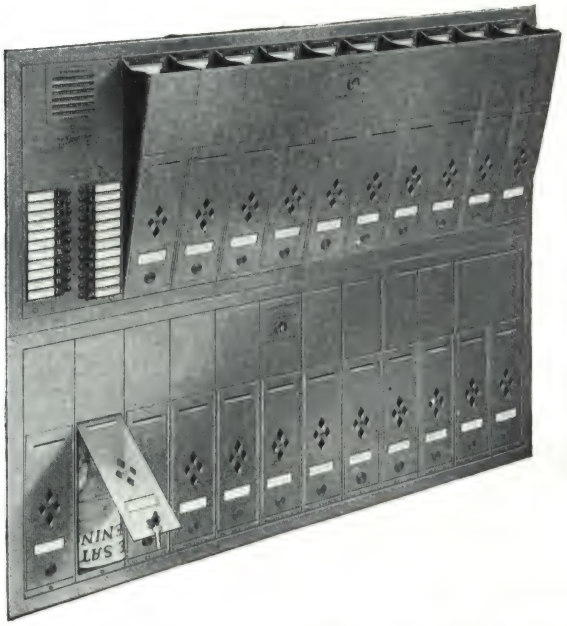


Apartment House Mail Box and Telephone Equipment

Write for Bulletin No. 89 giving *complete information and specifications* on mail boxes and telephone systems for apartment houses containing 3 to 100, or more, suites.

The illustration at the left shows a vestibule outfit for a 22-suite apartment house consisting of 22 "tilting" mail boxes and a cordless (loud speaking) telephone equipped with 22 suite and 1 janitor calling buttons. Top row of boxes tilted forward for deposit of mail by postman and one tenant's door in bottom row is open for withdrawal of mail.

The Couch "Tilting" Mail Box (approved by P. O. Dept. Patented) may be installed in combination with or separate from a vestibule telephone. It can also be supplied with speaking tube mouthpiece and call button or call button only. Fronts of boxes are of solid brass with steel reinforcements. Standard Finish: sprayed brass or black. Any hardware finish may be specified.

Flush Suite Phone

Surface Mounted Suite Phone

SPECIMEN SPECIFICATIONS COVERING MAIL BOX AND TELEPHONE EQUIPMENT FOR APARTMENT HOUSES

One Front Vestibule—Any Number of Suites

(1) There shall be furnished and installed all telephones and mail box apparatus, wire, batteries, labor and other items necessary for a complete system.

(2) All apparatus to be located in accordance with architect's instructions.

(3) The telephone service shall be as follows:

Note: Selections to be made from this list according to requirements.

(I) Vestibule calls suites. (II) Vestibule calls janitor. (III) Suites call janitor. (IV) Suites call laundry. (V) Suites call office. (VI) Suites operate vestibule door opener. (VII) Janitor calls suites. (VIII) Janitor calls office. (IX) Janitor operates vestibule door opener. (X) Tradesmen's door calls suites. (XI) Tradesmen's door calls janitor. (XII) Laundry calls suites. (XIII) Office calls suites. (XIV) Office calls janitor.

(4) Vestibule equipment to consist of a combination outfit consisting of a front connected telephone, call button and *Post Office approved* Couch "Tilting" mail boxes.

(5) Vestibule telephone to be equipped with:

(5a) Watchcase receiver and armored cord.

(5b) Cordless (loud speaking) receiver.

(5c) Swing arm receiver.

(6) Each suite to be equipped with a telephone which shall be fitted with the required number of push buttons. Telephones to be:

(6a) Couch No. 48 flush mounted type.

(6b) Couch No. 49 surface mounted type.

(7) Janitor quarters to be fitted with:

(7a) Answering telephone.

(7b) Answering and calling telephone.

(7c) Answering and calling telephone equipped with electrical reset annunciator drops to indicate individual station calling.

(8) Tradesmen's door to be equipped with:

(8a) Surface mounted calling telephone.

(8b) Flush mounted calling telephone.

(See next column for wiring specifications.)

Two or More Sections, Each Section with Separate Front Vestibule—All Under Care of One Janitor

(1) There shall be furnished and installed all telephones and mail box apparatus, wires, batteries, labor and other items necessary for a complete system.

(2) All apparatus to be located in accordance with architect's instructions.

(3) Telephone service shall be as follows:

Note: Selections to be made from this list according to requirements.

(I) Vestibules call associated suites. (II) Vestibules call janitor. (III) Suites operate associated door opener. (IV) Suites call janitor. (V) Suites call associated laundry. (VI) Suites call office. (VII) Janitor call suites. (VIII) Janitor operates all vestibule door openers. (IX) Janitor calls office. (X) Tradesmen's door calls associated suites. (XI) Tradesmen's door calls janitor. (XII) Laundries call associated suites. (XIII) Office calls suites. (XIV) Office calls janitor.

(4) Each vestibule equipment to consist of a combination outfit consisting of a front connected telephone, call buttons and *Post Office approved* Couch "Tilting" mail boxes.

(5) Vestibule telephone to be equipped with:

(5a) Watchcase receiver and armored cord.

(5b) Cordless (loud speaking) receiver.

(5c) Swing arm receiver.

(6) Each suite to be equipped with a telephone which shall be fitted with required number of push buttons. Telephones to be:

(6a) Couch No. 48 flush mounted type.

(6b) Couch No. 49 surface mounted type.

(7) Janitor quarters to be fitted with:

(7a) Answering telephone.

(7b) Answering telephone with electrical reset annunciator drops to indicate from which section a call is made and with plug and jacks for connecting to any section.

(7c) Answering and calling telephone with electrical reset annunciator drops to indicate from which section a call is made and with plug and jacks for connecting to any section and with buttons for individually calling all suites.

(7d) Answering and calling telephone equipped with electrical reset annunciator drops to indicate from which individual station a call is made and with plug and jacks for connecting to any section and with buttons for individually calling all suites.

Wiring Specifications (Applying to Any Apartment House Telephone System)

(1) *Note: Use this paragraph only if specifying a conduit job.*

All wiring to be installed in rigid conduit. Single wires to be no smaller than No. 19 B&S gauge and rubber covered.

Alternatively, lead covered cables may be used when conductors shall be no smaller than No. 22 B&S gauge, except battery and door opener wires which shall be no smaller than No. 19.

(2) *Note: Use this paragraph only if specifying a non-conduit job.*

Single wires to be no smaller than No. 19 B&S gauge and to be double cotton insulated saturated with moistureproof compound with an outer braid finished in moistureproof compound. (Dampproof office wire.)

Alternatively, lead covered or braided cables may be used when conductors shall be no smaller than No. 22 B&S gauge except battery and door opener wires which shall be no smaller than No. 19 B&S gauge. Lead covered cables to be used when run through damp places, otherwise braided cables may be used.

Wires and cables to be supported by wood cleats or other approved methods and to be properly protected against mechanical injury and contact with piping of all kinds.

(3) Current supply for operating the system shall conform to the specifications of the telephone manufacturer.

(4) The entire installation to be subject to the approval of the architect and shall be tested free from crosses and grounds and handed over in perfect working order.

THE NORTH ELECTRIC MANUFACTURING COMPANY

Automatic Telephone Equipment

GALION, OHIO

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Products

PRIVATE AUTOMATIC TELEPHONE SYSTEMS.
CITY AUTOMANUAL TELEPHONE EXCHANGES.
DIAL AUTOMATIC TELEPHONE SYSTEMS.
REMOTE CONTROL POWER SYSTEMS.
AUTOMATIC DIALS.
RELAYS and RELAY SWITCHING SYSTEMS.
NORTH-WESTINGHOUSE REMOTE CONTROL EQUIPMENT for Electric Power Stations.
AUTOMATIC STOCK EXCHANGE RECORDING EQUIPMENT.

The Company

THE NORTH ELECTRIC MANUFACTURING COMPANY has been engaged continuously in the manufacture of high grade telephone equipment since 1884. Early interested in the development and application of machine switching methods to telephone exchange operation, the North Company has contributed indispensable pioneering achievements to the art of automatic telephony, and now owns and controls one of the most important blocks of patents.

Hand Telephone

Independent in ownership and control, and unfettered by binding affiliations opposed to the highest interests of the telephone art, THE NORTH ELECTRIC MANUFACTURING COMPANY is able to operate at all times to the best advantage of its clients, and to offer a product of quality matured by years of practical experience in the manufacture and installation of Automatic Telephone Systems of all kinds.

The North All-Relay Automatic Telephone Exchange

The North "All-Relay" Automatic Telephone Exchange, manufactured in this country exclusively by THE NORTH ELECTRIC MANUFACTURING COMPANY, is the latest completed development in the automatic telephone industry. It has been specially designed and constructed to reduce maintenance requirements and costs to the very minimum.

The "All-Relay" Central Switching Gear is composed solely of small solidly constructed relays, each comprising only a magnet, a hinged armature, and a group of contact springs. The complex series of operations for making and breaking telephone connections under control of the dials is performed by the mere swinging on its pivot of the armature of each of a number of relays in sequence, through a network of wire circuits which are permanently bound into cables and soldered in place. These relays connect with the calling line, register the impulses from the dial, choose the wanted line, test, ring and perform all the functions of a girl operator in a manual switchboard or of the large, complex stepping selectors found in other automatic exchanges. The relays are constructed of the best materials, are initially adjusted, and are unchanging through millions of operations.

The "All-Relay" equipment is entirely devoid of the wipers, shafts, gears, ratchets, pawls, latches, coil springs and other like parts of which all selector-type automatic systems are composed, and does not require the delicate adjustment, frequent re-adjustment, cleaning and lubrication common to such selectors.

Advantages of the North All-Relay Automatic System

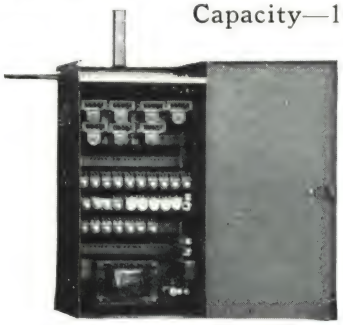
Simplicity of construction.
Ease of installation.
Freedom from routine maintenance.
Instantaneous ring and high speed of service.
Secrecy of conversations.
24-hour unattended operation.
Improved telephone service.
Increased organization efficiency.
Cash savings in telephone rentals.

THE NORTH ALL-RELAY TELEPHONE SYSTEM

Automatic and Unattended

The Simplex Unit of North Automatic System

The Simplex Unit is for a special purpose. Designed for organizations with light telephone usage, this system has a valuable application in schools where the distance between classrooms renders an automatic telephone system indispensable.



Charger, Batteries and Exchange of the Simplex Unit

Condensed Description

Cabinet — Wall type, 12x24x9 in.

Capacity—10 to 100 stations.

Ringing—Stations are rung selectively with intermittent ringing current automatically controlled from the switchboard.

Talking—Common talking channel with provision for special secret stations.

Operation—Automatic; 24-hour service; using standard dial telephones.

Power — Storage battery, 24 volts, automatically maintained in charged condition by an alternating-current rectifier.

Continued on next page

For the convenience of superintendents, principals and executives, stations may be installed permitting absolute secrecy of conversation.

As a means of supervising the system, monitor, or busy lamps, can be furnished; also the system can be equipped with a number of dialless stations whose operation automatically signals the principal's office. These dialless stations can be called selectively from any dial station.

By a means of the group ringing feature, a single operation of the telephone is sufficient to make a general call, to summon a conference or to make an announcement of general character.

Wiring—Paramount in simplicity and economy of installation: one individual wire per station; one common wire to all stations; one common wire or ground return.

Where it is believed that a selective type exchange permitting of two or more simultaneous secret conversations will ultimately be required, an additional individual wire should be included in the original installation and one of the common wires eliminated. This will save expense when the change is made.

All-Relay Automatic Exchange Type 3 Equipped with 30 Lines

Complete Range of Models

The North Automatic Telephone System is built in a complete range of models to meet all requirements of interior communication. Models are classified according to the maximum number of telephones and the maximum number of simultaneous conversations which can be handled by the exchange unit.

The most popular models are:

Model 3—30 line. Permitting a maximum of 30 lines, 6 simultaneous conversations.

Model 5—50 line. Permitting a maximum of 50 lines and 6 simultaneous conversations. (Not expandable.)

Model 10—100 line. Permitting a maximum of 100 lines.

Model 30—1000 line. Permitting a maximum of 1000 lines.

Model 10 and Model 30 are expandable. That is, equipment can be added for expansion to any desired number of lines and any required number of simultaneous conversations.

Any or all of the features described can be incorporated in each of these three models, the only distinction being the number of exchange units.

All-Relay System Type No. 3

This is a complete automatic telephone exchange built for the needs of the small user. Condensed into minimum cabinet space, and yet providing all the automatic service features to be found in the large systems. The North All-Relay Telephone System No. 3 makes an ideal installation.

Low in price, easy to install, simple to operate and free from maintenance costs, this system supplies a long-felt need by solving the problem of intercommunication in an efficient and economical manner.

This ideal has been made possible, and a system of utmost reliability and continuity of operation developed, by the use of simple telephone relays. These sturdy single-motion relays take the place of the delicate and troublesome mechanical switches used in other types of automatic equipment.

Condensed Description — *Capacity* — The exchange has a capacity of 30 direct lines and 6 conversation channels, termed links; it may be equipped with any combination of lines and links not exceeding these figures.

Secretary Service—For the convenience of the executive and his secretary, any line on the exchange may be equipped with two telephones with provision for the selective ringing of either station without disturbing the other. This permits the secretary to receive all calls, only extending those on which the executive wishes to talk.

Operation—The operation is automatic, using standard dials as in city exchanges; 24-hour unattended service is thus provided.

Talking—The links provide selective connections insuring absolute secrecy of conversation, the number of links furnished determining the number of simultaneous conversations possible.

Ringing—Stations are rung selectively by means of intermittent ringing current automatically controlled by the switchboard.

Telephones—Automatic telephones with dials are used in any of the standard types.

Cabinets—The exchange is housed in a steel cabinet finished in olive green enamel. It stands 52 in. high, 36 in. wide and 12 in. deep.

Power—The system is operated from a 24-volt storage battery automatically maintained in charged condition by an alternating current rectifier permanently connected to the city lighting circuit.

All-Relay Automatic Exchange Type 10 Equipped with 100 Lines

Wiring—A single pair of wires between each telephone and the exchange constitutes the entire wiring system.

Maintenance—The All-Relay construction justifies the claim of maintenance brought to an irreducible minimum. The power equipment requires little attention besides the addition of distilled water to the battery. The entire system thus provides uninterrupted service at little or no maintenance cost.

Continued on next page

Type No. 5—50-Line Exchange

The ultimate capacity of an All-Relay Exchange Type No. 5 is 50 lines and 6 links. Although it is built to accommodate the individual line equipment for a maximum of 50 lines and trunking equipment for 6 simultaneous secret conversations, it can be also equipped with any combination of lines and links not exceeding these figures.

The switching equipment is entirely automatic in operation, and the complete equipment consists of:

Condensed Description

All-Relay Automatic Switching Unit—The automatic switching unit is self-contained within a rolled steel cabinet, standing 78 in. high, 36 in. wide and 12 in. deep. Finished in olive green enamel with swinging doors back and front, provided with locks and with glass panels in the front doors.

Power Equipment—The power equipment consists of:

(1) Storage Battery—This is a 24-cell, 48-volt, lead-acid diamond grid storage battery assembled in 8 three-cell moulded steel-glass jar units with built-in specific gravity indicators and splashproof filler vents.

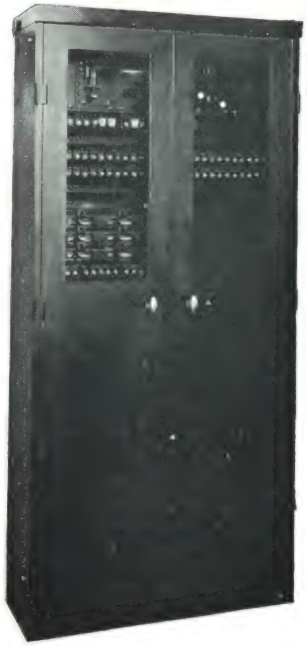
(2) Charging Equipment—Two general types of charging equipment are offered, namely:

(a) Automatic charge.

(b) Floating charge with alarm panel.

Features—In addition to the complete intercommunicating telephone facilities afforded by this system, many extremely convenient and useful services may be provided. These features include the following:

(1) Code call and fire alarm.
(2) Conference.
(3) Executive service.
(4) Departmental selection.
(5) Watchman's clock service.
(6) Annunciator service.
(7) Routine maintenance is *entirely eliminated.*



Relays Neatly Assembled in a Steel and Glass Cabinet

Type No. 10—100-Line Exchange

The initial capacity of this model permits a maximum of 100 lines and 10 simultaneous conversations.

Inasmuch as the design and operation of the exchange units are the same for all models, the description of exchange types above is in all other respects applicable to Type 10.

Telephones

Are the highest grade standard instruments, furnished with North dials by means of which any station on the system may be called automatically at the will of the user. They are of high efficiency in transmitting and reproducing the voice and are suitable for long distance transmission.

They are supplied in four standard types: hand microphone, desk set, wall set, flush type wall set.

Dial

The solid construction and reliability of operation of the North dial with its dustproof and almost noiseless movement, insure perfect performance and freedom from maintenance costs.

Solidity of construction is obtained by using a white metal, cuplike, die casting as the base of the dial in which the controlling mechanism is mounted and securely enclosed against dust.

Only the best materials obtainable are used.

All exposed metal parts are of monel metal.

Impulse springs have double contacts of gold-platinum alloy which insure unfailing electrical contacts.

Specifications

Note: The following simplified specification is so worded as not to shut out competitive bids in cases where local laws forbid the use of closed specifications.

The contractor shall furnish and install ready for service one automatic interior telephone system with all conduits, wiring, telephones, battery, power equipment and other apparatus as hereinafter described.

Exchange Type—The telephone switching equipment shall be of The North Electric Manufacturing Company's "All-Relay" automatic selective-ringing, selective-talking type or equal, having terminals for calling and for called lines, and connecting links, with automatic connection of the calling line to the link upon lifting the receiver, and automatic connection of the link to the called line by impulses transmitted over a single pair of wires from the calling station and produced by a ten-digit finger-hole dial mounted on the telephone set, the same as in automatic city exchanges. The switching mechanism shall be composed of relays exclusively.

General—The exchange shall be so designed as to provide the following features:

(1) Each station shall be able to communicate with every other station.

(2) Any two stations shall be able to communicate without the possibility of being overheard or interfered with by a third station.

(3) Access to any station already in use shall be automatically prevented and, when attempted, a distinctive signal shall be automatically transmitted to such station attempting.

(4) All connections shall be controlled by the operation of finger-hole dials carrying the digits 1 to 0 and mounted on the telephones.

(5) Ringing of the bells shall be intermittent and controlled automatically from the exchange without the necessity of a ringing key or button at the telephone.

(6) The ringing of the bell at the called station shall be indicated to the person calling by a distinctive audible signal in the receiver of the calling station.

Exchange Size—The exchange shall have a capacity of ..... lines and ..... links (trunks or connectors) and the initial installation shall be ..... lines and ..... links. Provision is to be made for adding lines and links without altering the original equipment.

Telephones—Telephone instruments shall be of the highest quality and in design, construction and performance the equal of telephones used by public telephone companies. All telephones shall be equipped with ringers of the polarized double-gong type. Telephones shall be furnished in the following types and quantities:

..... desk telephones; ..... flush telephones;
..... wall telephones; ..... hand telephones.

Power Equipment—The power equipment shall include a 48-volt (24-volt for Type 3) storage battery of sufficient ampere-hour capacity to run the exchange for 24 hours under normal load without receiving charge. There shall also be furnished a motor-generator, tungar or other suitable approved rectifier for keeping the battery charged. Devices shall be included for generating alternating current suitable for operating the telephone bells and furnishing the busy signal. All of this equipment shall be of standard design as furnished by the manufacturer for the size and type of exchange covered by these specifications.

Housing—The exchange proper shall be contained in a steel and glass cabinet. The power equipment shall be mounted separately in accordance with the standard practice of the manufacturer.

Wiring—Telephone wiring shall be of No. 19 B&S gauge twisted pair braided, rubber covered interior telephone wire for dry locations, and No. 18 B&S gauge saturated braided rubber covered wire where dampness may be encountered.

A single pair of wires shall be used from each telephone directly to the automatic switchboard, or to the nearest distributing cable terminal.

Where found more convenient, standard No. 22 silk and cotton insulated lead covered switchboard cable may be used from local distribution points to the switchboard.

Cable wires and telephone distribution wires shall be run in rigid iron conduit.

Conduits—Conduits shall be run in the switchboard room between the various pieces of apparatus according to the manufacturer's blue print layout.

Installation—This contractor shall install all apparatus, connect all telephones, and turn the entire system over to the owner in first class operating condition.

Switchboard installation shall be made according to specifications furnished by the manufacturer.

GRAYBAR ELECTRIC COMPANY

INCORPORATED

Inter-communicating Telephone Systems

Graybar Building, Lexington Avenue and 43rd Street

NEW YORK, N. Y.

For Distributing Houses, see our other section

For Graybar Electrical Equipment for Home, Office and Industry, see Manufacturers' Index

GRAYBAR INTER-COMMUNICATING TELEPHONE SYSTEMS

System No. 1—Selective Ringing, Selective Talking

Service

For use in business organizations, industries, stores, institutions, large residences, etc., where frequently more than one conversation will take place at the same time, where instantaneous connections without loss of time are necessary, and where the highest grade of transmission is required.

Operation

Each station can (by merely pressing a button) selectively ring and talk with any other station without disturbing the rest of the stations in the system and as many separate conversations can be carried on simultaneously as there are pairs of Inter-Phones. For example, in a system consisting of six Inter-Phones, three separate conversations can be carried on at the same time.

For each station in the system, one push button key is required in each Inter-phone.

Capacity

The Inter-Phones are available in standard sizes of 6, 12, 16, 20 and 24 buttons.

Inter-Phones for System Number One

These Inter-Phones embody the highest standards of engineering, design and workmanship of any inter-communicating type equipment. Five different designs of Inter-Phones are provided for this system—namely, surface wall type, flush wall type, desk set type, cradle type and hand set type. These Inter-Phones have the same circuit characteristics and may be used interchangeably in a system.

No. 1324C-12

Wall Types—Sets are finished in black enamel and have a hinged face plate which makes it possible to easily inspect all connections and apparatus without disturbing installations.

No. 1324 Surface Wall Type—All metal set having hinged face plate, movable transmitter and hand receiver.

Code No.	Number of buttons	Housing, in.		
		Height	Width	Depth
1324C-6	6	10	$6\frac{3}{8}$	3
1324C-12	12	10	$6\frac{3}{8}$	3
1324C-16	16	$14\frac{5}{16}$	$7\frac{1}{16}$	3
1324C-20	20	$14\frac{5}{16}$	$7\frac{1}{16}$	3
1324C-24	24	$14\frac{5}{16}$	$7\frac{1}{16}$	3

No. 1355C-16

No. 1355 Flush Wall Type—Has a steel face plate on which is mounted talking and signaling apparatus and a sheet steel outlet box arranged for ¾ in. conduit. Outlet box can be separated from set and installed in wall during construction of building.

Code No.	Number of buttons	Housing, in.			Outlet box, in.		
		Height	Width	Depth	Height	Width	Depth
1355C-16	16	$14\frac{1}{2}$	$6\frac{7}{8}$	.....	$12\frac{7}{8}$	$5\frac{1}{4}$	$3\frac{11}{32}$
1355C-20	20	$14\frac{1}{2}$	$6\frac{7}{8}$	.....	$12\frac{7}{8}$	$5\frac{1}{4}$	$3\frac{11}{32}$
1355C-24	24	$14\frac{1}{2}$	$6\frac{7}{8}$	.....	$12\frac{7}{8}$	$5\frac{1}{4}$	$3\frac{11}{32}$

Desk Type—The No. 6016D set consists of desk stand and metal key box.

Desk stand is finished in Bower Barff. It is the type of desk stand generally used for public telephones.

Key box is finished in dull black enamel and is provided with four rubber feet to keep metal housing from scratching table or desk. Connecting cord between key box and desk stand is 5½ ft. long. Cable entrances are provided at bottom and ends of box.

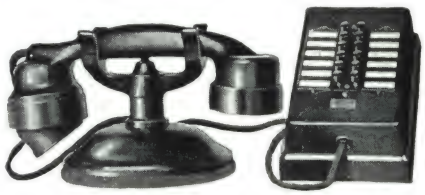
Code No.	Number of buttons	Desk stand	Cord, ft.	Key box	Dimensions, in.		
					Width	Length	Depth
6016D-6	6	1140BE	$5\frac{1}{2}$	328C-6	5	$7\frac{1}{2}$	$2\frac{5}{8}$
6016D-12	12	1140BE	$5\frac{1}{2}$	328C-12	5	$7\frac{1}{2}$	$2\frac{5}{8}$
6016D-16	16	1140BE	$5\frac{1}{2}$	328C-16	$5\frac{3}{4}$	$10\frac{3}{4}$	$2\frac{5}{8}$
6016D-20	20	1140BE	$5\frac{1}{2}$	328C-20	$5\frac{3}{4}$	$10\frac{3}{4}$	$2\frac{5}{8}$
6016D-24	24	1140BE	$5\frac{1}{2}$	328C-24	$5\frac{3}{4}$	$10\frac{3}{4}$	$2\frac{5}{8}$

Cradle Type—No. 6016CH set consists of hand set with cradle type mounting and desk type key box.

Hand set is made of black moulded bakelite and represents most efficient cradle hand set available from a standpoint of both design and workmanship.

Cradle or mounting for supporting above hand set consists of metal base finished in black with nickel trimming. It is arranged for desk mounting for supporting hand set when not in use. Cutout switch is provided for operating purposes.

Key box used with this set is same as described above for No. 6016D type Inter-Phone.



No. 6016CH-12

Code No.	Number of buttons	Hand set and cradle	Cord, ft.	Key box	Dimensions, in.		
					Width	Length	Depth
6016CH-6	6	1016CH	$5\frac{1}{2}$	328C-6	5	$7\frac{1}{2}$	$2\frac{5}{8}$
6016CH-12	12	1016CH	$5\frac{1}{2}$	328C-12	5	$7\frac{1}{2}$	$2\frac{5}{8}$
6016CH-16	16	1016CH	$5\frac{1}{2}$	328C-16	$5\frac{3}{4}$	$10\frac{3}{4}$	$2\frac{5}{8}$
6016CH-20	20	1016CH	$5\frac{1}{2}$	328C-20	$5\frac{3}{4}$	$10\frac{3}{4}$	$2\frac{5}{8}$
6016CH-24	24	1016CH	$5\frac{1}{2}$	328C-24	$5\frac{3}{4}$	$10\frac{3}{4}$	$2\frac{5}{8}$

No. 6016HR-12

Hand Set Types—***No. 6016HR***—Consists of hand set with hanger and desk type key box. Hand set is finished in black with nickel trimmings. A talking button is located in hand set handle which takes the place of a switch-hook.

Continued on next page

Hand set hanger is a simple nickel-plated hook for hanging hand set to side of desk or wall.

Key box is same as described for No. 6016D type Inter-phone.

Code No.	Number of buttons	Hand set	Cord, ft.	Hand set hanger	Dimensions, in.			
					Key box	Width	Length	Depth
6016HR-6	6	1003R	6	141A	328C-6	5	7½	2⅝
6016HR-12	12	1003R	6	141A	328C-12	5	7½	2⅝
6016HR-16	16	1003R	6	141A	328C-16	5¾	10¾	2⅝
6016HR-20	20	1003R	6	141A	328C-20	5¾	10¾	2⅝
6016HR-24	24	1003R	6	141A	328C-24	5¾	10¾	2⅝

No. 6038C-12

No. 6038C — Consists of hand set and switch-hook box for mounting to side of a desk. Also includes desk type key box.

Hand set is made of black moulded Bakelite and is most efficient hand set available in design and workmanship.

Switch-hook box can be installed on side of desk, on wall, or any vertical surface.

Key box is same as described for No. 6016D type Inter-phone.

Code No.	Number of buttons	Hand set and switch-hook box	Key box	Dimensions, in.		
				Width	Length	Depth
6038C-6	6	1038C	328C-6	5	7½	2⅝
6038C-12	12	1038C	328C-12	5	7½	2⅝
6038C-16	16	1038C	328C-16	5¾	10¾	2⅝
6038C-20	20	1038C	328C-20	5¾	10¾	2⅝
6038C-24	24	1038C	328C-24	5¾	10¾	2⅝

Accessories

Cable—For connections between various stations, cable specially designed for Inter-Phones can be supplied. This cable includes necessary number of wire conductors (two pairs for battery leads and one pair for each station in system) and is furnished in three different types to suit various locations and conditions:

Type	6 stations	12 stations	16 stations	20 stations	24 stations
Fireproof braid	No. 134B	No. 141B	No. 157B	No. 158B	No. 136B
Brown cotton braid	No. 155B	No. 156B	.....	.....	.....
Lead covered	No. 134B	No. 141B	No. 157B	No. 158B	No. 136B

Cable Terminals—A cable terminal should be used wherever a junction is to be made between cables. In cases where cable can be run direct to Inter-Phone, no cable terminal is necessary. The number of cable terminals required should be determined by the installer.

No. 19 Cable Terminal—No. 19 type cable terminal is made of hard wood, numbered and shellacked, and equipped with a sheet steel cover, finished in black enamel.

Code No.	Capacity, pairs	Length, in.	Width, in.	Depth, in.	Use with buttons
19A	14	8	5⅞	2½	6 and 12
19B	26	14	5⅞	2½	16, 20 and 24

Stranded Flexible Cables—This stranded flexible cable is for use with No. 6016D, H, CH and HR Desk Inter-Phone Sets, where it is required to move the key box of these sets about the desk.

Furnished with silk-covered, mercerized and common cotton braid. The standard outer color of the cable braid is brown.

Cord Code No.	Number of single conductors	Used with button capacity
416	16	6
428	28	12
436	36	16
444	44	20
452	52	24

Dry Batteries—Not more than twelve dry cells will be necessary for operating system. (Five cells for the talking circuit; four to seven cells for ringing circuit, depending upon length of line.)

Bell Ringing Transformers—Bell ringing transformers may be used for ringing bells of System No. 1. However, they cannot be used for furnishing the talking current.

Type A transformer delivers current at three voltages, 6, 14, and 20, the selection of which depends upon the line resistance.

Detailed information for installing, including wiring diagram, battery requirements, cable connections, etc., are included in our bulletin, "Installing and Maintaining Graybar Inter-Phones, which will be furnished upon request.

System No. 11—Selective Ringing, Common Talking

Service

For use in residences, banks, institutions, warehouses, stores or other mercantile establishments where conversations can be limited to one at a time.

Operation

Each Inter-Phone in the system is equipped with a number of push buttons (one for each other station in the system). By depressing the button marked with name or number of station wanted, the bell at that station will ring and there only.

Any station in the system can selectively ring any other station. *Only one conversation can be carried on at a time.*

Capacity

The wall type Inter-Phones can be furnished in capacities of 2, 3, 4, 6 and 8 buttons, accommodating 3, 4, 5, 7 and 9 stations respectively in a system.

The desk and hand set Inter-Phones are furnished in capacities of 4 and 8 buttons, accommodating 5 and 9 stations respectively in a system.

No. 2527C-8

Inter-Phones for System No. 11

Wall Types—Finished in black enamel and made rustproof by the Parker Process.

No. 2527 Surface Wall Type—Surface mounting metal housing contains all the talking and signaling apparatus. Has metal back-board with hinge arrangement for mounting set to wall.

Code No.	Number of buttons	Dimensions, in.		
		Height	Width	Depth
2527C-3	3	7½	5	2⅝
2527C-4	4	7½	5	2⅝
2527C-6	6	7½	5	2⅝
2527C-8	8	7½	5	2⅝

Continued on next page

No. 2539 Flush Wall Type—Has flush steel face plate on which is mounted all talking and signaling apparatus, also metal outlet box and set of outlet box hangers for mounting set in wall.

Code No.	Number of buttons	Dimensions
2539C-3	3	See below
2539C-4	4	
2539C-6	6	
2539C-8	8	

Cradle Type—Consists of hand set with cradle type mounting having push buttons mounted in the base. Hand set is black moulded Bakelite, light in weight, pleasing in appearance and efficient in service. Inter-Phone set includes an apparatus box containing signaling bell and connecting block.

No. 6044C-8

Number of buttons	Code No.
4	6044C-4
8	6044C-8

Hand Set Type—Consists of efficient light-weight hand set equipped with "press-to-talk" lever; also metal push button block having black enamel finish with nameplate opposite each button. Block includes terminals for connecting hand set cord.

Inter-Phone set includes bell and connecting block, which may be ordered enclosed in metal apparatus box, indicated in following:

No. 6034BH

Number of buttons	Code No.
4	6034AZ
4	6034BG
8	6034BB
8	6034BH

Accessories

Retardation Coil—A No. 51H retardation coil must be ordered separately for installation near battery of each system.

Cable—Three common wires and one individual wire for each station.

Batteries—Five Columbia gray label dry cells required for complete operation of this system.

System No. 12—Master Station, Common Talking

Service

Consists of one centrally located "Master Station" Inter-Phone to which are connected other "outlying station" Inter-Phones. System provides for communication from a central point to different stations and vice versa.

Operation

Master Station Inter-Phone is equipped with a number of push buttons, one for each outlying station in system. By depressing button marked with name or number of outlying station wanted, bell at that station will ring and there only.

Outlying stations are equipped with only one button which will ring master station when depressed. Only one conversation can be carried on at a time.

Capacity

One master station and from two to sixteen outlying stations.

MASTER STATION INTER-PHONES FOR SYSTEM NO. 12

Wall Types—No. 2527 Surface Wall Type

Code No.	Number of buttons	Dimensions of housing, in.		
		High	Wide	Deep
2527C-2	2	7½	5	2⅝
2527C-3	3			
2527C-4	4			
2527C-6	6			
2527C-8	8			

No. 2539 Flush Wall Tpye

Code No.	Number of buttons	Face plate, in.		Outlet box, in.		
		High	Wide	High	Wide	Deep
2539C-2	2	9	5⅝	7½	4	2⅛
2539C-3	3					
2539C-4	4					
2539C-6	6					
2539C-8	8					

Cradle Type

Code No.	Number of buttons	Set consists of	
6044C-4	4	1044C-4 cradle	35B apparatus box
6044C-8	8	1044C-8 cradle	35B apparatus box

Hand Set Type

Code No. with housing,	Code No. without housing,	Number of buttons	Set consists of
6034BG	6034AZ	4	35-B apparatus box (with housing) or 11-B Bell & 8H connecting block (without housing)
6034BH	6034BB	8	

Outlying Station Inter-Phones for System No. 12

Following outlying station Inter-Phones are similar in construction to master station Inter-Phones except that only one button is provided in each set for ringing master station.

Number of buttons	Metal wall type Inter-phones		Hand set Inter-Phones		
	Surface	Flush	Cradle type	Surface box type	Flush box type
1	2527C-1	2539C-1	6044C-1	6043E	6042K

No. 6042E is same as No. 6042K, but without face plate and wall box.

Accessories

Retardation Coil—A No. 51H retardation coil must be ordered separately with each master station Inter-Phone and installed near battery of system.

Wiring—For connection between outlying stations and master station either cable or insulated wires can be used, depending largely upon layout of system. Three common wires are required throughout system, and, in addition, one individual wire from master to each outlying station. Where there is a long run of a large number of wires, it will be found economical to use cable, and at all distributing and junction points to install connecting blocks. From these connecting blocks separate wires can be run to Inter-Phones.

Batteries—Five Columbia gray label dry cells are required for operation of this system when distance between master station and most distant outlying station is 750 ft. or less, and No. 22 B&S gauge wire (as in case of Western Electric cable) is used.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY

GENERAL OFFICES AND FACTORIES
100 Carlson Road
ROCHESTER, N. Y.

BRANCH SALES OFFICES
CHICAGO, ILL., 17 South Jefferson Street
KANSAS CITY, MO., Coca-Cola Building

STROMBERG-CARLSON TELEPHONE MANUFACTURING CO., LIMITED OF CANADA
211-219 Geary Avenue, TORONTO, CAN.

Products

Manufacturers of INTER-COMMUNICATING TELEPHONE SYSTEMS and TELEPHONE APPARATUS. Also dealers in Telephone Cable and Supplies.

Selective Talking—Selective Ringing Telephone System No. 1

System No. 1 satisfies the requirements of most offices, factories, etc., where the volume of traffic does not justify the use of a switchboard and operator. Each telephone may ring and talk with any other telephone without interfering with any of the remaining stations.

No. 903 Type Station

Station Equipment

Each station is equipped with a telephone and key box of either 12 or 22-station capacity. However, it is unnecessary to purchase a complete system unless required. Additional stations, up to capacity, may be added at any time without disturbing those already installed.

No. 903 Type—The No. 903 Type is a combined wall telephone and key box. Finish is dull golden oak. It contains complete talking, signaling and switching apparatus for one station.

No. 903-B Capacity—12 stations.
No. 903-C Capacity—22 stations.

No. 1128 Type—The No. 1128 Type consists of a hand set telephone and key box both of which are finished dull black. This outfit provides the convenience of a one-piece instrument. All signaling and switching apparatus is contained in the key box.

No. 1128-B Capacity—12 stations.
No. 1128-C Capacity—22 stations.

No. 1128 Type Station

Wiring

System No. 1 employs full metallic circuit wiring between all stations. Stromberg-Carlson cables, in full color code, are furnished in proper capacities and contain all wires essential to the system. Painted braid sheath cable is recommended except where exposed to dampness, acid fumes or placed in conduit when leaded sheath should be used. Properly designed terminal boxes provide ready facilities for making cable connections.

Battery

Two sets of dry cells are required, one set of seven cells to supply current for talking purposes and the other from seven to ten cells for ringing the telephone bells, the number depending upon the amount of cable in the installation.

A Stromberg-Carlson Type "B" Bell Ringing Transformer may be connected with the 110-volt 60-cycle lighting circuit in place of the battery for ringing purposes.

Private Exchange Switchboard System No. 6

System No. 6 offers to architects, contractors and owners a standardized inter-communicating telephone system for factories, offices, schools, hospitals, clubs, hotels, etc., where the volume of traffic necessitates simultaneous conversations and where the services of an attendant are required. With this system it is possible for any telephone to be connected with any other by signaling the operator who makes all connections.

Switchboard Equipment

The switchboards are made in four sizes:

No. 104 Cordless type—10 lines capacity.
No. 101 Cord type—50 lines capacity.
No. 102 Cord type—100 lines capacity.
No. 106 Cord type—300 lines capacity.

The No. 104 cordless switchboard comes fully equipped with 10 lines and 5 connecting circuits but the No. 101, No. 102 and No. 106 types of switchboards, although wired to capacity in all instances, may be purchased with as low as 10 lines and 4 connecting circuits equipped.

Dimensions of Switchboards—

No. 104 Height 16 in. Width 16 in. Depth 13⅛ in.

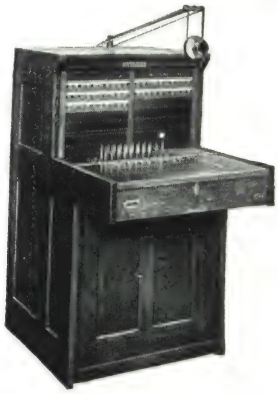
No. 101 Height 42¾ in. Width 20¾ in. Depth 29⅝ in.

No. 102 Height 45½ in. Width 25¼ in. Depth 35 in.

No. 106 Height 51 in. Width 25¼ in. Depth 35 in.

Continued on next page

Switchboard Operation—All connections through the No. 104 switchboard are made by means of keys. The removal of the receiver from the hook of the station instrument lights a lamp in the switchboard as a signal to the operator who answers over her telephone and makes the desired connection by the operation of keys. The return of connected parties' receivers to the



No. 102 Switchboard

hook switches illuminates another lamp indicating to her that the connection is no longer required, when she restores the keys to their normal position.

The No. 101, No. 102 and No. 106 switchboards have identical operating characteristics. The removal of the receiver from the hook of the station instrument lights a lamp which notifies the operator that her services are required. She answers by inserting the answering cord in the indicated jack and completes the requested connection by inserting the calling cord of the pair in the jack of the desired party and ringing his telephone. On the completion of the conversation both cords are returned to their normal position.

Operator's Telephone Set

The operator's set consists of either a suspended or breast plate type transmitter and a watchcase type receiver with head band for the No. 101, No. 102, or No. 106 type switchboard. For the No. 104 switchboard the operator uses a standard No. 1168 desk stand.

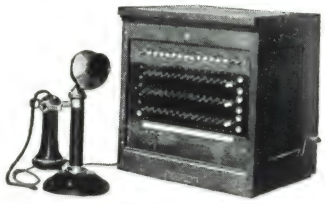
No. 1168 Desk Stand

Outlying Station Telephones

There are three types of outlying station equipment, all of which insure high talking efficiency. The instruments are those used by telephone companies as standard apparatus for local and long distance service.

No. 1168 Desk Stand

The No. 1168 desk stand is associated with the No. 1156-BY desk set box to provide a very neat, light weight station instrument. The desk stand is equipped with the Stromberg-Carlson standard transmitter and receiver. The signaling equipment, a 1000-ohm ringer, an induction coil and a 1 M.F. condenser, is mounted in the desk set box. Both pieces of apparatus are finished in dull black enamel with nickel trim. Mounting space of desk set box $9\frac{3}{16}$x$6\frac{3}{4}$x$3\frac{9}{32}$ in.



No. 104 Switchboard

No. 1155-BY Wall Telephone

The No. 1155-BY wall telephone contains all talking and signaling apparatus in one compact unit. The box is of pressed steel finished in dull black enamel with nickel trim. The telephone is equipped with Stromberg-Carlson standard transmitter and receiver. The signaling equipment consists of a 1000-ohm ringer and a 1 M.F. condenser. Mounting space $9\frac{3}{16}$x$6\frac{3}{4}$x$6\frac{7}{8}$ in.

Wall Telephone No. 1155-BY

No. 1177 Hand Set Telephone

The No. 1177 hand set telephone is associated with the No. 1156-BY desk set box to provide a station instrument unexcelled for convenience. The hand set telephone provides the convenience of a one-piece instrument with talking efficiency equal to the desk stand. The signaling equipment mounted in the desk set box consists of a 1000-ohm ringer and a 1 M.F. condenser. Mounting space of desk set box $9\frac{3}{16}$x$6\frac{3}{4}$x$3\frac{1}{4}$ in.

No. 1177 Hand Set

Wiring

Two wires are required to connect each station with the switchboard. Stromberg-Carlson Standard Switchboard Cables are furnished in proper capacities for the requirements of any size of installation. Painted and braided sheath is recommended for interior use, but where subjected to excessive moisture, acid fumes, or when installed in iron conduits lead sheath cable should be used.

Battery

The battery recommended for any installation of not over 100 stations consists of 11 cells of Electric Storage Battery Company's Type C T chloride accumulators. To charge the battery a General Electric Company's No. 244,708 Tungar Rectifier is employed.

Systems No. 2, No. 3 and No. 4

Systems No. 2, No. 3 and No. 4 are designed to furnish service in small factories, offices, or residences where the number of stations is limited and it is not necessary to carry on more than one conversation at a time. For this type of service one of these systems is suitable to meet every requirement.

SELECT-O-PHONE COMPANY

Manufacturers of the Select-O-Phone Automatic Telephone and "Paging" System

PROVIDENCE, R. I.

BRANCH OFFICES

PROVIDENCE, R. I., 1012 Eddy Street
NEW YORK, N. Y., 551 Fifth Avenue
CHICAGO, ILL., 508 So. Dearborn Street
HARTFORD, CONN., 60 Sumner Street
SEATTLE, WASH., 244 Central Building
VANCOUVER, B. C., 702 North West Building

AGENTS EVERYWHERE

Product

The SELECT-O-PHONE, an Automatic Central Station Interior Telephone System which eliminates both operator and complicated cables.

Adaptability

The Select-O-Phone is adaptable to the varying service requirements in private residences or estates, industrial plants, offices, lumber yards, docks, mills, mines and wherever time or convenience is a factor in interior communication.

Description

The Select-O-Phone is a full automatic telephone system, especially developed to serve organizations requiring from five to fifty-five telephone stations, either within one building or distributed among several buildings.

The system is built on the unit plan, permitting as few stations as are needed to be installed initially, and stations added one by one up to the ultimate capacity.

Capacity—The Standard Select-O-Phone system is made in 12, 36 and 55-line capacity and the Junior system in 12 and 36-line capacity. The station capacity may be doubled by using party lines.

Wiring—The line wiring from each Select-O-Phone to the automatic switchboard consists merely of a single strand of standard triple conductor telephone wire. Thus all complications such as cable, junction boxes, etc., encountered in interior telephone systems have been eliminated in the Select-O-Phone system.

Operation—Operation of the Select-O-Phone is simplicity itself. All that is required is to simply turn the dial by means of the knob until the number of the station desired is under the indicator, then remove the receiver, whereupon the dial quickly runs back to the normal position and the connection is automatically made. By pressing the button on the instrument, the bell at the called station rings and upon replacing the receiver, disconnection is instantaneous. In calling a party line station simply pressing the ringing button and removing the receiver makes the connection.

Service Features

The general call, or "paging," feature (optional) provides a ready means for quickly finding a party who may be away from his regular station.*

Secret conversation between any two stations without cut-off or interruption.*

Secret conference, or general conversation between three or more stations.

Select-O-Phone handles separately and simultaneously as many calls as may be initiated.

Executive right-of-way for the chief to all telephones whether busy or not.

Provides watchman's call and auxiliary fire alarm service.

Installation

All of the apparatus included in the Select-O-Phone system as well as the wiring mentioned above, is so simple that the plant electrician or any local electrician or contractor, by following the printed instructions, can easily install and maintain the system and add necessary extensions without special telephone knowledge. Thus station locations may be changed as desired and additions made at practically no expense or loss of time.

*This feature does not apply to the Junior system.

Select-O-Phone Instruments

The types of Select-O-Phone instruments most generally used are shown in the diagram below. All instruments are finished in dull black enamel and polished nickel. Similar to standard city service instruments, with addition of numbered dial.

Automatic Central Switchboards

Switchboards are made in three capacities: 12, 36 and 55 lines.

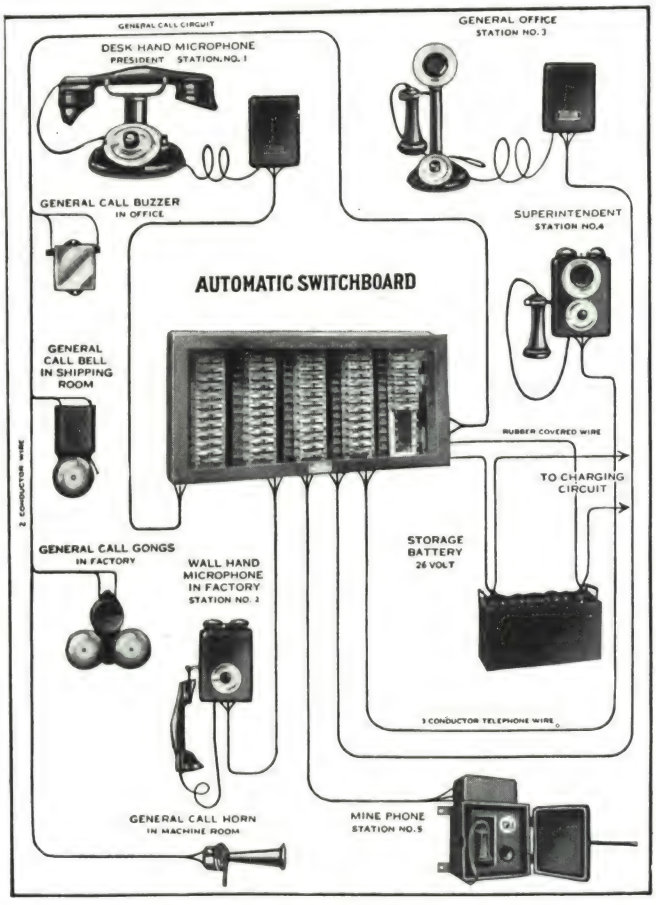
Type M-55—Capacity, 55 lines. Dimensions, 45x24x9 in.

Type M-36 and Junior 36—Capacity, 36 lines. Dimensions, 30x24x9 in.

Type M-12 and Junior 12—Capacity, 12 lines. Dimensions, 15x24x9 in.

Catalogue and Specifications

Our Catalogue No. 240, descriptive of Select-O-Phone apparatus and service, and our Standard Specification, No. 203, which should be in the files of every architect and engineer, will be sent on request.



A Model Select-O-Phone Layout

Method of wiring, the various principal parts and their relation to one another in the system

HAMILTON-SANGAMO CORPORATION

Manufacturers of Electric Clocks and Clock Systems for Every Purpose

LANCASTER, PA. SPRINGFIELD, ILL.

Products

HAMILTON-SANGAMO ELECTRIC CLOCKS for alternating and direct current and SYNCHRONOUS ELECTRIC CLOCKS for individual unit installations, or complete secondary clock systems.

The Company

The HAMILTON-SANGAMO CORPORATION represents the combined manufacturing facilities, financial responsibility and engineering knowledge of the Hamilton Watch Company and the Sangamo Electric Company, two outstanding organizations in their respective fields. Hamilton Watch is known and recognized everywhere as outstanding makers of fine watches. The Sangamo Electric Company has long been a leader in the development and manufacture of electric precision instruments.

The System

The combined engineering staffs of the two companies, Hamilton Watch and Sangamo Electric, have devoted years to the development and design of dependable electric clock systems and individual installations that can be sold at prices that make them practical for use even in the smallest of buildings.

Types of Systems

(1) Synchronous clocks for alternating current (no master clock or special wiring required).

(2) Electrically wound for alternating or direct current. Each unit having reserve to run a minimum of twenty hours after current is interrupted. Master clock corrects all secondary units every hour. Special three-wire circuit to all clocks.

Types of Master Clocks

Master clock furnished with 11-jewel lever type escapement, pendulum, or program clock.

Wiring Diagrams and Specifications

Architects and engineers are invited to write to our Contract Sales Department at Springfield, Illinois, for complete wiring diagrams and specifications to cover any electric clock systems as outlined above. In order that we may have all the necessary data at one time, architects should also send complete blue prints and state specification requirements.

State type of case, as well as dial size required.

Give complete specifications on any special clocks.

State type of master clock desired.

State which type of clock system you wish information on.

State kind of current supplied: direct and at what voltage; alternating—voltage and frequency and whether frequency is maintained constant by power company.

Note: Clocks are not equipped with dials larger than 14 inches.

Standard Cases for Master and Secondary Clocks

Master Clock
(Lever type escapement)
16-in. square wood wall clock in either genuine oak or mahogany and walnut finishes. 12-in. dial with extra heavy figures and second hand

Round Secondary Clocks
(5, 10 or 12-in. dials)
Aluminum cases in standard finishes of mahogany, walnut, white or olive green.
5701S..... 5-in. dial
10701S.....10-in. dial
12701S.....12-in. dial

Square Secondary Clocks
(12 or 14-in. dials)
Square wood cases in genuine oak or mahogany and walnut finishes
12703S.....12-in. dial
14703S.....14-in. dial

Flush mounting and special designs quoted separately

LANDIS & GYR, INC.

DEPARTMENT: MAGNETIC CLOCK CO.

Manufacturers of Magneta and Inducta Clock Systems

104 Fifth Avenue
NEW YORK, N. Y.

Products

MAGNETA and INDUCTA ELECTRIC CLOCK SYSTEM; LANDIS & GYR ELECTRIC CLOCKS.

Also Electric Meters for alternating or direct current, Time Switches, Transformers, Special Metering Equipment.

Magneta Electric Clock System

The Magneta System operates directly on 110 to 120-volt alternating or direct current and consists of a master clock and a number of secondary clocks.

It is intended for use in high quality hotels and other buildings and in fine residences. Workmanship and finish are the highest degree attainable in clock manufacture. Provisions can be made for adaptation to any interior planned by the architect.

It is unlike any other clock system, having a magneto-electric master clock, which itself generates the current impulses necessary for actuating the secondary clocks, thus rendering the clock system independent of outside sources of current. *An interruption in current supply will not affect it or the secondary clocks.*

There are no batteries or contacts used to drive the secondary clocks, thereby eliminating a usual source of trouble.

Magneta Master Clock

Movement—The master clock is equipped with an automatic self-winding arrangement. Has a "Remontoire" type escapement, the most accurate made; the type applied to all astronomical regulators, and used where absolutely accurate time is required.

Operation—The clock movement proper, as well as the magneta generating apparatus, are both operated by weight; the generating apparatus being released every minute by the clock movement. The weight is wound automatically by an electric motor. This motor derives its source of power from the electric supply line in the building. The clock is therefore not affected by an interruption in current supply, up to a period of from 8 to 12 hours. If the power line is permanently out of order, the clock can be wound by hand.

Capacity and Size of Master Clocks

The master clocks differ in size according to the number and size of the secondary clocks. The smallest size master clock will drive 25 small or medium sized secondary units—(5 to 12-in. dial). A 50-unit master clock is one which controls 50 secondary clocks up to 12-in. dials. Larger secondary clocks require more units. Thus, for example, a 20-in. dial secondary clock takes 3 units.

Relay master clocks allow systems up to any number of secondary clocks.

Secondary Clocks

These clocks all have Magneta electrical movements. The standard type is a circular wooden case in oak or birch (mahogany finish) or a circular metal case with white enameled dials, black numerals, balanced hands and stout glass fronts. In both cases, the figures are marked on a white dial in either Arabic or Roman.

Secondary clocks are noiseless and can be used in bedrooms where other clocks would be objectionable.

Prominent Magneta Installations

Magneta Systems are installed in some of the most prominent buildings in this country and Canada. Among them are:

U. S. Custom House, New York
U. S. Post Office, New Orleans
Union Station, Washington
U. S. Post Office, Washington
Ritz-Carlton Hotel, New York
Singer Building, New York
U. S. Rubber Building, New York
New York Edison Co., New York
Cook County Hospital, Chicago
Courthouse, Memphis
Examiner, San Francisco
St. Francis Hotel, San Francisco
Metereological Bureau, Toronto
Dominion Observatory, Ottawa

Landis & Gyr Electric Clocks

These are individual clocks which operate from house alternating or direct-current supply. They are independent of frequency and voltage variation. Each clock has a mechanical reserve for approximately 3 days, therefore not affected by current interruptions. Silent in operation, no hum.

Made in mantel and square wall style. Mantel style has a 5½-in. dial; wall style, 10-in. and 12-in. dials.

Magneta Secondary Clocks

Landis & Gyr Electric Clock

ESTABLISHED 1884 INCORPORATED 1888

THE STANDARD ELECTRIC TIME COMPANY

SPRINGFIELD, MASS.

BRANCH OFFICES

ATLANTA, GA., Glenn Building
BALTIMORE, MD., Baltimore Trust Building
BIRMINGHAM, ALA., 2920 7th Avenue, South
BOSTON, MASS., 10 High Street
BUFFALO, N. Y., 220 Delaware Avenue
CHARLOTTE, N. C., 217 Latta Arcade
CHICAGO, ILL., 1510 Monadnock Building
CLEVELAND, OHIO, 1333 Union Trust Building
COLUMBUS, OHIO, 83 So. High Street
DALLAS, TEX., 716 Mercantile Bank Building
DENVER, COLO., 562 Penn Street
DETROIT, MICH., 806 Donovan Building
KANSAS CITY, MO., Mutual Building
LOS ANGELES, CAL., Room 670, 124 W. 4th Street
MINNEAPOLIS, MINN., 745 McKnight Building
NEW YORK, N. Y., 50 Church Street
PHILADELPHIA, PA., 1612 Market Street
PITTSBURGH, PA., Bessemer Building
PORTLAND, ORE., 65 1st Street
SAN FRANCISCO, CAL., 1 Drumm Street
SCRANTON, PA., 148 Adams Avenue
SEATTLE, WASH., 1714 1st Avenue, South
SPOKANE, WASH., 110 So. Cedar Street
TAMPA, FLA., 114 W. Alfred Street
MONTREAL, QUE., THE STANDARD ELECTRIC TIME COMPANY OF CANADA, LTD., 726 St. Felix Street

Products

"STANDARD" ELECTRIC TIME and PROGRAM SYSTEMS.

"STANDARD" ELECTRIC TELEPHONE and FIRE ALARM SYSTEMS.

"STANDARD" ELECTRIC TOWER and STREET CLOCKS.

INDUSTRIAL EQUIPMENT.

LABORATORY ELECTRICAL EQUIPMENT.

HOSPITAL SIGNALING SYSTEMS.

"Standard" Service

The keynote and the policy of this organization has been the manufacture of but one quality of equipment—the very best that good materials and first class workmanship can produce. Simplicity, reliability and long-wearing qualities, are characteristic of all "Standard" products.

Fig. 105

60-Beat Master Clock

Equipped with mercurial pendulum, program clock, pilot dial and milliammeter

The "Standard" Electric Time Systems

Types—"Standard" Electric Time equipment is now furnished for either storage battery operation or direct from 110-volt a-c. with reserve power for continuous operation of clocks in case of current failure on the latter system.

"Standard" equipment lends itself readily to a great variety of installations, and is manufactured in many different styles to meet manufacturing and engineering conditions.

"Standard" Master Clock—The "Standard" master clock is automatically wound and furnishes the impulse for secondary clocks each minute. The secondary clock contact is of the wiping type, self-cleaning and reliable.

Master clocks are manufactured in the 60-beat pendulum type with either metal ball or mercurial compensating pendulum.

Cases—Cases for "Standard" master clocks are of the graceful ox bow type as illustrated, finished in oak or birch, Median or mahogany finish. Special cases can be furnished in other woods with special finish to sample if desired.

"Standard" Secondary Clocks—These are of the minute impulse type and require no oiling, winding, individual setting or regulation. The movements are enclosed in dustproof cases and will run for years without attention. Roman numerals are regularly furnished. Arabic numerals are furnished when specified.

Half-minute impulse clocks are also furnished on special order.

Program Clock—The "Standard" program clock is a highly perfected mechanism, and accomplishes three important effects. First, to select the proper minute for bell ringing; second, to change program schedule automatically from one day to the next; third, to silence the signals nights, Saturdays, etc., if desired. It insures complete flexibility and readily changes schedules with simplicity of operation and perfect reliability. All program signals are operated through relays.

Mounting—The program clock is furnished either in master clock case or separate case.

Fire Alarm Testing—Provision may be made for the automatic testing of the school fire alarm system from the program clock.

No. 140

Program Clock

Case open showing working parts of four-circuit clock

Fig. 116

Square Wood Secondary Clock

Fig. 110

Flush Type Clock with Wood Ring

Fig. 118

Round Metal Secondary Clock Spun Case

Fig. 112

Dustproof and Waterproof Secondary Clock

Fig. 114

Marble Secondary Clock, Heavy Cast Bronze Trimming

Fig. 119

Double Dial Secondary Clock with Wood Case

Continued on next page

Program Signals

"Standard" wood box bells are made in sizes 3, 4, 6, 8 and 10 in. Cow gongs, 2½, 4 and 6 in. Outside weatherproof gongs furnished with or without housing and screen, 6, 8, 10 and 12 in. Long duration contact furnished for ringing outside gongs.

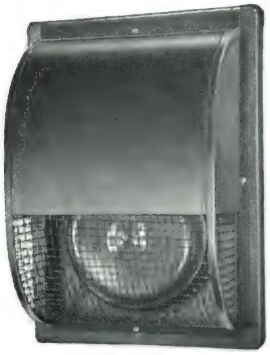


Fig. 804
"Standard" Weatherproof Gong with Housing and Screen

No. 801
Wood Box Buzzer

Fig. 803
Wood Box Bell

Fig. 150
Metal Case Bell

Standard Tower and Outside Clocks

"Standard" Electric Tower Clocks are furnished in our regular designs or to architects' specification. Write for complete details and estimates.

Fig. 820
Street Clock

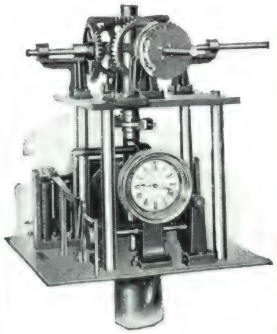


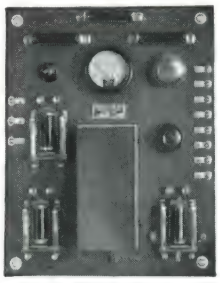
Fig. 455
Standard Electric Tower Clock Movement

Fig. 185
Campanile Type Tower Clock

Fire Alarm Equipment

The "Standard" Fire Alarm Systems are manufactured in either the open or closed circuit types, the latter as a double supervised system with or without coded stations. The "Standard" master code fire alarm station furnishes 4 rounds or will repeat until shut off if preferred. Signals on the open circuit type may be vibrating or single stroke gongs, also horns. On the closed circuit type single stroke gongs are used.

"Standard" Fire Alarm Systems are furnished for operation from either battery or alternating-current service. The systems may be tested automatically through the program clock if desired.



Fire Alarm Master Code Signal Box Control

Telephone Equipment

The "Standard" Telephone System is a common talking, selective ringing system, consisting of a combination bell control board and a central telephone station. This board comprises perforated connecting strips, one for each program circuit, the number of holes corresponding to the number of room bells in the building. Threaded plugs are provided by means of which any bell may be readily changed from one connecting strip to another, thus changing the program schedule of that room without the use of screwdriver or disconnecting the wiring. On this same board are push buttons (one for each signal), a hand microphone, an interconnecting device and a buzzer.

Various types of room phones may be used; the hand microphone style, the watchcase receiver, the long receiver type, or the flush type. Desk type phones may be furnished, as well as desk control board, if desired.

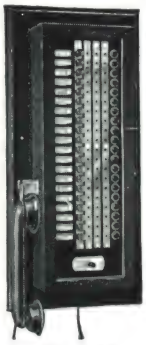


Fig. 818
Combination Bell Control Board and Central Telephone Station

The "Standard" Telephone System operates from the same battery used for the clock and bell systems. The operation of the clocks each minute shows that the battery is in first class condition; therefore, the "Standard" Telephone System is not subject to the usual troubles due to defective battery.

Fig. 819
Wall Telephone with Watchcase Receiver

Electical Equipment for Laboratories

General—This apparatus is for use in physics, chemistry, and biological laboratories, or wherever electric current is desired in varying voltages for experimental purposes. The equipment consists of a control panel, storage battery, also motor generator set, if desired. The simplicity and great flexibility of the apparatus offers a wide range of use. It is the ideal installation for high schools and colleges.

Control Panel—This comprises two units, the plug-in or jack panel and the battery charging and motor generator control panel. The former consists of groups of single-pole jacks, the two upper rows as shown being the jacks terminating the outgoing or table circuits. The next seven rows, each with busbar

Laboratory Current Supply Equipment
Produces current at different voltages for laboratory experiments from storage battery and motor generator supply

Continued on next page

on back are connected to the various taps taken from the storage battery. The arrangement is such that 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 and 24 volts may be delivered to the various table circuit jacks and current supply jacks. In addition there are jacks furnished for 110-volts a-c. and 110 volts d-c. (the latter obtained from motor generator). The construction of the jacks and handles of the cord connectors is such that it is impossible to get a short circuit by improper plugging. Jack panels are furnished for any desired number of table circuits and where conditions require it, auxiliary or subpanels are furnished in the different laboratories.

The battery charging and motor generator control panel has mounted on it a battery voltmeter and ammeter, bulb rectifier, special rheostat with indicating dial and pointer used for charging any section of the battery, generator voltmeter and ammeter, generator field rheostat, starting switches, etc. At the top of the panel is a flush type fuse cabinet with fuses for all lines.

All the above control equipment is mounted in a wood cabinet lined with steel.

Storage Battery and Motor Generator—The storage battery is of the sealed glass jar type and for ordinary work should be of 60-80-ampere hour capacity. The battery is mounted on a substantial battery rack.

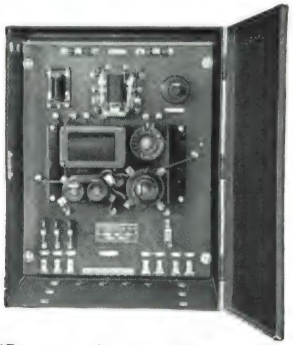
The motor generator may be from 500 watts up to as high a capacity as its use demands. It is of the compound wound type with the generator directly connected to the motor through a flexible coupling.

Wiring and Installation Data—Each table circuit should be run in separate conduit to a special outlet box in the wall 4 ft. 6 in. high, back of the control panel, and nothing less than No. 12 rubber covered wire is recommended.

The 110-volt a-c. should be brought to the panel from the nearest convenient constant source, and also feeds for the motor generator (usually 220 volts).

The control cabinet should be placed in the physics laboratory or convenient to it, and the battery and motor generator should be placed as near the control cabinet as possible.

In the physics laboratory separate circuits for each table are desirable, but in the chemistry laboratory the demonstration table should be on one circuit and the students' tables placed on either one or two additional circuits.



"Standard" A-c. Power Unit

Fig. 200
Commercial Time Stamp

Fig. 807
"Standard" Automatic Charging Device

Hospital Signaling Systems

For a Patient to Call a Nurse
For the Office to Call a Doctor
For the Doctor to Register In and Out

The successful operation of a nurse calling system depends largely on the portable circuit closing button. "Standard" buttons are extremely durable, designed to eliminate any possibility of grounds, short circuits or loss of adjustment. The portable button is enclosed in a brass shell of heavy gauge, chromium plated. Line springs are mounted on a genuine bakelite base with tubular eyelets.

Buttons are connected with 6 ft. of "Tirex" 5-conductor rubber covered cable. Cables are securely anchored to the button and connections rigidly soldered.

Buttons can be reset by finger release lever or special key as desired.

Calling stations are genuine bakelite. Lamp sockets are secured with spring fingers for convenience. Circuit closing jacks are used which automatically put in call if plug is accidentally removed.

A complete line of duty and pilot stations are furnished including lamp type annunciators. Annunciator numbers are stenciled on metal panels, covered with dull white pyralin. Panels are washable and nonbreakable.

Doctors and Staff Register In and Out System—Consists of illuminated type annunciator with doctors' names printed on pyralin covered with glass and mounted in metal panel. Panels are arranged for neat flush wall mounting and equipped with toggle switches for convenient operation by the doctors.

Special equipment manufactured to meet any hospital requirements, and specifications furnished architects and engineers covering such requirements.

Nurse's Duty Station

Cord Plug and Button

SETH THOMAS CLOCK CO.

19 West 44th Street

NEW YORK, N. Y.

CHICAGO, ILL., 215 W. Randolph Street

SAN FRANCISCO, CAL., 278 Post Street

Products

TOWER CLOCKS of every description for public buildings, churches, factories, schools, private estates, etc.; SELF-WINDING CLOCKS; STREET CLOCKS; BRACKET CLOCKS; HANGING and MANTEL CLOCKS.

Tower Clocks

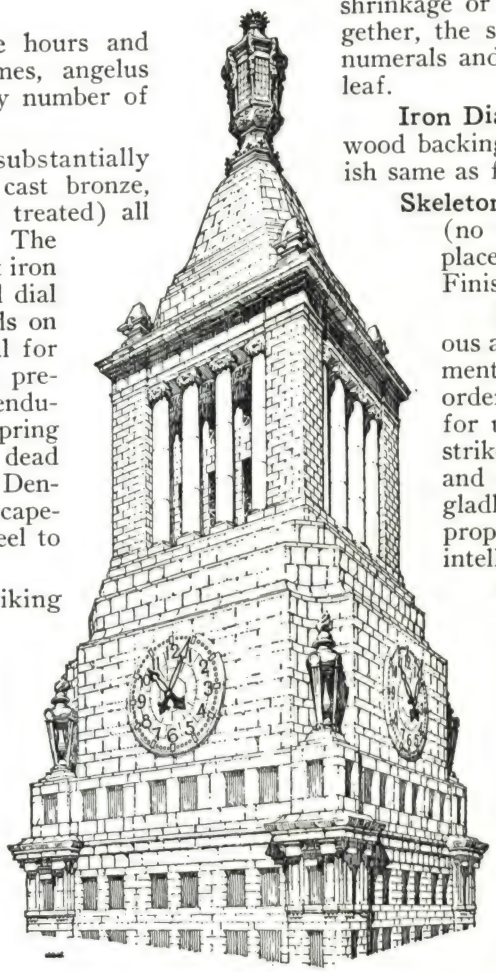
Both time and strike. Strike hours and half-hours; also Westminster chimes, angelus and shipbells; quarter-hours on any number of bells up to eleven.

Description—Movements are substantially constructed. The wheels are of cast bronze, machine cut, pinions of steel (heat treated) all steel parts heavily copper plated. The mechanism mounted on a heavy cast iron bed frame. On the clock is a small dial to indicate the position of the hands on the outside dial; also a seconds dial for close regulation; a safety catch to prevent the fall and breakage of the pendulum rod should the suspension spring break. Escapement either Graham's dead beat, mahogany pendulum rod, or Dennison's double 3-legged gravity escapement, the pendulum of zinc and steel to insure accurate compensation.

Silencing Devices—On all striking movements we can fit an automatic attachment to silence the striking train for whatever hours desired; or a hand switch to silence the clock for special occasions.

Automatic Light Switch—We can attach a double pole single throw Trumbull switch operated by a 24-hour wheel for automatically turning on and off the lights for illuminating the dials.

Self-winding Movements—(See illustration). We can equip movements with motors to operate on any current with automatic double pole single throw Trumbull switches in weatherproof iron boxes automatically operated by the rise and fall of weight for automatic winding.



Consolidated Gas Building, New York, N. Y.
WARREN & WETMORE, Architects

Size of Dials—As a guide in planning dials, we suggest that a good proportion is 1-ft. diam. for every 10 ft. in elevation.

Glass Dials—For illumination, dials may be safely used in whole plate not exceeding 4 ft. 6-in. diam.

For large sizes we advocate sectional glass and iron dials. The frame of the dial is cast in 6 sections with numerals and minute dots a part of the casting. The frame has rabbeted back to secure the glass which is installed in sections and fastened with brass clamps. All glass is ⅜ in. thick and ground on both sides.

Wood Dials—Two layers of ⅞-in. seasoned wood, tongued and grooved with grain crossed to prevent shrinkage or warping, the two layers bolted together, the surface painted and smalted; metal numerals and minute dots painted black or gold leaf.

Iron Dials—Heavy galvanized iron with a wood backing 1½ in. thick. Numerals and finish same as for wood dials.

Skeleton Metal—Cast Roman or Arabic (no minute dots) mounted on 2 rings placed 2 or 3 in. from face of the wall. Finish to be in contrast to color of wall.

Estimate—On account of the various arrangements and individual requirements, each clock is made to order and in order to make an estimate it is necessary for us to know whether it is a time or strike movement, the number, diameter and style of dials. On request we will gladly send a question sheet which, when properly filled in, will enable us to quote intelligently.

Guarantee—Our tower clocks are of first class material and workmanship and guaranteed against original mechanical defects for a period of 5 years, and, when fitted with Graham's escapement, to run within a variation of 30 seconds per month, or with Dennison's double 3-legged gravity, 10 seconds per month if given proper attention.

Information Required for Estimates—When asking for estimates the following facts will be of much assistance to us:

Size and number of dials.
Wood, glass, metal, or stone dial wanted.
Is clock to strike hours?
Is clock to strike quarter-hours?
Weight of bells.

Mammoth Clock Installations—

Consolidated Gas Building, New York, N. Y.—4 dials, 22-ft. diam.
Paramount Building, New York, N. Y.—2 dials, 25-ft. diam. and 2 dials, 22-ft. diam.
Colgate & Co., Jersey City, N. J.—1 dial, 50-ft. diam.
Emerson Drug Co., Baltimore, Md.—4 dials, 24-ft. diam.
Maryland Casualty Co., Baltimore, Md.—4 dials, 17-ft. diam.
C. Schmidt Sons, Philadelphia, Pa.—4 dials, 23-ft. diam.

Continued on next page

Seth Thomas Street Clocks

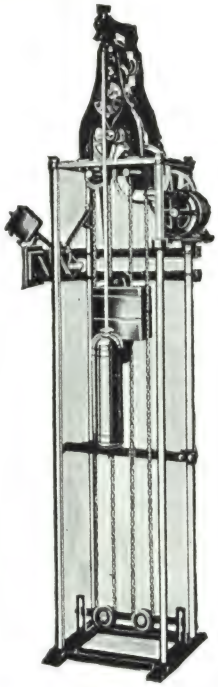
Of bracket or post type with 30 and 40-in. dials operated mechanically by the smallest size tower clock movement. These movements can be furnished in the 8-day weight driven, hand wind type or with automatic electric power wind, as illustrated.

Movement measures 2 ft. square and 5 ft. high, and may be enclosed in wood cabinet of neat design to match surrounding trim. In case of post clocks, movement is mounted in base or, if ornamental column is required without base, movement may be installed under sidewalk or in basement.

Four dials of 3 ft. each in diameter, 3 dials of 3½ ft. each, 2 dials of 4 ft. or 1 dial of 5 ft. may be satisfactorily operated by this movement which carries a 5-year guarantee, and will last a lifetime.

These movements may be equipped with automatic lighting switch for turning on and off the lights used for illuminating the dials.

Clock may be equipped with illuminated sign ornaments.



Electrically Wound Movement
For post or bracket type clocks

Special Designs

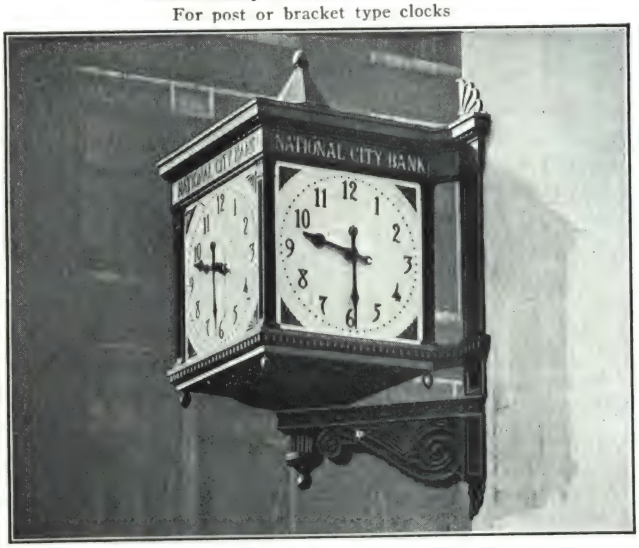
We specialize in sheet bronze and cast bronze outside clock cases to suit the architects' conception of what is proper for each individual building.

We recommend honed vitrolite glass dials which have the appearance of marble, with raised bronze numerals, hands, and minute marks. Also, we can furnish raised bronze letters as shown on cut directly below.

Seth Thomas Electric Clocks

In conjunction with the General Electric Company, we have recently developed one of the most efficient electrically operated clocks for inside use. These clocks operate on the lighting current and are so designed that as much as a five hour interruption in current supply will have no effect on its operation.

Two-dial Post Clock
With illuminated dials



Bracket Clock
Many different designs

Bracket Clock
Harmonious with architecture of building

Four-dial Bracket Clock
Illuminated dials and signs

WARREN TELECHRON COMPANY

Manufacturers of Telechron Timekeeping Equipment

GENERAL OFFICE AND FACTORY
ASHLAND, MASS.

DISTRIBUTORS AND REPRESENTATIVES IN PRINCIPAL CITIES
IN CANADA: CANADIAN GENERAL ELECTRIC CO., LTD., TORONTO, ONT.

Products

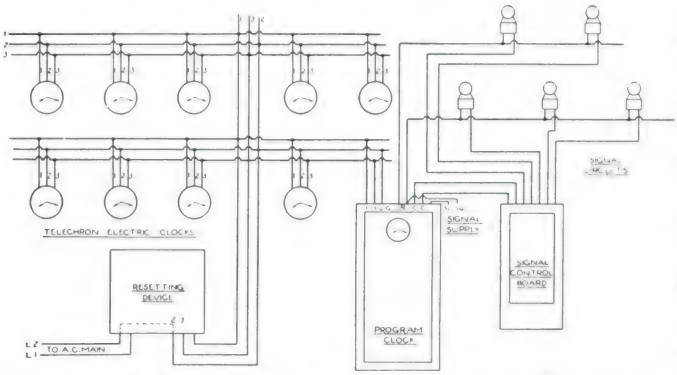
MASTER CLOCKS for frequency regulation in power stations; MOTOR DRIVEN CLOCKS for indoor and outdoor use, in single and multiple face design, illuminated and non-illuminated; PROGRAM CLOCKS for operating signals; SIGNAL CONTROL BOARDS; TOWER CLOCKS; SIGN CLOCKS; MOTORS and MOTOR DRIVEN MOVEMENTS for time stamps, time recorders, flow meters, pyrometers, and other special devices operating on timekeeping principles.

Telechron

Telechron is the trade-mark (registered in U. S. Patent Office) of the WARREN TELECHRON CO.

Principle of Operation

All clocks and timekeeping devices operated directly and continuously by a self-starting, synchronous motor, the speed of which is controlled directly by the frequency of the alternating current to which it is connected. The frequency is in turn controlled in the central station of the power company with the aid of a Telechron Master Clock.



Typical ADMR (Automatic Dual Motor Resetting) System for School Building

Types of Special Clock Equipment

**Secondary Clocks*—for indoor and outdoor use, single and multiple face design, with and without illuminated dials.

Tower and Sign Clocks—in various sizes up to the largest possible to build—construction permitting flood illumination or direct Neon tube or sign lamp illumination.

Program Clocks—in single or multiple circuit design, for operating a-c. or d-c. high (110) or low (24) voltage signals in schoolhouses, offices, factories, etc.

*Each clock is a complete, self-contained timekeeper in itself and is applicable for installation as an individual clock, or as a unit of a centrally controlled system, such control being of automatic or manual design. With central control, a separate wiring circuit is required similar to diagram.

Fields of Application

Schools—Secondary clocks for classrooms, boiler room, gymnasium, corridor and auditorium use.

Hospitals—Secondary clocks for offices, corridors, wards, lobbies, and special tap bell clocks for operating rooms.

Office and Public Buildings—Built-in wall models for offices. Corridor and lobby clocks, and outdoor clocks for wall face mounting.

Banks—Special designs in marble, bronze, etc., for banking room. Post and bracket clocks for outdoor use.

Towers—Single and multiple face designs, all driven individually and at continuous rate by separate movements and motors. Not affected by weather conditions.

Railroad Stations—Marble clocks for concourse; clocks for waiting room and offices. Outdoor clocks for face of building.

Hotels—Special built-in construction for guest rooms; clocks for corridors, lobbies, dining rooms and offices.

Sign Clocks—For advertising purposes; small models to combine with suspension type signs. Larger types for mounting on sign frames on roof of building, directly illuminated with Neon tube, or sign lamps.

Central Control Equipment

Although Telechron Clocks operate individually from the light socket—where a great many clocks are installed or where a minimum amount of attention can be given to timekeeping equipment, as in hospitals, banks, schools, etc.—a separate wiring circuit is recommended, with a central control unit to take care of resetting the complete system to correct time (following a possible interruption in power supply), as a unit, either automatically or manually.

System control may be of three-wire dual motored type, or of two-wire double frequency type, the use of either depending directly upon number and types of clock equipment involved.

Time Stamps and Time Recorders

This equipment is available through licensees, with Telechron motors, some models being suitable for use with above central control equipment and others for individual installation only.

Guarantee

All clock equipment manufactured by the WARREN TELECHRON COMPANY is guaranteed against mechanical and electrical defects for a period of one year.

Features of Telechron Timekeeping Equipment

Each clock is a complete, independent timekeeper in itself. No local master clock to adjust, oil, clean, etc. The Telechron Master Clock in the power station is under supervision of competent operators. Clock hands are driven continuously at constant rate, eliminating sticking or scattering. Each clock motor completely sealed, requiring no lubrication, regulating or cleaning.

Specifications

Complete specifications and recommendations to cover your particular requirements will be supplied by your local Telechron distributor or by the factory without obligation.

The New Internal Revenue Building, Washington, D. C.
Is equipped with an ADFR (Automatic Double Frequency Resetting) System involving 875 clocks and buzzers, two 6-circuit program clocks, and central control equipment

CHICAGO WATCHMAN'S CLOCK CO.

TELEPHONE
CALUMET 1809

1526 South Wabash Avenue
CHICAGO, ILL.

BRANCH OFFICES IN PRINCIPAL CITIES

Chicago Watchman's Clock System

Listed and labeled by the Underwriters' Laboratories, Inc., and by the Factory Mutual Laboratories. This system embodies distinctive points of construction and exclusive methods of registration endorsed by engineers.

Clock in Leather Case Ready for Service

It consists of the clock, the leather carrying case, the required complement of stations with seals and a year's supply of dial record sheets.

The system is so devised that the clock must be carried by the watchman on his regular rounds at stated intervals to the patrol stations, each station having a key which fits the clock. When this key is inserted and turned it registers on a paper dial within the clock, in an embossed figure, the exact time of registry.

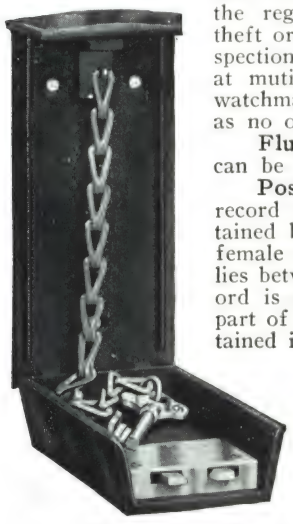
The keys are chained and sealed at the various stations, making it impossible to remove them without detection. The clock, while in the possession of the watchman, is locked and is equipped with a telltale device which records the exact time of every opening and closing of the clock upon the paper dial.

By keeping the locking key and the supply of used and unused dials inaccessible to the watchman, he can not open the clock or otherwise examine or tamper with his records without being detected. The user of a spurious key can never know the result of his attempts, yet each is recorded upon the paper dial and will be discovered on the following morning.

A Few of Many Advantages

It Is a Flexible System—Every Chicago Clock is built to serve sixteen or more stations, although additional stations can be furnished as needs require, without interruption of service. It is only necessary to send us the serial number of the clock and the number of additional stations desired.

Improved Station Boxes—While the standard drop cover box can be furnished if desired, it is recommended that lock box stations be installed. The slight additional cost is more than compensated by the fact that the registering keys are protected from theft or damage. Should an occasional inspection of the system show any attempt at mutilation of the keys or chain, the watchman can properly be charged with it as no one else has access to the box.



Lock Station Box Open

Flush Type Box—This type of box can be furnished if desired.

Positive, Clean Registration—The record or registration on the dial is obtained by bringing together a male and a female die upon the record sheet which lies between them and upon which the record is embossed. The male die is not a part of the key but of the mechanism contained in the clock case, where it is secure against injury or tampering. It is made of rustproof non-corrosive metal. As a result, the embossed record will be as clear-cut after ten or twenty years of use as when new.

Each key embosses on the paper dial a distinctive figure, tamper-proof and different from that of every other key. Only a firm pressure is required to produce a perfect impression. These keys are all made of rustproof, non-corrosive metal. With the Chicago System, the dials can not be manipulated, nor missed stations filled in, except by actually taking the clock to the stations at the exact time to be registered.

Keys Not Interchangeable—No two keys in the Chicago System are interchangeable, nor can the key of one clock be used in another clock of the same make, which is an advantage where a large system requiring more than one clock is in operation. Duplicate keys can not be supplied except upon official order of the user and only from dies in our own plant.

Construction

Carrying Case—Only the finest 8-ounce oiled harness leather used, waterproofed and hand-sewed to increase the life and durability of this part.

Clock Case—One of the exclusive features of the Chicago Clock is its die-cast aluminum case. Very light, strong, non-corrosive, and practically indestructible, it is so designed that the registering mechanism and the clock movement it contains are entirely separated and protected from dust, dampness and jarring.

Standard Drop Cover Box without Lock

Movement—The only clock on the market equipped with an 8-day movement, full jeweled; this is built exclusively for us by the Waltham Watch Co. The short pinions and nickel movement plates are similar to those found in automobile clocks and other sensitive devices from which accurate service under severe conditions is demanded.

Record Sheet—The paper dials are usually arranged for twenty-four hours to provide a record for Sunday and holiday registering, without any one having to go to the plant on those days to change the dials. Twelve-hour dials may be had, if desired.

Easy to Install

To install, only an hour or two is required for putting up the stations, which can be shifted or relocated at any time at the slight trouble of replacing the seals that will be furnished without charge.

Trial Offer

Sent on approval to any point in the United States to be judged on its merits.

Users of This System

Chicago Systems are giving satisfactory service in many of the largest industrial, mercantile and business buildings of the country, such as Marshall Field & Company, Pittsburgh Plate Glass Company, Standard Oil Company and others.

Flush Type Station Box

DETEX WATCHCLOCK CORP.

70 Varick Street, NEW YORK, N. Y.
4155 Ravenswood Avenue, CHICAGO, ILL.
27 Beach Street, BOSTON, MASS.
Room 802, 116 Marietta Street, ATLANTA, GA.
DETEX SERVICE STATIONS IN ALL LARGE CITIES

Detex Patrol Watchman's Clock

Products

PORTABLE WATCHMAN'S CLOCKS, ELECTRICALLY (Magneto) OPERATED WATCHMAN'S CLOCK SYSTEMS, SUPERVISORY ANNUNCIATOR SYSTEMS and WATCHMAN'S TELEPHONE SYSTEMS.

Listed by the Underwriters' Laboratories, Inc., and Factory Mutuals Laboratory.

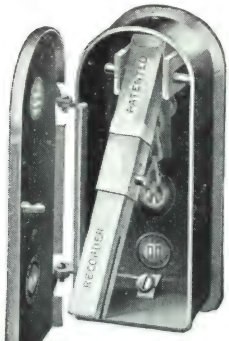
Detex Patrol Watchman's Clock System

Consists of a portable clock and any number of recording stations. A system that is unique in its flexibility and adaptability.

Clock — Full eleven-jewel movement. Enclosed in leather pouch. Patented lock.

Recording Stations— flush surface or stormproof type. Lock or non-lock. No wiring required.

Equipment Furnished — Watchman's clock, leather carrying pouch, one year's supply of dials, required stations with keys (or recorders), chains, metallic seals and screws, and complete instructions for installation and operation.



Surface Type Key Station

DIMENSIONS, INCHES

Surface station, non-lock	1¾ x 4 x 2½
Surface station, lock	2¼ x 4 x 2⅝
Flush station plate	4½ x 4⅞
Key box	3 x 2 x 3½
Stormproof station box	8⅜ x 6⅛ x 2⅝

Stormproof Station Box

Detex Newman Watchman's Clock System

Consists of a portable clock and from one to thirty stations of the key type.

This is the first type of watchman's clock ever made in the United States.

Clock—Strongly made. Jeweled movement. Enclosed in leather case.

Key Boxes — Surface, flush or stormproof type non-lock. No wiring required.

DIMENSIONS, INCHES

Surface station	5¾ x 2⅝ x 1⅝
Flush station plate	6 x 3
Key box	5½ x 2½ x 2
Stormproof station box	8⅜ x 6⅛ x 2⅝

Detex Newman Watchman's Clock

Flush Type Station

Detex Eco Magneto Watchclock System

Consists of a centrally located recorder and from 1 magneto patrol station to the limit of requirements.

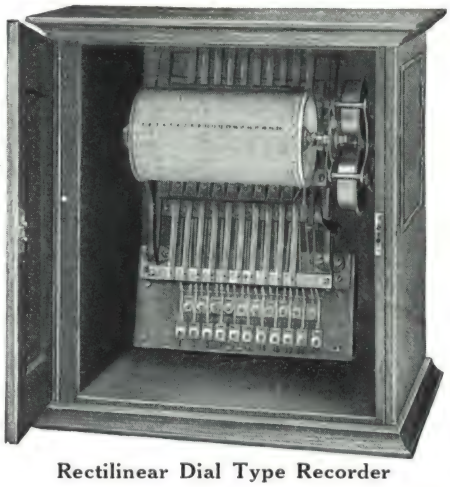
This system can be used as a simple recording system, or can be combined with the supervisory annunciator system, or the supervisory annunciator and telephone system.

Recorder—Seth Thomas eight-day movement. *Record:* either 12, 24, 48, or 72-hour record dials. *Recorder case:* wood in any specified finish.

Annunciator—The annunciator enables the supervisor to tell at a glance the exact location of all watchmen. A turn of the crank at a station not only registers in the recorder but also drops a corresponding target on the annunciator. No additional wiring is required.

Telephone System—Enables the supervisor to communicate instantly with all watchmen. Central telephone located at supervisor's desk. Each watchman carries a small hand set telephone which can be plugged in at stations.

Generator Stations—Of the 3-bar type. Surface, flush or weatherproof design.



Rectilinear Dial Type Recorder

RECORDER DIMENSIONS, INCHES

Type	Maximum capacity, station	Height	Width	Depth
48-hour rect. dial type	20	17¾	17¼	12½
	40	17¾	23¼	12½
	60	17¾	29¼	12½
72-hour rect. dial type	25	22⅛	23	12
	40	22⅛	29	12
Circular dial type	20	17¾	16	9 1/16
	30	21¾	18⅜	9 1/16

GENERATOR DIMENSIONS, INCHES

Surface generator	6 x 5 x 4 1/2
Flush generator plate	8⅞ x 5 5/8
Flush generator insert	8 x 4¾ x 4¾

TELEPHONE SYSTEM DIMENSIONS, INCHES

Master telephone	10 x 6½ x 3
Standard generator	8½ x 5 x 4
Flush generator plate	8¾ x 5½
Flush generator insert	8 x 4¾ x 4¾

Surface Type Generator

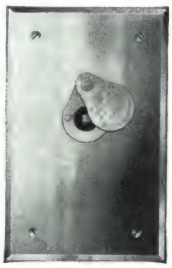
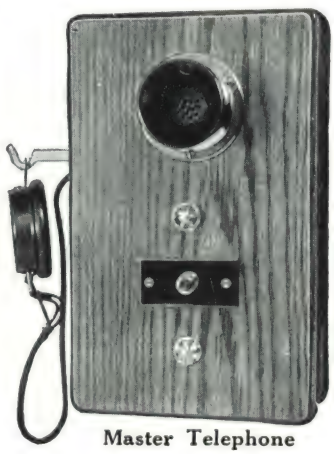


Plate for Flush Station

Annunciator



Master Telephone

Standard Generator

ORTHO-TONE HOTEL RADIO EQUIPMENT

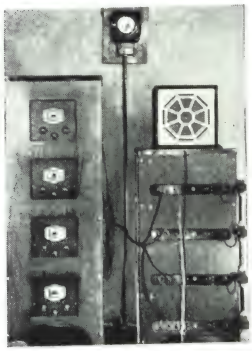
MANUFACTURED BY
ORTHO-TONE COMPANY

Originators of Multi-Speaker Installations, Non-Radiating Chandelier Speakers with Four or More Program Channels, Minimum Servicing

4002 Woodland Avenue, KANSAS CITY, MO.

In General

A full house is a profitable one. The huge expenditures in modern hotel construction make it necessary that every guest-bringing convenience be employed. Radio in *every room*, originated by Ortho-Tone, solves the vacancy problem by giving the hotel operator a new and dynamic attraction to be talked about and advertised.

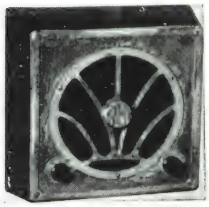


Ortho-Tone Receiver and Amplifier

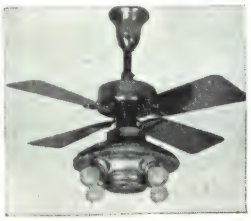
At the right is pictured the Combination Multi-Receiver and Amplifier, the size shown being designed for 160-room hotel or smaller. This equipment is manufactured in sizes ranging from 160 to 5000 rooms. The receiver and amplifier are installed in the penthouse, or near the roof, being away from street noises and, therefore, quiet in operation. The receiver and amplifier are completely automatic in operation, installed and adjusted to the desired wave length. They are turned on and off at desired hours by a time-switch device. This equipment is the key to Ortho-Tone's splendid performance and is the exclusive design of the Ortho-Tone Company. It is built solely for hotel use and is the product of years of experience and practical application.

Ortho-Tone Speaker Units

The non-radiating chandelier speaker, upon which Ortho-Tone holds patents, eliminated room-to-room interference, gives a beautiful tone and is finished in any desired color combination with Dupont duco. It is far more attractive than the ordinary hotel light fixture, and requires no wall space, which is at a premium in all hotel construction problems. This fixture, with the speaker built in, forces the entertainment to radiate spherically. The sound does not strike the walls or ceiling directly, but travels along them in the same plane, eliminating all room-to-room noise, and permitting greater volume without annoyance to other guests. It is used extensively in new construction.

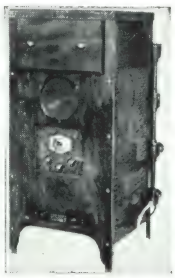


The wall-type speaker is used chiefly in public rooms, lobbies, coffee shops, dining rooms, etc. It is the same as our chandelier speaker in tone quality. It is the type we recommend for connection with a microphone at the telephone switchboard which can be used as a call system. Also, it is used for installations in buildings already constructed where it is impossible to wire for the chandelier type speaker.



The chandelier speaker can also be supplied with ceiling fan, as shown in the accompanying illustration. The room control switch makes it possible to turn on either the lights, the fan, or the radio, or all three of them.

Radio Phonograph Combination and Amplifier



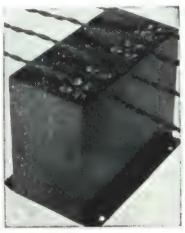
This equipment is ideal for the smaller hotel, tourist cabin camp, school, public room entertainment, or in any sized hotel where entertainment is desired at low cost. The equipment brings in a single program and can be used successfully for any number of speakers from 40 to 5000. It also can be used in connection with the paging system described below. At any future time, the units contained therein can be converted into a multi-program system.

Paging System

The call board and paging system (at left) combines the highest grade microphone, amplifier and furniture. It is truly a masterpiece for tone. The plugging and switching arrangement is made for the utmost ease and flexibility in operation. This system is ideal for either the multi-program or single channel radio phonograph combination installations. It is a simple matter to plug in on any public room speaker, saving time of page boys and the time of the guest whose presence at the desk is desired.

Control Station

Each room is provided with a room control switch as shown. It permits the room occupant to select his own station and to control the volume. It fits a standard two-gang switch box, to be mounted in the wall. The switch box is not furnished with control.



Distribution Assembly

This Distribution Assembly is used to head each riser and selects just the proper amount of wattage required for that particular riser, thereby protecting control panels and speakers from undue loads and burnouts.

It is just one of the many units in the Ortho-Tone installation which assures the minimum in service requirements.

Service to Architects

We urge architects everywhere to send for our catalogue which gives complete installation details and complete description of equipment.

Ortho-Tone Radio in Every Room is easily installed by electricians who can follow simple blue prints and match colored wiring.

We feel it our duty to offer to architects our advice and the benefit of our experience in equipping nearly 100 hotels with this house-filling, good-will building equipment.

Feel free to call upon us for our services at any time by letter, telephone or telegraph.

RCA VICTOR COMPANY, INC.

ENGINEERING PRODUCTS DIVISION

Radio Equipment and Parts

233 Broadway, NEW YORK, N. Y.

REPRESENTATIVES IN PRINCIPAL CITIES

RCA CENTRALIZED RADIO EQUIPMENT FOR MODERN BUILDINGS

In planning new apartment, hotel and other multiple residence buildings, provision for proper radio reception is becoming a necessity. New buildings not equipped in the beginning with adequate radio facilities may soon have to be so equipped at a greater expense.

To meet the rapidly growing demand for high quality radio distributing systems, the RCA VICTOR COMPANY, INC. has designed special apparatus for apartment houses, hotels, hospitals, sanitariums, schools, and even residences.

The RCA VICTOR COMPANY, INC. has perfected two principal methods of wiring buildings for multiple radio reception.

(1) A single antenna connected with a distribution system to radio receivers in rooms throughout the building. As many as 80 radio sets of different makes can be independently operated from this common antenna. Additional antennae may be installed for additional groups of 80 receivers.

(2) A centralized radio receiving equipment with a distribution system to transmit broadcast programs to as many as 5000 or more rooms throughout a building. Equipment may be installed to transmit a single radio or phonograph program, or to make available the choice of programs from two, three or four broadcasting stations.

Descriptive bulletins covering both systems will be mailed on request.

The RCA VICTOR COMPANY, INC. will lay out complete wiring and apparatus specifications for either system from the building plans, and architects or engineers should communicate with the nearest RCA office for this service.

RCA ANTENNA DISTRIBUTION SYSTEM—FOR MULTIPLE RECEIVERS

The RCA Antenna System for Multiple Receivers has been developed to meet the condition which is becoming more and more serious, of providing antenna facilities for satisfactory broadcast reception in apartment buildings. While its development was primarily for the purpose of meeting this demand, it can be applied to other types of buildings when similar requirements must be met.

In this system, but one ordinary receiving antenna is used, and the radio frequency energy so received is distributed throughout the building to wall outlets in the individual rooms or apartments. From these outlets, the usual antenna, ground and line power connections are made to the tenant's radio receiver.

A maximum of 80 radio receivers of any type or manufacture can be operated simultaneously from one roof antenna for the reception of programs selected at will, and without interaction or mutual interference—one with the other.

As many more extensions can be accommodated by the use of a second antenna.

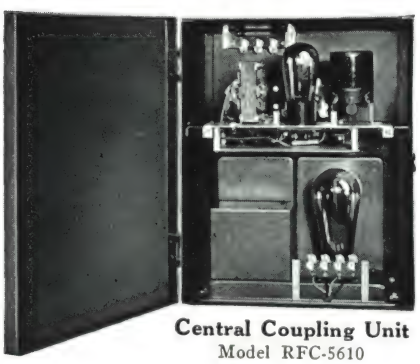
The undesirable effects of a long or crooked lead-in, such as is necessary to reach the ground floor of a tall building, are eliminated, and tests have shown that in some cases, stations can be received by means of this system which otherwise could not be heard at all.

Some of the unique features of this system are:

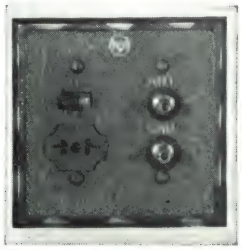
(1) The high signal intensity obtained.

(2) The total absence of interaction between receivers.

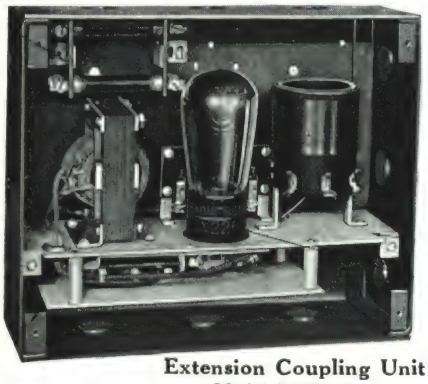
Apartment Installation Showing Radio Outlet and Power Supply to Receiver



Central Coupling Unit
Model RFC-5610



Radio Outlet Unit
Model RFO-5632



Extension Coupling Unit
Model RFX-5620

Continued on next page

(3) The practical elimination of the pickup of interfering noises from electrical equipment.

(4) The efficient reception of signals, simultaneously, at all frequencies of the broadcast range, by the individual receivers.

(5) Low initial cost and negligible maintenance.

(6) Ease of installation, and as foolproof as the wiring for the electric lighting circuits.

(7) No moving parts.

(8) Compact arrangement, attractive appearance.

(9) Elimination of the shielding effect of steel frame buildings on a long lead-in.

(10) Vastly improved appearance of the building.

This equipment is designed for alternating or direct-current line power operation.

A general description of the apparatus involved, together with a schematic sketch of the wiring layout, is incorporated in bulletins, sent on request.

RCA CENTRALIZED RADIO—FOR MULTIPLE LOUDSPEAKERS

This centralized radio receiving system was designed for the purpose of furnishing radio programs throughout large buildings, such as hotels, schools, apartment houses, hospitals and in any other place where it is desired to operate and control a multiplicity of loudspeakers, head telephones—or both—from a central location.

Special Design—This apparatus should not be compared with the ordinary radio receivers which are designed for home use. Highly specialized equipment is necessary to meet the demands of a true centralized radio system, and extensive research, development and design have combined to make it available. It is built in true central station switchboard form; rugged, reliable and easily installed and operated. Constant attention is not necessarily required, provision having been made for automatic operation when desired.

Flexibility—The apparatus is so designed that the installation can be conveniently extended as requirements increase. Additional loudspeakers or head telephones may be connected to the original load at any time, and when the full capacity of the amplifiers has been reached, additional amplifiers may be installed in a uniform manner for which provision is made on the receiving racks. As many as 3000 pairs of head telephones or 200 loudspeakers may be operated from one amplifier unit, depending on the volume level desired.

Safety and Convenience—The distribution system is so arranged that it will render the most reliable service with a minimum of attention. Protective devices are incorporated to eliminate willful tampering or accidental damage to the single extension where it is apt to occur.

Extension Fittings—A complete line of extension equipment is available for this system. Outlet devices are provided for loudspeaker or headphone extensions. A variety of types has been designed to meet the requirements of one, two, three and four channel installations and loudspeakers can be supplied with or without individual volume controls. The selection of programs or the transfer from one channel to another is accomplished by means of special jacks for plugging in the loudspeaker or headset. Channel selector switches may be supplied for this purpose if desired. The cover plates are secured in such a manner that a layman cannot remove them with ordinary tools.

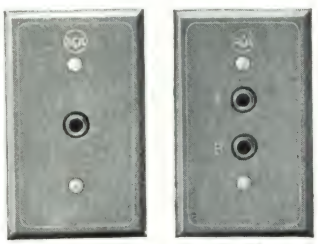
Centralized Radio Panel

Headphones and loudspeakers with extension cords and plugs are available in forms particularly adapted to centralized radio service. A special wall type loudspeaker has been developed, for mounting flush in the wall. This is enclosed in a metal box, faced with a neatly decorative grille, which may be concealed by a suitable drape, if desired. This type of loudspeaker is thus protected from deliberate tampering or accidental damage.

Particularly in a new building, it is advisable to consider the economy in the installation of wiring and outlets for two or more channels even though but one channel is required for the initial installation.

Power Supply—The equipment is supplied for alternating or direct-current line power operation; no batteries or charging devices are necessary.

Electric Phonograph—A special electric phonograph unit may be included in the installation if desired. The control panel is so arranged that it is only necessary to turn a small switch for transfer from radio to the electric phonograph.



Single Double

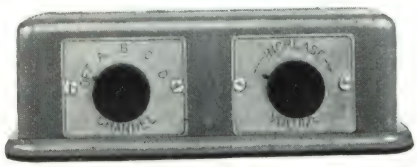
Jack Outlets, Wall Type

Volume Control, Wall Type

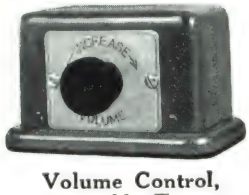
Channel Selector Switch, Wall Type

Loudspeaker, Wall Type

Channel Selector Switch, Portable Type



Combined Channel Selector and Volume Control, Portable Type



Volume Control, Portable Type

R. W. COTTON, Sales Manager

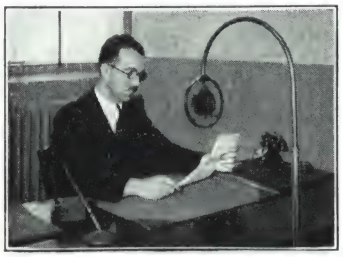
SAMSON ELECTRIC COMPANY

AMPLIFIER DIVISION

CANTON, MASS.

BRANCH OFFICES

BOSTON, MASS., 146 Summer Street
BUFFALO, N. Y., 942 Elmwood Avenue
CHICAGO, ILL., Room 1108, 139 North Clark Street
DETROIT, MICH., 159 East Elizabeth Street
KANSAS CITY, MO., 326 Railway Exchange Building
LAKEWOOD, OHIO, 1254 Hall Avenue
LOS ANGELES, CAL., 324 North San Pedro Street
MIAMI, FLA., 15 N. W. 12th Avenue
MINNEAPOLIS, MINN., 301 Warner Building
NEW ORLEANS, LA., 1812 Masonic Temple
NEW YORK, N. Y., 369 Lexington Avenue
PHILADELPHIA, PA., 1207 Race Street
PITTSBURGH, PA., 629 Fulton Building
ST. LOUIS, MO., 2110 Pine Street
SALT LAKE CITY, UTAH, 221 S. W. Temple Street
SAN FRANCISCO, CAL., 90 Ninth Street
SEATTLE, WASH., 106 Denny Way



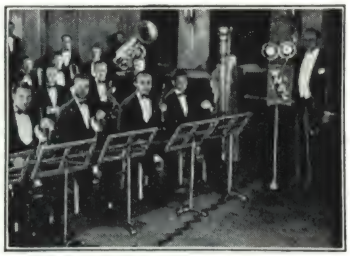
Speaker at Microphone

Centralized Amplifying Equipment for All Buildings

Samson Amplifying Equipment receives programs (from radio broadcasts through its receiving set, addresses through its microphone, and records through its motor-driven phonograph) which are amplified, distributed to any or all rooms in the building or to other buildings, and there faithfully reproduced by its loud speakers for an audience of any size.

Reproducer in Hotel Room

Phonograph Pick-up



Broadcasting Studio

Types of Buildings in Which Used

Hundreds of Samson Amplifier Systems in this and many other countries can be seen in schools, hotels, apartment houses, skating rinks, swimming pools, churches, ballrooms, public buildings, hospitals, theatres, memorial chapels, race tracks, clubs, laboratories, and outdoor services, etc.

Estimates and Layouts Furnished

Upon application estimates of cost and layout will be given by our main office or any of our branch offices located in all principal centers.

Guarantee

The Samson Electric Company, which has held a leading position in communication engineering for nearly half a century and accumulated valuable information from its many installations in nearly every possible field of application, guarantees that Samson Amplifying Equipment is right and that its excellent service will be rendered for years to come.

PMR 40 PAM Centralized Amplifying Equipment

Example of Care Used in Design

A nation-wide survey among school boards, superintendents, principals and teachers, supplied a composite picture of their needs. Then the Samson Amplifier Systems were designed to meet these needs.

Many Architects Now Suggest Installations

Recognizing the advantages of Samson Amplifier Systems, architects today are suggesting installations to their clients. Just one of these advantages is indicated by the experience of an apartment hotel in Chicago where its Samson equipment is credited with breaking all records of time required for 100% leasing.

Literature

Complete information on many types of installations are available and will be supplied on request.

BEST MANUFACTURING COMPANY

Manufacturers of Wall Type Speakers on Central Radio Systems

1200 Grove Street
IRVINGTON, N. J.

Best Wall Type Speaker

Especially designed for installation in hotels, hospitals, schools, and wherever reception is distributed from a centralized amplifier.

Best Wall Type Speaker

Side View of Panel and Wall Box

Best Wall Type Speaker is furnished complete ready for installation in the wall; equipped with an efficient magnetic type speaker contained in a metal wall box. The front panel and grille are regularly supplied in walnut finish but may be finished to harmonize with any interior. Special key screws secure the front panel and grille and prevent tampering with speaker.

Models

Model W-1—Standard equipment consists of magnetic type speaker; volume control and station selector mounted on front panel; station selector is for use on 3-channel system, but can be furnished for 4 or more channel system if required.

DIMENSIONS

Wall Box		Wall Panel	
Width	10 1/16 in.	Width	11 7/8 in.
Length	12 1/16 in.	Length	13 1/4 in.
Depth	3 3/16 in.	Depth	3/8 in.

Model W-1A—This is essentially the same as Model W-1 in appearance and performance, except that the station selector switch is equipped with line loading coils which are switched across each channel when the speaker is not connected to the channel. These have practically the same impedance characteristics as the speaker and serve to maintain the line impedance at the same value whether speaker is connected or not. Dimensions same as for Model W-1.

Model W-2—Essentially the same as Model W-1 but not equipped with volume control and station selector.

DIMENSIONS

Wall Box		Wall Panel	
Width	10 1/16 in.	Width	11 7/8 in.
Length	10 1/16 in.	Length	11 7/8 in.
Depth	3 3/16 in.	Depth	3/8 in.

Model W-3—A smaller wall type than Models W-1 and W-2 but not equipped with volume control and station selector.

DIMENSIONS

Wall Box		Wall Panel	
Width	9 3/16 in.	Width	10 3/4 in.
Length	9 3/16 in.	Length	10 3/4 in.
Depth	3 3/16 in.	Depth	3/8 in.

Note: All speakers may be wound to any specified impedance.

Control Boxes

For installations in which volume control and station selector are not included in speaker cabinet—single, double, or triple gang boxes with moulded bakelite switch plates.

W-10—Station selector only—switch for 3 or 4 channels and for "off" position mounted in single gang box.

W-11—Same as W-10, except mounted in single 2-gang box.

W-12—Same as W-11, except additionally equipped with line load coils.

W-13—Volume control only—constant impedance "L" type mounted in single gang box and plate.

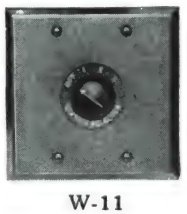
W-14—Dual control (station selector and volume control) mounted in 3-gang box and plate.

W-10

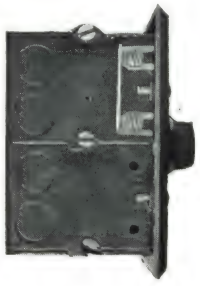
W-14A—Same as W-14, except equipped with 2-conductor jack.

W-15—Same as W-14, except additionally equipped with line load coils.

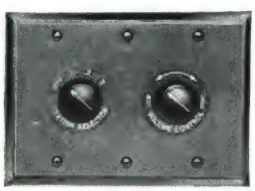
W-15A—Same as W-15, except equipped with 2-conductor jack.



W-11



Side View of Control Box



W-14

RACON ELECTRIC CO., INC.

Manufacturers of Horns and Sound Reproducing Units

TELEPHONE
SPRING 1120

18 Washington Place
NEW YORK, N. Y.

SOLE METROPOLITAN DISTRIBUTORS: TIMES APPLIANCE CO., 333 West 52nd Street, NEW YORK, N. Y.

Racon Public Address Equipment

Striding along with radio's amazing march of progress, Racon has provided the industry with one of its most important accessories, the air column type horn.

Where other concerns have concentrated their efforts on instruments for transmitting, receiving and recording, Racon has specialized on instruments for projecting sound, and for many years their equipment has been recognized as being about as perfect as it is possible to make it.

Sound projection today employs the highest type of engineering knowledge, and in no small degree is the horn or projecting device responsible for the purity of tone and the distance over which the sound travels.

Employing the exponential principle of horn construction, Racon has been recognized as a leader in this line and here are shown a few of the devices that are applicable to systems for the distribution of sound in theatres, hotels, institutions and outdoor gatherings.

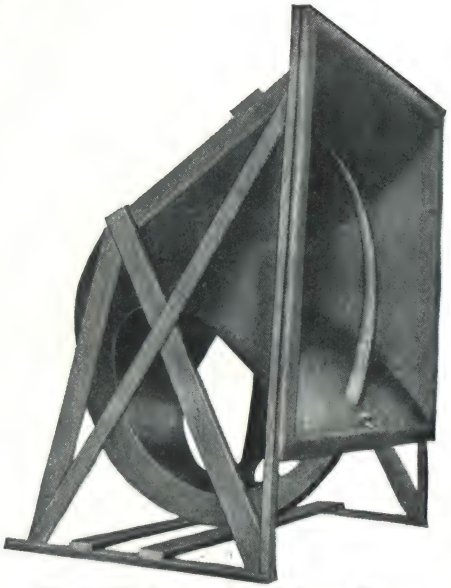
Racon makes a horn for every sound reproducing purpose, the home or the largest stadium, and provides a complete line of electro-dynamic units for use in connection with their horns.

Racon Engineering Service

Architects, engineers and others contemplating the installation of sound projecting and centralized radio installations are invited to consult Racon or their distributors regarding the proper type of equipment, for success in sound projection is assured only by co-operation between the electrical acoustical and structural agencies.

Six Foot Trumpet
Bell, 30 in. round. Length, 6 ft. Weight, 15 lb.

Electro-Dynamic Unit with Three Horns



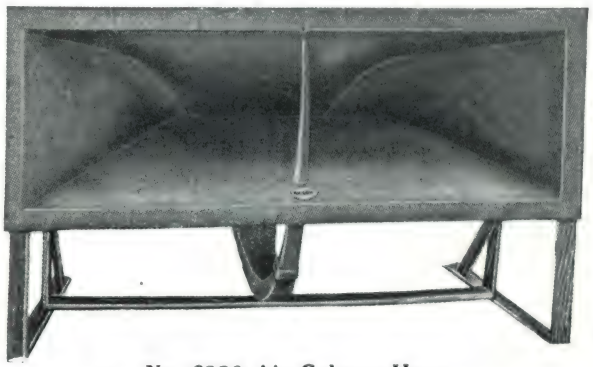
No. 4320 Racon Air Column Horn
Air column, 10 ft. Bell, 40x40 in. Depth, 34 in. Weight, 45 lb.

Giant Electro-Dynamic Type Horn Unit
Capable of handling 30 watts undistorted output. Field consumption is approximately 1 amp. at 6 volts

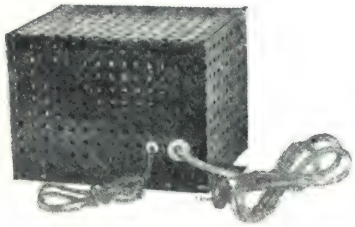
Junior Electro-Dynamic Type Horn Unit
Capable of handling an undistorted output of 25 watts

Baby Electro-Dynamic Type Horn Unit
Height, 3 in. Diameter, 4¾ in. Weight, 6¼ lb. Capable of handling an undistorted output of 15 watts

High Powered Magnetic Unit
Capable of handling 3 watts output without blasting. Used for great volume and projection



No. 6320 Air Column Horn
Length of air column, 10 ft. Bell, 76x28 in. Height, 57 in. Depth, 37 in. Weight, 60 lb.



Exciter
A 6-volt exciter for all electro-dynamic type horn units. Guaranteed harmless and will not overheat

RADIO RECEPTOR CO., INC.

Centralized Radio Public Address Systems

106 Seventh Avenue
NEW YORK, N. Y.

DISTRIBUTORS

METROPOLITAN DISTRIBUTORS: Times Appliance Co., 333 West 52nd Street, NEW YORK, N. Y.

NEW YORK, N. Y., Westinghouse Electric Supply Co., 45 West 25th Street
CHICAGO, ILL., General Electric Supply Co.
CLEVELAND, OHIO, General Electric Supply Co.
CINCINNATI, OHIO, General Electric Supply Co.
COLUMBUS, OHIO, General Electric Supply Co.

Licensed in Canada by Canadian General Electric Co., Ltd

POWERIZER SOUND SYSTEMS

Powerizer Centralized Radio Public Address and Sound Systems

Radio Receptor Co., Inc., offers to architects, builders and engineers a complete "Powerizer" system for transmission of sound from radio, voice, disc or film records.

Powerizer Systems are installed throughout the country in hotels, theatres, apartment houses, hospitals, schools, community houses, studios, railway terminals, parks, banquet halls and other places where radio, voice and music must be transmitted or amplified to remote instruments or to throngs of listeners.

A Specially Designed System

The Powerizer Sound System is a practical adaptation of the electrical voice to particular requirements. It is a carefully engineered assembly, varying from installation to installation, of matched and carefully balanced units designed to pick up voice or music from the air, from records or from a microphone, to amplify it, to distribute it, and to reproduce it perfectly.

This company is a licensee of the Radio Corporation of America and its associated companies, so that in designing Powerizer Sound Systems it can take full advantage of the latest and best practices in the handling of sound and electricity without fear of litigation or suspension of service. Its physical units, such as radio microphones, pick-up amplifiers, control panels, switches, speakers, etc., are the least important part of the system. Its real strength is in the design, fitted with all the nicety of exact engineering knowledge to the job.

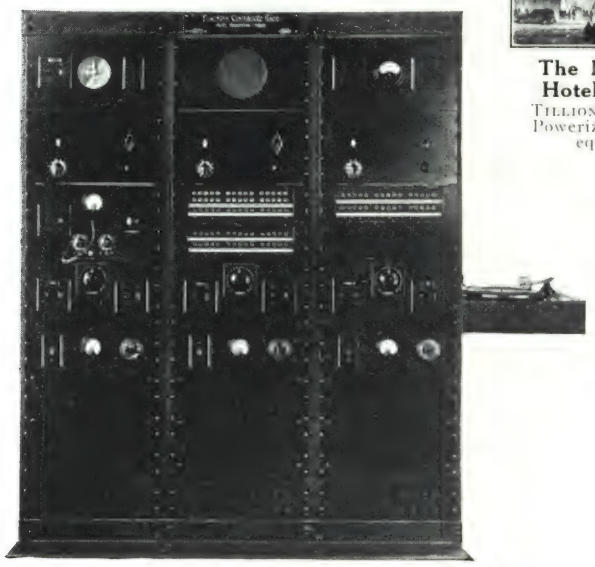
Powerized Service Is Nation-wide

Authorized electragists located at strategic points over the entire United States and Canada are its sole distributors. These men have been carefully selected because of their ability, integrity and financial standing. Whenever the requirements for a job differ in the slightest degree from the usual, complete data is sent to the home office and special drawings and instructions are forthcoming. A traveling superintendent is in charge of all work.

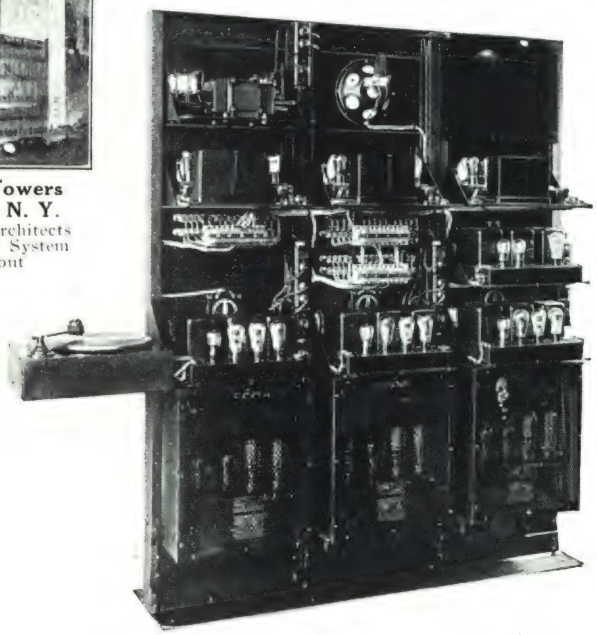
Co-operation with Architects and Engineers

We will be glad to send you details and specifications on any installation that you may have occasion to require, or we will design an installation to cover any requirement. Send for Form S 1030 which gives needed information on our systems.

The Manhattan Towers Hotel, New York, N. Y.
Tillion & Tillion, Architects
Powerizer Centralized System equipped throughout



Front View of Panel of Centralized Radio and Paging System in Manhattan Towers Hotel



Back View of Panel of Powerizer Three-channel System Supplying Reception to 600 Rooms in Manhattan Towers Hotel

TIMES APPLIANCE COMPANY, INC.

Centralized Radio and Public Address Systems

TELEPHONE
COLUMBUS 8300

333 West 52nd Street
NEW YORK, N. Y.

Exclusive Metropolitan Distributors for

BEST MANUFACTURING COMPANY
RACON ELECTRIC COMPANY
RADIO RECEPTOR COMPANY

Agent-Jobber for

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Products and Service

Complete CENTRALIZED RADIO and PUBLIC ADDRESS SYSTEMS planned, designed and installed.

We are the exclusive metropolitan distributors for

Best Manufacturing Company
Racon Electric Company
Radio Receptor Company

for whose representation in this catalogue, see Manufacturers' Index.

We are agent-jobber for Westinghouse Electric & Manufacturing Company.

Demonstration Rooms

Architects, builders, engineers and others interested are invited to visit our rooms and witness a full demonstration of Centralized Radio and Public Address Systems such as have been installed and successfully operated in hotels, institutions and public meeting places.

Qualified engineers will be in attendance to give full information and to demonstrate the apparatus.

Here you will see how our Centralized Radio and Public Address Systems are planned, designed and installed.

Fig. 1. Front View

List of Prominent "Powerizer" Installations

Manhattan Towers Hotel
New York, N. Y.

Montefiore Hospital, Bronx
New York, N. Y.

New York American (Prudence Penny)
Carnegie Hall, New York, N. Y.

Sound Beach Grammar School
Sound Beach, Conn.

Sea Breeze Rink Park
Rochester, N. Y.

Seneca Vocational School
Buffalo, N. Y.

Kentucky Derby
Louisville, Ky.

Scotts Roller Rink
Buffalo, N. Y.

Neptune Beach-River Road
Niagara Falls, N. Y.

U. S. Veterans' Hospital,
North Little Rock, Ark.

U. S. Veterans' Hospital
Tuskegee, Ala.

U. S. Veterans' Hospital
Alexandria, La.

Texas State Fair
Dallas, Tex.

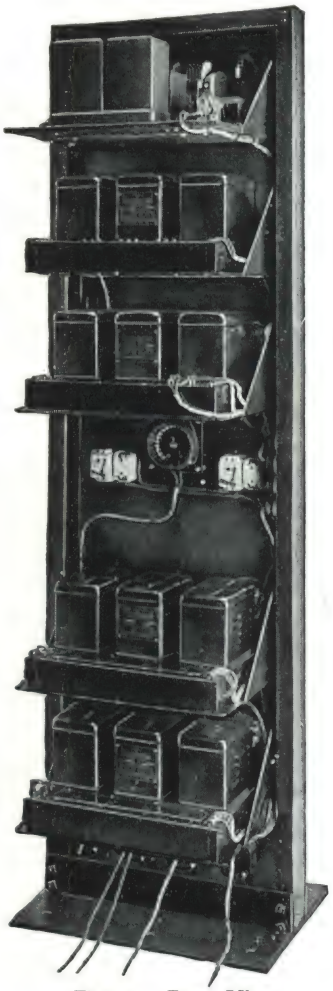


Fig. 2. Rear View

WESTERN ELECTRIC PUBLIC ADDRESS SYSTEMS

Distributor in the United States

GRAYBAR ELECTRIC COMPANY

Graybar Building, New York, N. Y.

Distributor for Canada and Newfoundland

NORTHERN ELECTRIC COMPANY, LIMITED

Plant and General Offices: 121 Shearer Street, Montreal, Que.

Foreign Distributors

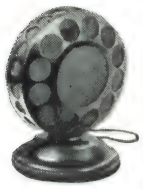
INTERNATIONAL STANDARD ELECTRIC CORPORATION

67 Broad Street, New York, N. Y.

General

Western Electric

The Western Electric Public Address System is a system for amplification, reproduction, and distribution of speech and music to an audience of from one to any size in a room or auditorium—or to the various parts of a building.



A Microphone Picks Up the Sound

Developed by Bell Telephone Laboratories for the WESTERN ELECTRIC COMPANY, the Public Address System has steadily increased its scope of commercial usefulness, until today its applications are practically endless.

Modern building enterprises of many kinds are including this equipment in their specifications.

Public Address Systems and Music Reproducer

Western Electric manufactures several types of Public Address Systems, applied according to requirement and area to be covered. The newest systems known as Nos. 5, 6, 7 and 8 represent all the latest developments in the art.

The essential parts of the Public Address System are:

(1) One or more microphones for "picking up" sound.

(2) "Mixing" and control panels.

(3) Amplifying apparatus.

(4) Observer's communicating system for theaters and similar auditoriums.

Modern School Systems Find the Equipment Invaluable

(5) Receivers and projectors, or loudspeakers. Either horn or cone type depending upon conditions of installation.

(6) Necessary wiring and circuits.

A receiving unit must be added if radio programs are to be reproduced.

In conjunction with the Western Electric Music Reproducer, the Public Address System can be operated at low cost from standard phonograph records—reproducing with fullness and richness, tone suggestive of a great orchestra. In conjunction with a receiving unit, radio programs may be reproduced with original effectiveness. And by using microphones and a selective system, house announcements and instructions may be simultaneously delivered in as many locations, and to as many people as desired.

The Western Electric Music Reproducer operates in exactly the same way as any phonograph but the difference is in the result.

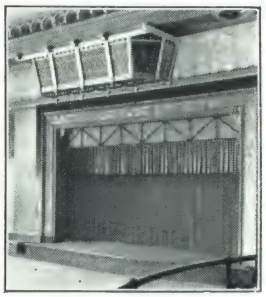
It consists of a motor-driven turntable, the pick-up or the electro-magnetic reproducer arm which carries the needle, a speed and volume control—all of which are mounted in a small cabinet. This cabinet may be kept out of sight in any convenient place, though always ready to operate by simply pressing a button and switching the pick-up to the amplifier of the Public Address System.

Hospitals Now Can Shorten the Convalescent Period

It should be pointed out that the Public Address System is especially planned for scientific distribution of sound—and for radio distribution it requires only the addition of loudspeakers and a standard radio receiving set to deliver the program to the locations and at the volume desired.

With a Public Address System, radio distribution is only one of the features by means of which entertainment may be supplied 24 hours a day—regardless of what may be on the air. With Public Address System and Music Reproducer there is music at any time for dancing, concert or accompaniment; with a microphone in circuit, management announcements, instructions or emergency directions are most quickly given in every part of the house at once; while with a receiving unit, radio programs are reproduced as desired.

Whether it is reproduction directly from the voices of speakers, singers or from instrumentalists, from records or the distribution of a radio program; voice and instrument, alone and together, in any desired volume are rendered in tone and clarity comparable to the original. Distortion, variation, and noise are pleasingly absent.

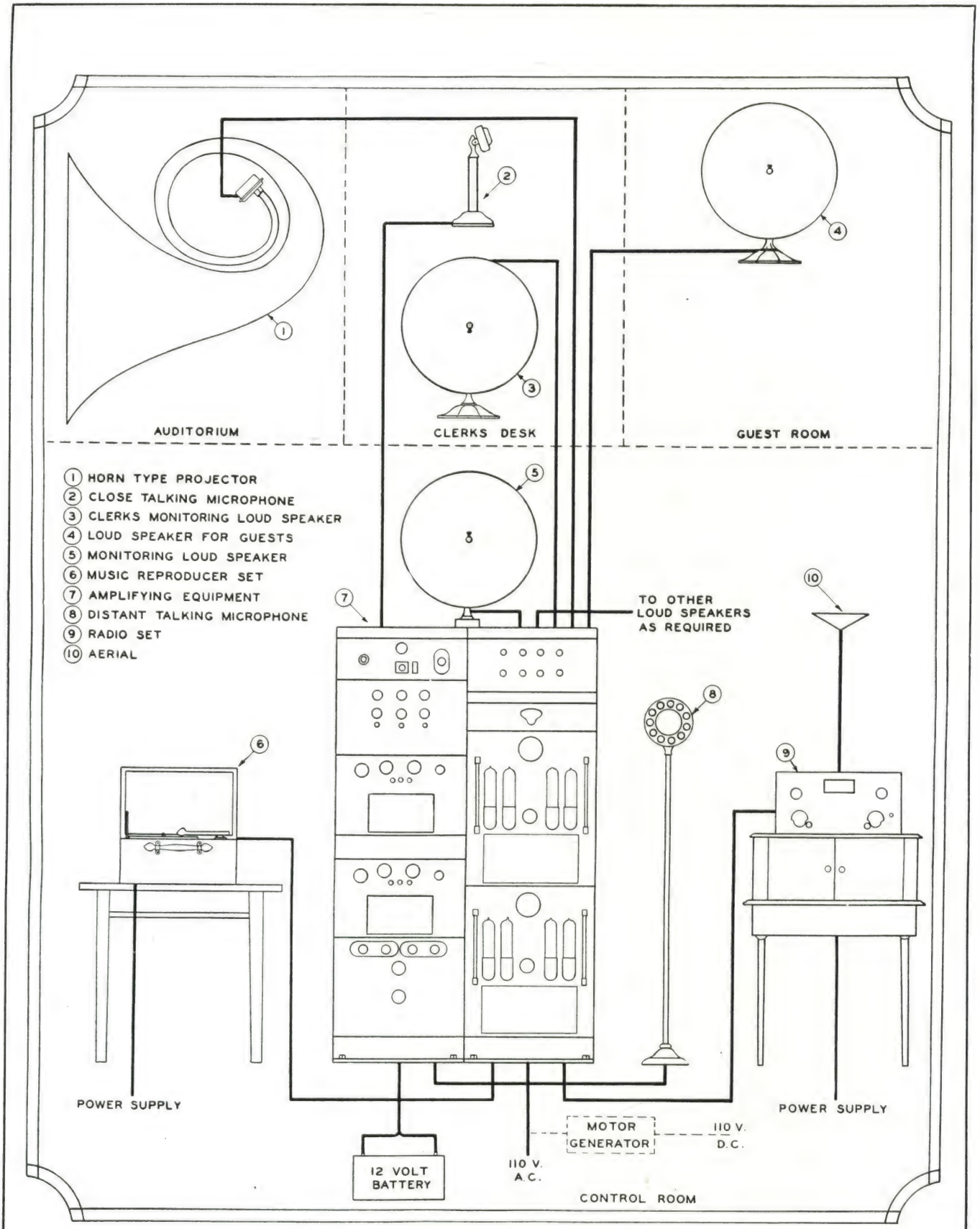


In the World's Largest Auditorium

Graphic Suggestions for Public Address System

The two following pages graphically suggest the multiplicity of uses for this system. On one page is shown an actual *picture* of a typical installation. The adjacent page shows an explanatory, schematic diagram of the same installation.

Continued on next page



SCHEMATIC DIAGRAM OF THE WESTERN ELECTRIC PUBLIC ADDRESS SYSTEM
With explanatory legend. This diagram indicates wiring and general layout of equipment

Continued on next page

PICTORIAL DIAGRAM OF THE WESTERN ELECTRIC PUBLIC ADDRESS SYSTEM

Showing the application of each piece of equipment. The numbers correspond to the numbers on the schematic diagram (preceding page)

Continued on next page

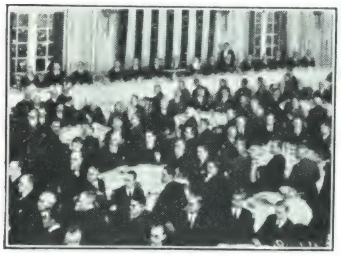
Cost

The cost of a Public Address installation is relatively small, considered in the light of its variety of uses—and of the profitable returns, direct and indirect, from those uses.

In estimating the cost of installation, individual requirements must be considered. Full information, including expert engineering advice, gladly given on application.

Guarantee

The Public Address System was developed and perfected by the Bell Telephone Laboratories which are the research laboratories of the American Telephone and Telegraph Company and the WESTERN ELECTRIC COMPANY. Thus the Public Address System represents the last word in electrical development as applied to sound transmission. The quality of workmanship of the Public Address System is guaranteed by WESTERN ELECTRIC COMPANY, manufacturers of equipment for the Bell System for nearly 50 years. Its reputation for painstaking methods and quality workmanship is scarcely equalled in any industry.



With a Public Address System, Weak Voices Are Heard to the Farthest Corners

Service

Western Electric maintains an emergency stock of Public Address repair parts at strategic locations throughout the country. In emergency, nearest Western Electric distributor should be consulted. Thereby expert knowledge is always readily available.

Radio Distributing Systems for Hospitals, Schools, Hotels, etc.

The radio distributing feature of the Public Address System has proved especially popular in large public buildings.

A single radio program may be heard via individual loudspeaker or earphones, in 500 or more rooms at once, if so desired.

In hospitals, the period of convalescence may be shortened by cheerful entertainment distributed (always under rigid control) by this system. The use of earphones prevents disturbance to patients who may require silence.

School children, in all parts of school buildings, may take advantage of educational radio programs. They may study "current events" by hearing the current events actually happen—whether it be a speech by the President of the United States, reports of an inspiring airplane flight, or news of distant explorations.

This Music Reproducer Set Is Always Ready and Out of the Way

Hotels, too, have found corresponding features of the Public Address System desirable and profitable. They may give to guests in their rooms symphony concerts, radio reports of the big fight and the big game, daily stock market quotations, Broadway jazz, setting up exercises—in fact, everything interesting that comes over the radio.

Clubhouses, ocean liners, and amusement parks also may apply this service.

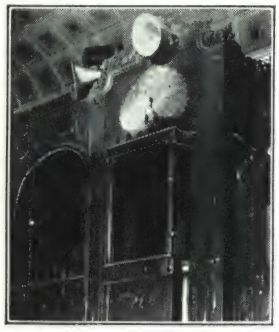
Many Possible Uses

There is no limit to the possible uses of the Public Address System—except the limits of human ingenuity. New applications are being discovered constantly.

Many uses, however, have been tried out in actual practice, and have proved extremely successful.

In Schools—The principal's announcements can be heard in all or whatever rooms he desires. Or, it may be, the voice of the music teacher, the gym teacher, school doctor, or a prominent visitor.

This system may supplement the auditorium—solving the "overflow" problem in overcrowded schools. Public Address makes the whole school an auditorium. Or it may be used *within* the auditorium, or to make it possible for small voices to be heard everywhere without voice-strain.



A Large Variety of Projectors Is Available for Use with the Different Systems

But perhaps the most valuable use of all for this system is that of auxiliary fire alarm or for other emergencies. Loudspeaker commands make possible an instant change in the line of march.

In Hospitals—In addition to picking up radio programs, the Public Address microphone can distribute the fun-making of professional entertainers who frequently visit hospitals. The Music Reproducer may also be used here to good advantage.

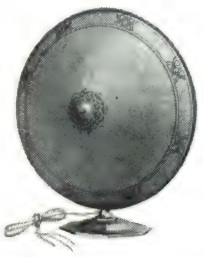
In Hotels—Music from the hotel orchestra may be carried to every part of the building. Guests may be paged quickly and unobtrusively. (Radio and Music Reproducer applications are also possible.)

In Churches—The voice of a speaker can be heard in all parts of the church, *clearly,* and without effort on the speaker's part.

Large Gatherings—The Public Address System becomes a necessity *indoors* in large auditoriums, convention halls, etc., and *outdoors* in the stadium, race track, or other sports center.

In the Theater—This system does wonders in the theater—especially in the very large motion picture houses of today. Supplementary stage entertainment need no longer work under severe difficulties.

Industrial Uses—The commercial service rendered by the Public Address System is not confined to entertainment alone. It has valuable industrial uses—in railroad switching, at airports, on movie sets; in industrial plants and railroad stations.



The Cone Type Loud Speaking Telephone Is Used for Small Indoor Areas

And a Myriad Other Uses—It may be used: in airplanes, courtrooms, department stores, vehicular tunnels, golf courses, parks, steamships, boats, prisons; at all outdoor functions; and by newspapers.

YAXLEY MANUFACTURING COMPANY

Approved Radio Products

1528 West Adams Street, CHICAGO, ILL.

Products

RADIO CONVENIENCE OUTLETS.
LOCAL and CENTRAL BURGLAR ALARM SYSTEMS.

Also Radio Products which include: Cable Connector Plugs, Automatic Power Control, Rheostats, Switching Rheostats, Potentiometers, Battery Switches, Inductance Switches, Jacks, Jack Switches, Phone Plugs, Panel Lights, Pilot Light Switches, Resistances.

YAXLEY
APPROVED RADIO PRODUCTS

Radio Convenience Outlets

General Installation Information—Yaxley Radio Convenience Outlets meet every radio requirement. They fit any standard switch box. For purposes of description, these outlets may be divided into two parts, namely: (1) the plate, and (2) the jack. The jack, which is thoroughly insulated from the plate, is permanently attached to a supporting strap, by means of which it may be mounted on the switch box. In the event that no switch box is used, the supporting strap may be fastened to the plaster lath or studding by means of wood screws. The wall plate fastens directly to the mounting strap by means of screws which are provided. The plate serves as a cover only and is not subject to any strain when plugs are inserted or removed from the jack.

Handsome Appearance—Finishes—Yaxley Radio Convenience Outlets are furnished regularly with either a rich, handsome bakelite plate, with satin brown finish, or metal plate in burnished brass, as desired. Special finishes in color or plating will be furnished on request.

Wiring Layouts—Distribution and Availability—Yaxley Radio Convenience Outlets may be installed by any electrical contractor. We will be glad to furnish complete technical information and wiring diagrams to meet any particular plan, without obligation. These outlets may be readily procured from jobbers and dealers in electrical and radio supplies.

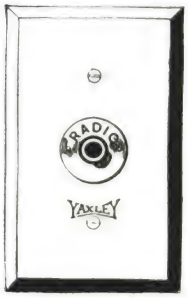
No. 135—For Loud Speaker Connections—Makes it practical to place radio receiving set in one room and enjoy reception in another part of the building. More than one No. 135 Radio Convenience Outlet may be used on the same circuit.

No. 134—For Several Loud Speaker Connections—Same as No. 135 but equipped with an impedance coil wound to 2200 ohms, which is equivalent to the resistance of the average loud speaker unit or head set. An equal volume is possible from one or several loud speaker units on the same circuit at the same time.

No. 136—For Aerial and Ground Connections—Aerial and ground wires are brought to the convenience outlet behind the sash and are then available for connection to the set by means of phone tip plugs furnished with each plate or No. 14 solid wire.

No. 137—7-Conductor, for Battery Connections—Make connections to the set through the outlet. Furnished complete with plate and plug.

No. 142—For Two Loud Speaker Connections—Same as No. 135 except that it has two speaker jacks on a single plate to be used on a two-channel system.

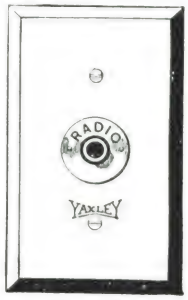


No. 135

No. 136

Special Plates for Any Individual Requirements

No. 142

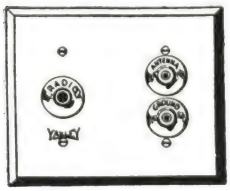


No. 134

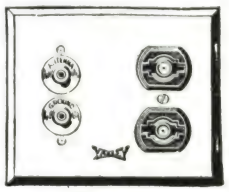
Gang Convenience Outlets

Yaxley Radio Convenience Outlets are also made up in gangs to form many effective combinations.

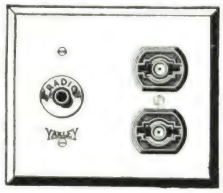
In addition to those illustrated below, special gang combinations will be figured on and made up on request.



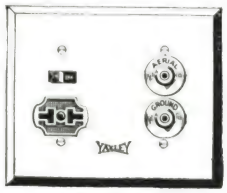
No. 238
For loud speaker and aerial and ground



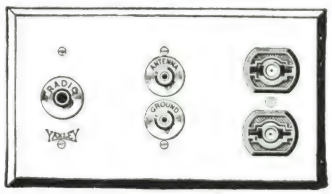
No. 241
For aerial and ground and A.C. connections



No. 242
For loud speaker and A.C. connections



No. 245
For electrical connections, with indicating "on" and "off" switch, and aerial and ground connections



No. 353
For loud speaker, aerial and ground and A.C. connections

Local and Central Burglar Alarm Systems

A considerable part of the engineering and manufacturing facilities of the YAXLEY MANUFACTURING COMPANY is devoted to the development of local and central station systems of protection against burglary, employing in this connection many items identical with or closely related to Yaxley Approved Radio Products. Full information will be furnished on request.

MATERIAL HANDLING

A. B. See Elevator Co., Inc. D6226
Active Elevator Co. D6268–6269
American Elevator & Machine Co. D6227
American Steel & Wire Co. D6246–6249
Beckwith Elevator Co., Inc.—
Ash Hoists and Sidewalk Elevators D6318–6319
Dumbwaiters and Elevators D6304–6305
Burwak Elevator Co. D6228
Capital Lift & Mfg. Co.—
Ash Hoists D6317
Freight and Passenger Elevators D6230–6231
Dumbwaiters and Hand Power Lifts D6267
Chelsea Elevator Co.—
Electric Dumbwaiters and Elevators D6306–6307
Hand Power Dumbwaiters and Elevators D6270–6272
Economy Engineering Co. D6364
Electric Dumbwaiters, Inc. D6308–6309
Elevator Supplies Co., Inc. D6264–6266
Elian, Frank, & Co. D6320–6321
Energy Elevator Co. D6273–6277
Ernst, Chas. K., Inc. D6322–6327
Evans Elevator Equalizer Co. D6250
G&G Atlas Systems D6350–6352
Gillespie, Robert, Co. D6328–6329
Gillis & Geoghegan D6342–6349
Grant Elevator Equipment Corp. D6253
Haslett Chute and Conveyor Co. D6353
Kiesling, John W., & Son, Inc. D6278–6287
Kimball Brothers Co. D6232–6233
Lagerquist, Gust., & Sons D6229
Lamson Co. D6354–6355
Logan Co. D6356
Marshall Brothers Co. D6234
Matot, D. A. D6288–6294
McLauthlin, Geo. T., Co. D6310-6311
Montgomery Elevator Co. D6235
Morris, Herbert, Inc. D6332–6337
Norton-Blair-Douglass, Inc. D6254
Oildraulic Lift Co. D6240
Olson, Samuel, & Co., Inc. D6357–6359
Otis Elevator Co. D6236–6239
Payne, F. S., Co.—
Dumbwaiters D6312–6313
Elevators D6242–6243
Randall Control & Hydrometric Corp. D6255
Richards-Wilcox Mfg. Co. D6256–6261
Security Fire Door Co. D6316
Sedgwick Machine Works D6296–6303
Shepard Elevator Co. D6241
Silent Hoist Winch & Crane Co. D6331
Standard Conveyor Co. D6360–6362
Standard Steel Specialty Co. D6251
Storm Mfg. Co. D6295
Televator Corp.—
Conveyors D6363
Dumbwaiters D6314–6315
Union Drawn Steel Co. D6252
Warner Elevator Mfg. Co. D6244
Wagner Mfg. Co. D6262–6263
Washburn & Granger, Inc. D6338–6341
Watson Elevator Co. D6245

A. B. SEE ELEVATOR COMPANY, INC.

52 Vesey Street
NEW YORK, N. Y.

CABLE ADDRESS
"A B See, New York"

OFFICES

NEW YORK, N. Y., 52 Vesey Street
BOSTON, MASS., 168 Stuart Street
HARTFORD, CONN., 410 Asylum Street
PHILADELPHIA, PA., 1420 Walnut Street
BALTIMORE, MD., 15 East Fayette Street
WASHINGTON, D. C., 14th and H Streets, N.W.
CLEVELAND, OHIO, 750 Prospect Avenue
DETROIT, MICH., 56 Henry Street
NEWARK, N. J., 29 Fulton Street

FACTORY: JERSEY CITY, N. J.

FOREIGN REPRESENTATIVES

TOKIO, JAPAN, Uchida Trading Company, Ltd.
SYDNEY, AUSTRALIA, Standard-Waygood, Ltd.
MONTREAL, QUE., Darling Brothers, Ltd.
HAVANA, CUBA., Daniel Inc.
RIO DE JANEIRO, BRAZIL, Middletown Car Co.

Products

Manufacturers of all types of Direct Connected Electric Passenger and Freight Elevators; Push Button Elevators; Sidewalk Type Elevators.

Design

The A. B. See electric elevators are designed and manufactured under the direction of the engineers of the A. B. See Elevator Company, Inc. and every part is designed for its specific work and is in no way an assembled product.

Gearless Traction Elevator

The gearless traction elevator was developed for high speed service where speeds of 450 to 700 f.p.m. are desirable.

The gearless traction machine consists of a large slow speed multipole shunt wound motor, having the armature, brake wheel and drive sheave mounted on one sleeve. This sleeve is mounted on two sets of roller bearings and rotates around a stationary shaft, which in turn is keyed to two cast iron hangers that bolt direct to a heavy ribbed cast iron base. This rigid patented self-aligning design used in connection with roller bearings is an exclusive feature of the A. B. See gearless traction machines.

Low operating cost and ease of control make this elevator desirable for high speed service.

Geared Traction Elevator

The geared traction elevator is the standard machine for buildings of moderate height requiring speeds of 150 to 450 f.p.m.

This machine has a high speed interpole motor of special design for elevator work, and a gear reduction to the drive sheave through steel worm and bronze gear which is directly connected to the drive sheave. The roping of this type machine is exactly the same as the gearless one-to-one machine. This type is made for both direct and alternating current and is suitable for one or two-speed motors.

Freight Elevator

A. B. See freight machines are roped two-to-one with sheave on car crosshead and counterweight, or have a gear reduction obtained by driving the drum or traction sheave through internal gears, accurately cut. For extra heavy duty up to 30,000 lb. a combination of the two drives is used.

75 Federal Street, Boston, Mass.
Thomas M. James Co., Architects
Thompson-Starrett Co., Builder
Cross & Cross, Agents
Equipped with eight A. B. See Auto-landing group control elevators

Push Button Elevator

The full-automatic push button control elevator has become very popular in the last few years, because this type eliminates the elevator operator. It is especially adapted for use in residences, hospitals and apartment houses.

This type of elevator can be operated on both direct and alternating current.

Sidewalk Machines

This company's sidewalk machines for both direct and alternating current are made in sizes 1000 to 6000 lb. and speeds 25 to 50 f.p.m.

Co-operation

Specifications, drawings and estimates for elevator installations will be furnished, without obligation, to those who will communicate with our nearest office.

INCORPORATED 1898

AMERICAN ELEVATOR & MACHINE COMPANY

INCORPORATED

500-522 East Main Street

LOUISVILLE, KY.

BRANCHES

DALLAS, TEX., 312 Construction Building
BIRMINGHAM, ALA., 308 Pioneer Building
SAN ANTONIO, TEX., 706 Gunter Building
HOUSTON, TEX., 911 Electric Building

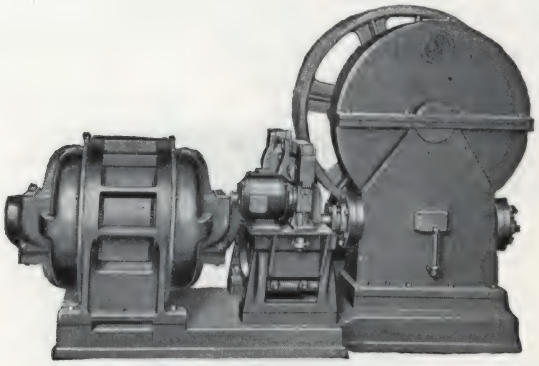
Products

A complete line of GEARLESS and GEARED ELECTRIC ELEVATORS for Direct and Alternating Current, including Variable Voltage Control, Automatic Self-leveling, and Automatic Pre-registering Signal Control.

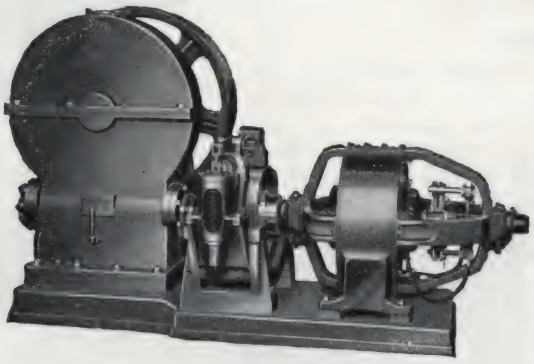
Also Automatic Push Button Passenger and Freight Elevators and Dumbwaiters; Automobile Elevators; Hand Elevators.

Facilities

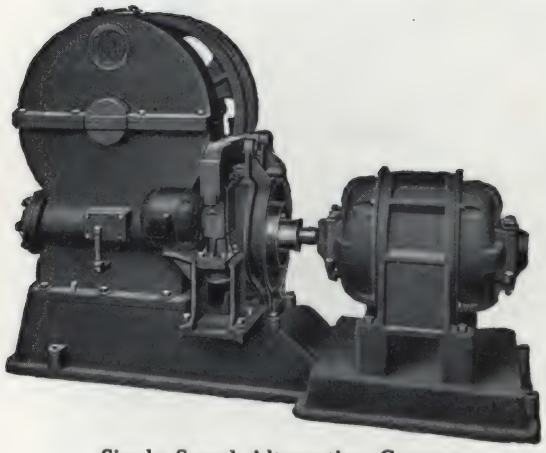
The company has one of the largest independent elevator plants in the United States, completely equipped for building elevators, elevator motors, controllers and other parts, thereby enabling it to execute orders promptly.



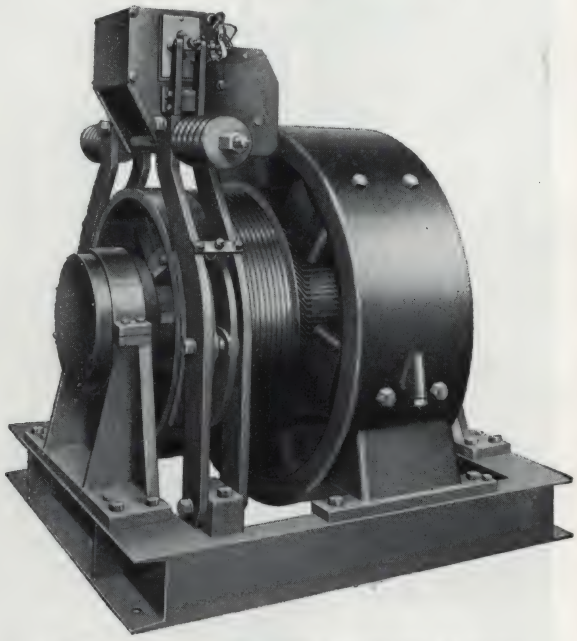
Two-speed Alternating Current



Variable Voltage Control



Single Speed Alternating Current



American-General Electric Gearless Variable Voltage Control

ESTABLISHED 1904

BURWAK ELEVATOR COMPANY

TELEPHONES
BARCLAY 9231-9232

227 Fulton Street
NEW YORK, N. Y.
FACTORY: WARSAW, N. Y.
Member of New York Building Congress

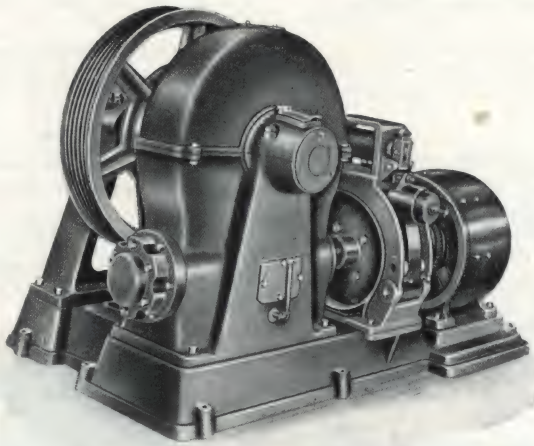
Products

ELEVATORS and LIFTING EQUIPMENT of all capacities and speeds, including:

Electric Passenger and Freight Elevators
Hydraulic Passenger and Freight Elevators
Automobile Elevators
Electric Sidewalk Elevators
Belted Elevators
Hand Power Elevators
Hand Power Sidewalk Elevators
Electric and Hand Power Dumbwaiters
Store Window Display Elevators
Organ Lifts
Sprocket Chain Driven Sidewalk Elevators

Service

We invite Architects and Engineers to consult with us on elevator projects of any kind of unusual field conditions or special equipment.



Burwak Electric Elevator Machine

Experience

We have had twenty-five years' experience in installing the above mentioned types of elevators, and we can furnish lists of installations made in many public and private buildings and institutions.

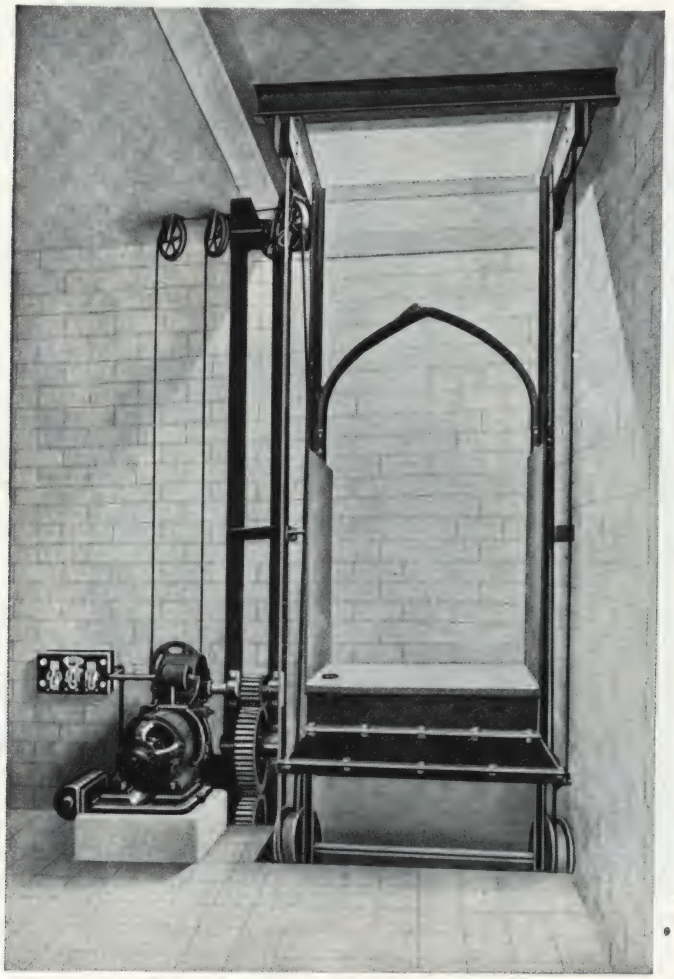
We specialize in full automatic push button elevators (eliminating the operator) and on which the gates are opened and closed automatically.

Control

Full automatic push button—selective control—constant-pressure—car switch and hand cable control.

Operation

Our machines are especially designed for quiet operation especially on alternating current. This is a necessary requirement in hospitals, schools, hotels, apartment houses and private dwellings.



Burwak Electric Sidewalk Elevator

Burwak Electric Dumbwaiter

ESTABLISHED 1882

GUST. LAGERQUIST & SONS

Manufacturers of Elevators

Seventh Street North and Bradford Avenue
MINNEAPOLIS, MINN.

REPRESENTATIVES

DULUTH, MINN., W. C. WRIGHT, Builders' Exchange

HELENA, MONT., RAYMOND C. GRANT

Products

ELECTRIC ELEVATORS for all kinds of passenger and freight service—all standard methods of control, including Variable Voltage and Automatic Leveling.

LAGERQUIST—GENERAL ELECTRIC GEARLESS ELEVATOR.

ELECTRIC, HYDRAULIC, and HAND POWER DUMBWAITERS.

HAND POWER ELEVATORS.

Also Electric and Hydraulic Sidewalk Lifts; Aluminum, Brass, and Gray Iron Castings; Incinerators.

Engineering Details

We maintain an Engineering Department for the purpose of not only design work but also for assisting our clientele in the proper analysis of particular elevator problems. This service, which is furnished gratis, deals with the preparation of drawings relative to hatchway details, specifications, and also with traffic data when desired. This work has as a foundation nearly fifty years of contact with the elevator industry.

Lagerquist Elevators

It is our ambition to keep abreast of the modern advance in elevator engineering. In order to do this properly all engineering is carried out in our own office, and we further maintain our own foundry in order that proper materials are incorporated with the manufacture of "Lagerquist Elevators."

Lagerquist Worm Geared Elevators are designed for duty speeds up to 400 ft. per minute. Control for geared machines ranges from the simple hand cable type to the more modern type of variable voltage with automatic leveling.

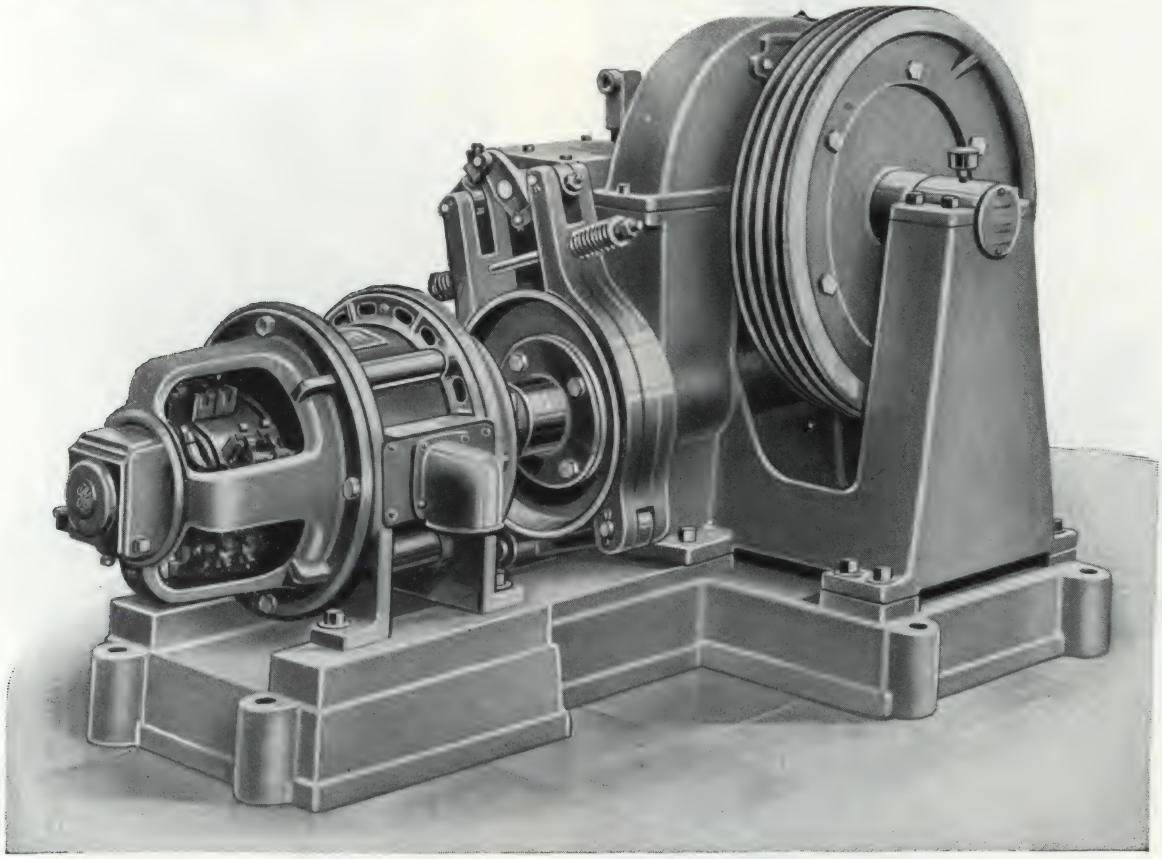
Lagerquist-General Electric Gearless equipment makes possible operating speeds up to 800 ft. per minute using pre-registering signal control.

Hand Power Elevators

There still are many towns in which electric or hydraulic power services are not available and, therefore, we continue to manufacture our well established line of hand power elevators. These equipments are assembled in our factory and carefully marked before knocking down for shipment which assures easy erection to the purchaser.

Dumbwaiters

Dumbwaiter equipment which we manufacture is also a product of many years experience. This equipment includes not only the simple hand power type but also hydraulic and electric designs.



Worm Geared Traction Elevator Engine, Model OT-3

THE CAPITAL LIFT & MANUFACTURING CO.

Manufacturers of Freight and Passenger Elevators

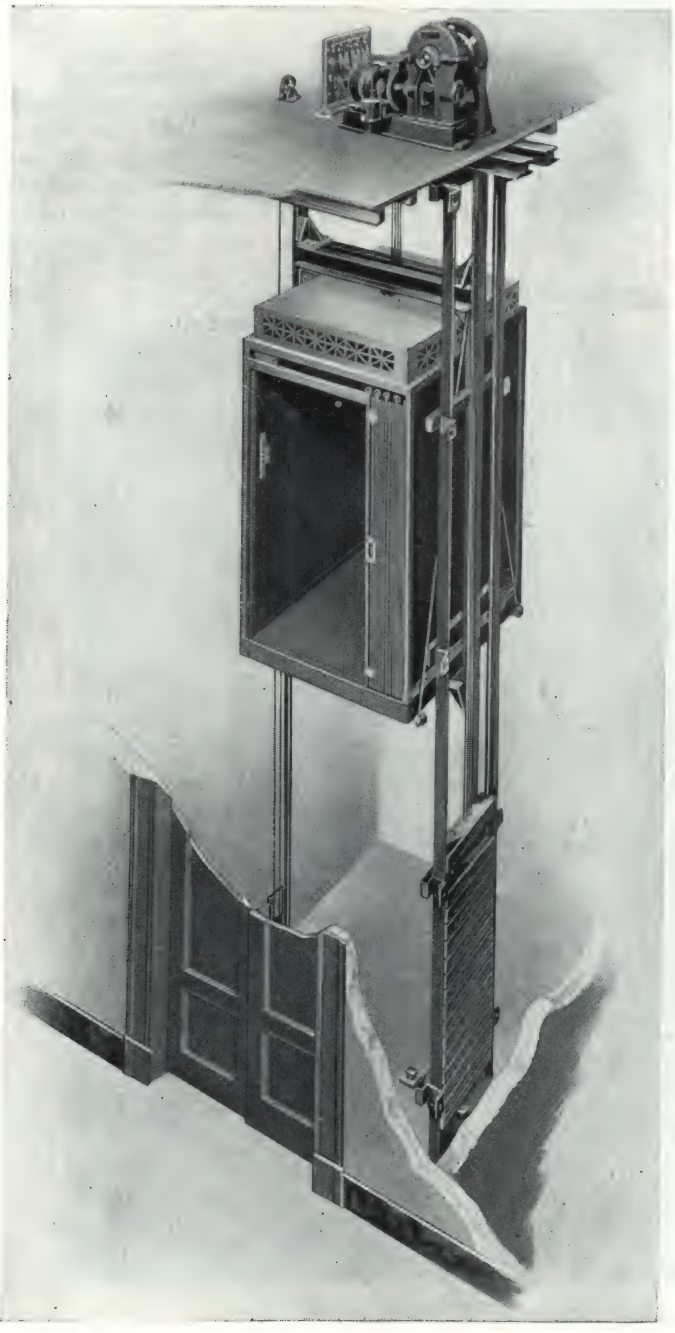
Town and Lucas Streets
COLUMBUS, OHIO

For our pages on Dumbwaiters and Ash Lifts, see Manufacturers' Index

Electric Passenger Elevators

They are modern in design, safe and reliable in operation, and are especially suitable to hotels, apartment houses, stores, hospitals, sanitariums, offices, schools and other public buildings.

Capacities—Range up to 4000 lb. The car speeds vary from 50 to 300 ft. per minute.



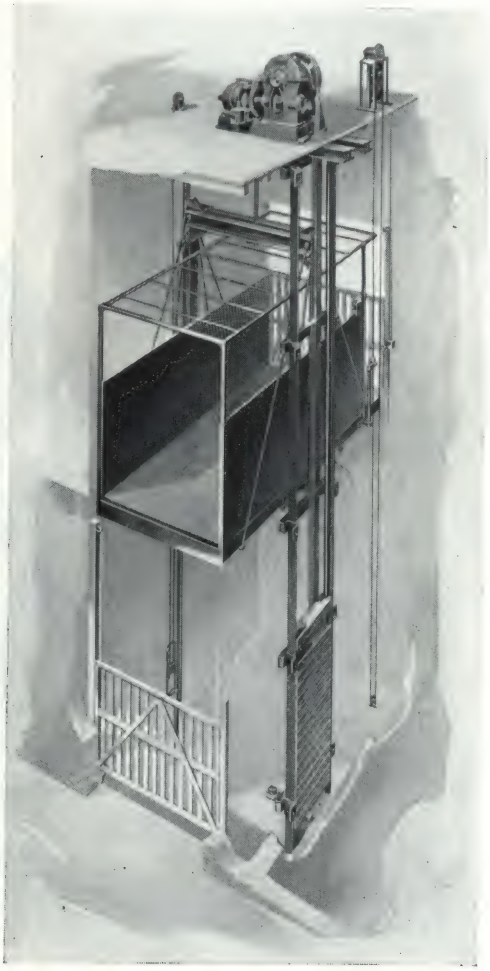
Control—Is by car switch, such as used in office, stores, hotel and similar buildings—or by automatic push button control, as used in hospitals, schools, apartments, etc.

Residence Size—It is also built in residence sizes for 3 or 4 passengers to travel at 35 ft. per minute speed. Safe, dependable and easily operated.

Standard Freight Elevator

The elevator, shown below, is used for all purposes and in all types of buildings. The car may be any size with entrance on one, two or three sides. Control may be by hand cable as shown, by full automatic push button, by constant pressure push buttons, or by hand switch in the car.

The usual arrangement is with engine on top, as shown, but it may be placed at the base of the shaft, if desired.



Electric Freight Elevator, Worm Geared Traction Type

Continued on next page

Model 20 Sterling Electric Sidewalk Lift and Platform Ash Hoist

For stores, hotels, hospitals, restaurants, schools, libraries, railroad stations or other buildings to handle boxes, cans, barrels, baggage, rolls, etc., between a basement and a sidewalk level, or between floors.

Made of steel throughout. Sizes to suit conditions. Capacities 500 to 5000 lb., at a speed of 25 ft. per minute.

Control by flexible hand cable; by a hand switch on the car; or by constant or momentary pressure push buttons. When desired, steel bows are placed on car for operating sidewalk doors.

The worm gearing, with ball thrust bearings, is enclosed in an oil bath. The spur gearing is machine cut.

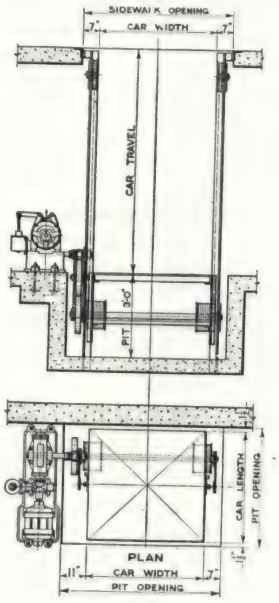
Special sizes for ashes—in car sizes not over 25 sq. ft. Capacity 1000 lb., uses hoist with 3 to 5 hp. motor.

Directions for Ordering—In making inquiry, please give:

Car size; travel; load; type of control desired; electric current available.

State if sidewalk doors are wanted, also if bows for opening doors are desired, also if safety gate is required in basement pit.

"Right-hand" lift is shown; "left-hand" lift furnished if so stated.



Installation Diagram, Model No. 20

Model 21 Hydraulic Plunger Sidewalk Lift

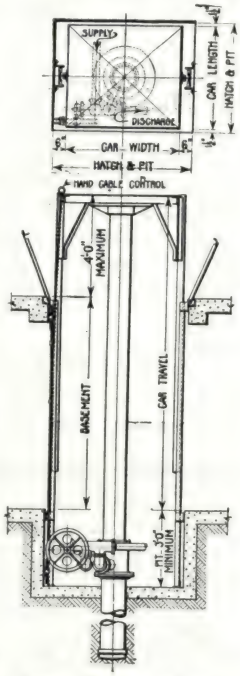
A steel platform travels in guides on top of a finished steel pipe piston, which slides in a pipe cylinder of the same length. No motor or engine is needed to operate it. No space outside the area of the hatchway is required. It is suited to water pressure of 60 to 120 lb. per sq. in. at normal service rates, and where the soil will readily permit sinking a well for the pipe cylinder.

Application—It is an inexpensive lift for handling ashes from the boiler room to the sidewalk, oils and supplies to the boiler room or any kind of merchandise between sidewalk or truck level and a basement.

Platform may be of any size to suit requirements and the capacity ranges from 200 to 4000 lb., depending on water pressure available. The speed range is from 20 to 30 ft. per minute.

They are well suited to public buildings, stores, garages, restaurants, hotels, hospitals, etc.

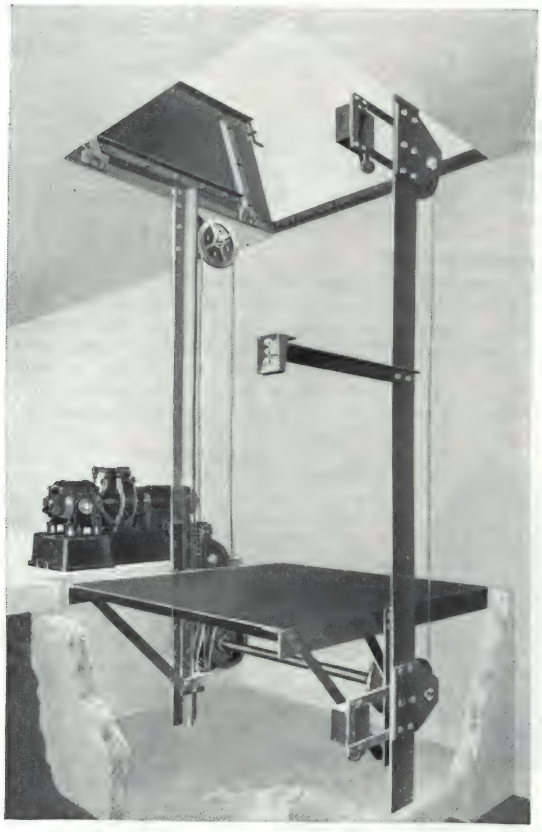
Ordering—State the purpose or use; maximum load to be handled; platform travel; width and length; water pressure available; and if sidewalk doors, safety gates or other protection is desired.



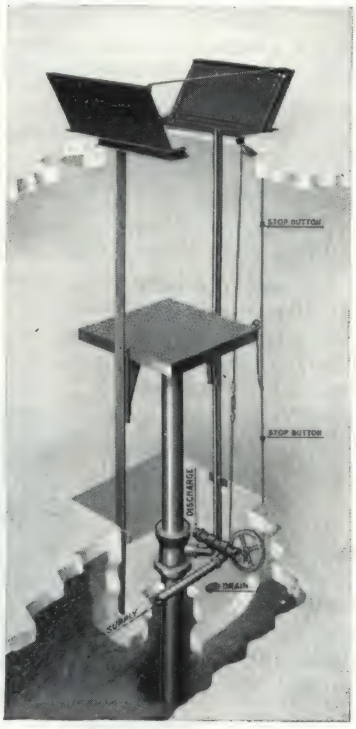
From Basement to Truck Bed

Other Products

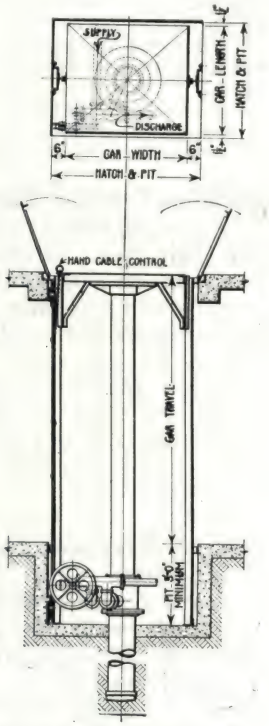
Also manufacturers of Skip Hoists, Ice Lifts, Ice Tiering Machines, Stereotype Plate Handling Equipment, Newspaper Lifts, Gravity Droppers, and Roll Paper Hoists.



Model 20 Sterling Electric Sidewalk Lift



Model 21 Hydraulic Sidewalk Lift



From Basement to Sidewalk Level

ESTABLISHED 1883

KIMBALL BROTHERS COMPANY

Electric Elevators

TELEPHONE, 149

1000 Ninth Street, COUNCIL BLUFFS, IOWA

BRANCH OFFICES

MINNEAPOLIS, MINN. DENVER, COLO. SALT LAKE CITY, UTAH TULSA, OKLA. LOS ANGELES, CAL.
KANSAS CITY, MO. DETROIT, MICH. ST. LOUIS, MO. DES MOINES, IOWA

Products

Manufacturers of a complete line of GEARLESS and GEARED ELECTRIC ELEVATORS for both passenger and freight service, including Variable Voltage Control, Automatic Operated Push Button Elevators, Dumbwaiters, Hand Elevators, Ash Hoists; and of the nationally advertised KIMBALL LIGHT ELECTRIC ELEVATORS.

Design

Kimball Elevators are designed under the supervision of our own Engineering Department and built complete in our own factory, by expert craftsmen.

Experience and Establishment

Forty-six years as successful manufacturers and builders of hand power and electric elevators. KIMBALL BROTHERS COMPANY is an established firm of high financial standing and integrity. Kimball Elevators are backed by factory service of highest character.

Straight Line Drive Machine

The demand for conservation of space is met efficiently by the Kimball Straight Line Drive Machine.

All Kimball Geared Traction Elevators use it as a special Kimball feature.

Comparison Between Old Type and Kimball Straight Line Drive Machine—Old type machine assembled as three individual units—motor, brake and machine—each a separate unit aligned and bolted separately to bed plate.

Kimball "Straight Line Drive" machine is assembled with machine frame, brake base and motor mounting as one solid, compact unit, assuring positive and permanent alignment between the moving parts.

Old style, three-unit type, is not so compact, involves many parts, is more easily disaligned and is more expensive in upkeep.

Kimball "Straight Line Drive" machine, single unit type is compact (occupies about two-thirds the space required by old type), inexpensive and efficient in operation.

Gearless Traction Elevator

The gearless traction elevator has been developed for high speed service, ranging from 450 to 700 ft. per minute. The gearless traction machine is a slow speed multi-pole shunt wound direct-current motor, having armature brake wheel and drive sheave mounted on one continuous sleeve. The Kimball Gearless Traction Machine embodies the same rugged and liberal design as the geared type. Low operating cost, and flexible means of control, make this elevator especially desirable for high speed installation.

Geared Traction Passenger Elevators

The geared traction elevator of the single wrap "V" groove type, has been generally adopted as the standard machine for buildings of moderate height requiring speeds of from 100 to 400 ft. per minute, for passenger service.

The Kimball Geared Traction Machines are equipped with high speed motors specially designed for elevator service, and speed reduction is obtained through a worm and gear reduction to the "V" groove traction sheave.

In all Kimball Traction Geared Machines the gear is riveted direct to the web or sleeve, to which the traction sheave is attached, "web drive."

Freight Elevators

Kimball Straight Line Drive Freight Elevators are built very rugged in design and of heavy proportion, and embody the same fundamental-principle design as all other Kimball machines. Slow speed on heavy capacity freight elevators is obtained through two-to-one hatch roping.

Push Button Elevator

The full automatic floor selective push button elevator has become a very popular type of control of late years, because it gives twenty-four hours daily service and eliminates the operator. Kimball Hatch Control Push Button Elevators are of the "straight" line drive" type, are very simple in design and construction, easily operated and especially accurate at the floor stops. This machinery is especially practical for use in hospitals, apartment houses, residences, office buildings, factories, banks, and elsewhere.

The two-button, or "hold-in" type push button control is gaining rapid popularity for freight and passenger installations.

Safety

Kimball built is safely built. All Kimball elevators are equipped with recognized practical safety appliances as recommended by Federal, State, and municipal codes and casualty insurance requirements.

Recommendations

Passenger Elevators—For buildings 10 to 12 stories or more, we recommend car speed ranging from 250 to 400 ft. per minute. In smaller cities where the demands are not so great, we find a speed of 150 to 200 ft. per minute very satisfactory and especially economical and practical. In estimating capacities on passenger elevators, it is common practice to figure 75 lb. per sq. ft. of cab area. An allowance of 400 sq. in. per person is accepted as general practice.

Freight Elevators—These are made of any size to suit the particular industry in which they are to serve. It is considered good practice to keep the size of the platform as small as practical for the type of merchandise to be transported, inasmuch as floor space is exceedingly valuable. It is desirable to make platforms narrower postwise than front to back. This arrangement enables the manufacturer to more adequately brace and truss the platform and sling.

Chieftain—An Eppley Hotel Equipped with Kimball Elevators

Catalogue

We publish a large quantity of valuable literature covering all types of elevators. This literature will be sent free, postpaid, to any architect upon request.

Continued on next page

Kimball "5A"-Light Electric Elevator

Some years ago, the Kimball Light Electric Elevator, a new idea, startled the builders in industry. It afforded a means of vertical transportation of the lighter capacities at a price of which other manufacturers said "impossible." Today Kimball Light Electric Elevators are in operation from coast to coast and gulf to border, and thousands of satisfied owners are enthusiastic boosters of this long desired achievement. Inexpensive, standard passenger or freight elevator service for your smaller type of office, industrial, retail and hospital buildings, regardless of height, puts the electric elevator within the reach of all owners. Standardization of design and size, and the tremendous demand for this machine, enable even the small town merchant to economically install and operate a Kimball Light Electric Elevator and realize a quick return on his investment.

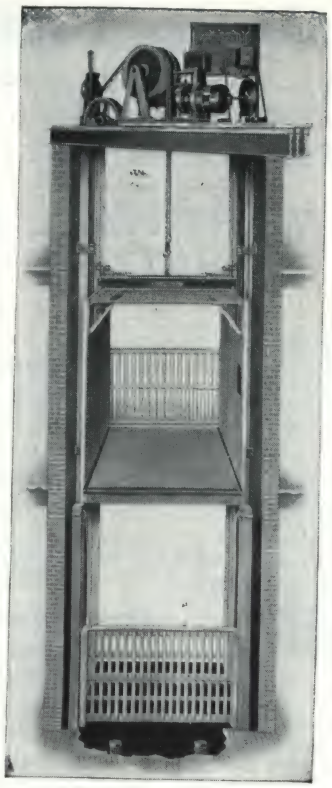
Range—Most any desired range of capacity and speed can be easily obtained with the Kimball "5A"-Light Electric, in general as follows:

Capacity 1000 lb., speed 65 to 100 ft. per min.
Capacity 1500 lb., speed 50 to 75 ft. per min.
Capacity 2000 lb., speed 30 to 60 ft. per min.

For special capacities and speeds, write the factory.

Adaptability—Kimball Light Electric Elevators are manufactured by us equipped with safety devices to comply with all federal, state and city elevator laws and insurance recommendations, including the A.S.M.E. Code.

Machine—The Kimball "5A" Traction Machine is especially designed for the Kimball "5A" Elevator by our own engineers and manufactured in our own plant. This machine is of the Kimball Universal Straight Line Drive type, assembled as a single unit.



Kimball "5A"-Light Electric Elevator

Worm Gear—Cut on special hobbing machines from solid phosphor bronze and riveted direct to web, or sleeve to which the "V" groove traction sheave is bolted. (Sleeve drive.) No keys used.

Worm—Cut from solid stock carbon steel and ground to fit gear.

Brake—Kimball oil submerged electro-magnet release type, spring applied, operating Kimball flexible band (not a cast iron shoe). Brake lined all the way round with special composition brake lining.

Motor—Standard manufacture high torque type, ring-oiled, of ample horsepower, specially made for the Kimball "5A" Machine.

The entire Kimball "5A" Machine unit mounted on single cast iron bed plate with raised oil rib.

Control—Kimball "5A" Elevator Controllers are made in the following popular designs:

Hand Rope—A mechanical control of the simplest type. The pulling the cable starts, stops or reverses the elevator, equipped with automatic platform locking device and final stop buttons.

Full Magnet—For faster freight or passenger installations, a full electrically operated mechanism with self-centering car switch, "dead man handle" type, in the car for starting, stopping and reversing elevator. Emergency or "hold elevator" switch attached to starter.

Floor Selective Push Button (Automatic)—The popular control for hotel, hospital, apartment house or general use. Requires no operator. Push the button and call the elevator, step in the car and push the button opposite the desired landing, and the elevator takes you to your destination, stops automatically and permits you to leave car without interference from any other landing.

Non-selective or "Hold-in" Push Button—A very desirable simplified control, largely supplanting the hand rope type; consists of two buttons at each landing and two buttons in car. Press and hold in the "Up" or "Down" button and you are carried to your destination. Remove pressure on button and elevator stops. Equipped with automatic top and bottom safety stops.

All controllers fitted with electric hatch limit safety switches, as standard equipment. Where city or state requirements demand, or where owner desires, controllers are fitted with phase failure and phase reversal, sequence relays and emergency release, and no-voltage features.

Details—***Guides***—Steel planed and matched T's are furnished as standard equipment (unless otherwise specified).

Bail, or Safety Sling—Built of steel angle uprights and steel channel crosshead with corner brace irons.

Cables—The Kimball "5A" Electric Freight Elevator is hoisted by three ½-in. Swedish iron cables, giving ample factor of safety.

Note: For passenger service four ½-in. cables are furnished.

Gates—Safety hatch gates are furnished as standard equipment, and where codes require they are equipped with electric contacts and locks.

Enclosure—Freight platforms are enclosed on two or three sides with wood wainscot enclosure, as standard equipment. Steel enclosure may be had at a nominal extra charge.

Canopy—On freight cars the top is fitted with a diamond wire mesh canopy as standard equipment.

Bumpers—Spring bumpers are furnished for installation in the pit under the car, as standard equipment.

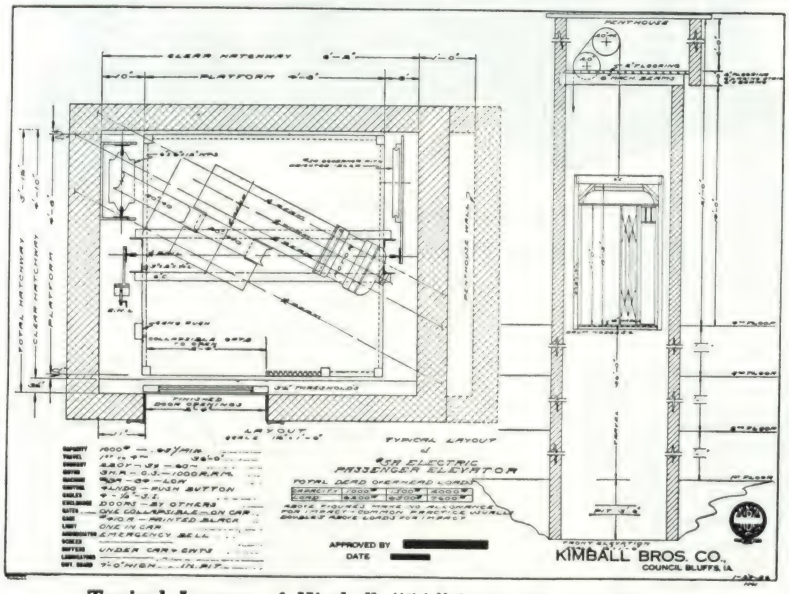
Light—A lighting fixture with control switch and conductor cable is furnished on all jobs as standard equipment.

Foundation—The machine, controller, governor, etc., rest on a foundation of three steel I-beams by Kimball Brothers Company. The wood flooring is to be furnished by the owner.

Cabs—We can furnish any desired design of ornamental passenger cabs and will gladly furnish illustrations upon application.

Alternative Features—*Maple Guides*—While the Standard Kimball "5A" Elevator is designed for steel guides, in many cities the code does not demand this construction. In such an event, a considerable saving can be realized by the substitution of maple guides for steel. The equipment is the same as our standard machine, except for the guides themselves, the guide shoes and the wood post type safety catch.

Installation—The basic construction features of the Kimball "5A"-Light Electric Elevator make its installation a very simple operation. If the owner wishes to erect it himself we provide him with complete details, sketches, plans and descriptions, free of charge, showing clearly easiest and quickest way to make installation.



Typical Layout of Kimball "5A"-Light Electric Elevator

Guarantee — The guarantee on Kimball "5A"-Light Electric Elevator fulfills the requirements of the A.I.A.

Correspondence Invited—Your client will appreciate an investigation of the Kimball "5A"-Light Electric. Write us for a detailed descriptive folder on this equipment. The architect will find this machinery adaptable to a large field of practical uses. There is a Kimball elevator built for every requirement.

MARSHALL BROTHERS CO.

Passenger and Freight Elevators
21st and Mary Streets, South Side
PITTSBURGH, PA.

MARSHALL ELEVATORS
TRADE-NAME

Products

PASSENGER and FREIGHT ELEVATORS: Electric, Hydraulic, Belt and Hand Power; DUMBWAITERS.

Also, Sidewalk Lifts, Invalid Elevators and Telescopic Ash Hoists: Electric, Hydraulic and Hand Power.

Electric Elevators

Passenger Elevators—Controlled by car switch or push button. Designed for office buildings, residences, factories, apartments, etc. Geared and gearless types.

Freight Elevators—Built in all sizes and capacities. Operated by car switch, push button or hand cable.

Our automobile electric elevators are specially designed for extra heavy duty.

Dumbwaiters—Electric dumbwaiters, operated by push button, made to suit any size hatchway.

Note: All of the above types of elevators are for alternating or direct current. Variable voltage control can be supplied for all types of equipment.

Hydraulic Plunger Elevators

For all water pressures and for freight purposes, as well as for dumbwaiter service.

Belt Power Elevators

Made for freight service where it is more desirable to use belts from main shaft or countershaft for driving power.

Hand Power Elevators

These are for use in stores, factories, residences, etc., where no electric or other power is available.

Special Types of Elevators

We also manufacture sidewalk lifts, invalid elevators and ash hoists, operated by electric, hydraulic or hand power.

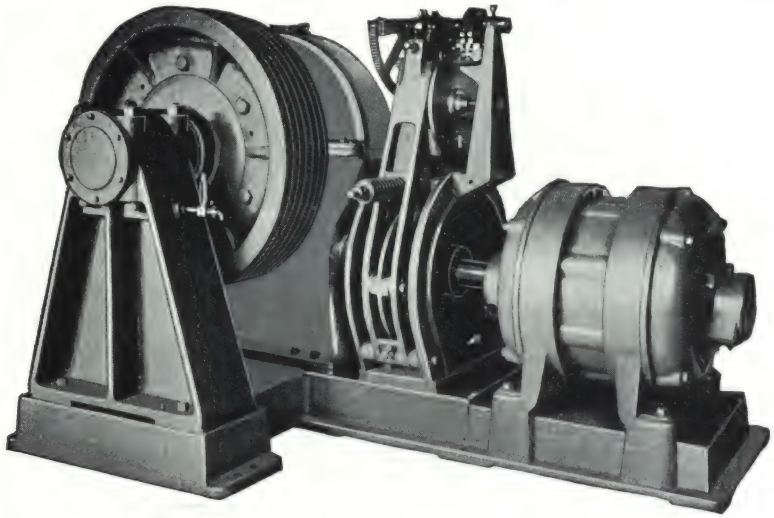
Data Required for Estimates

We will furnish on application, data sheets showing information required for making estimates.

Over a Century in the Engineering Field

We have been in business for many years and maintain a service department, enabling us to supply repair parts promptly.

We will gladly give engineers, architects and owners the benefit of our experience in connection with the installation of all types of elevators.



Direct Connected Heavy Duty Elevator Engine

Partial List of Marshall Elevator Installations

COMPANY	NUMBER
*Aluminum Company of America, Pittsburgh, Pa.	2
*American Sheet & Tin Plate Co., Pittsburgh, Pa.	8
*Carnegie Steel Co., Pittsburgh, Pa.	6
*Follansbee Brothers Company, Pittsburgh, Pa.	4
*Harbison-Walker Refractories Co., Pittsburgh, Pa.	24
*Hazel-Atlas Glass Co., Pittsburgh, Pa.	12
*Jones & Laughlin Steel Corp., Pittsburgh, Pa.	2
*Locomotive Stoker Company, Pittsburgh, Pa.	3
*Mesta Machine Company, Pittsburgh, Pa.	4
*National Lead & Oil Company, Pittsburgh, Pa.	2
*Oil Well Supply Company, Pittsburgh, Pa.	3
*Parcel Post Terminal, Pittsburgh, Pa.	3
*Pennsylvania Railroad Co., Pittsburgh, Pa.	11
*Pittsburgh Plate Glass Co., Pittsburgh, Pa.	25
*Pressed Steel Car Co., Pittsburgh, Pa.	3

*We have installed elevators in various plants of these companies.

COMPANY	NUMBER
*Standard Sanitary Mfg. Co., Pittsburgh, Pa.	15
*Standard Underground Cable Co., Pittsburgh, Pa.	6
*Union Supply Company, Pittsburgh, Pa.	9
Auto Body Company, Lansing, Mich.	2
Carborundum Company, Niagara Falls, N. Y.	19
W. S. George Pottery Co., East Palestine, Ohio	6
Ford Motor Car Company, Glassmere, Pa.	1
Homeopathic Hospital, Pittsburgh, Pa.	3
Keystone Driller Company, Beaver Falls, Pa.	2
Motroup Steel Products Co., Beaver Falls, Pa.	2
Mahoning Foundry & Machine Co., Youngstown, Ohio	6
New York & Pennsylvania Co., Johnsonburg, Pa.	4
Peoples Institute, Pittsburgh, Pa.	2
Phoenix Glass Company, Monaca, Pa.	9
Physicians Office Building, Pittsburgh, Pa.	1
U. S. Government Hospital, Dawson Springs, Ky.	2

MONTGOMERY ELEVATOR COMPANY

MOLINE, ILL.

BRANCH OFFICES, SALES AGENCIES AND SERVICE STATIONS

CHICAGO, ILL.	DENVER, COLO.	DES MOINES, IOWA	SCRANTON, PA.	SEATTLE, WASH.
KANSAS CITY, MO.	OMAHA, NEB.	CEDAR RAPIDS, IOWA	TULSA, OKLA.	SPOKANE, WASH.
WICHITA, KAN.	PEORIA, ILL.	BURLINGTON, IOWA	HOUSTON, TEX.	TACOMA, WASH.
		DETROIT, MICH.		

Products

PASSENGER and FREIGHT ELEVATORS: Gearless Traction Type; Geared Traction Type; Variable Voltage Control; Pre-registering Signal Control; Self-leveling Elevators; Push Button Full Automatic; Cumulative Push Button Automatic; Simplified Push Button Freight Elevators; Electric Dumbwaiters.

Facilities

A completely equipped plant enables this company to execute orders without delay and at reasonable prices.

Heavy Duty Freight Elevators

Our combination of ball bearing construction, with simplification of control, has resulted in a popular, dependable freight elevator, requiring the minimum amount of care or expert attention for maintenance.

Cumulative Button Control for Passenger Elevators

For automatic passenger elevators in apartment houses, hospitals, and similar buildings, the MONTGOMERY ELEVATOR COMPANY has developed and perfected a system of control whereby every signal from every floor is registered and accumulated, so that the car will answer every call in proper sequence automatically. The passengers will not be left waiting at their landings indefinitely, or passed up by the car while it is in use by someone else.

This Montgomery cumulative control makes the service of an automatic elevator much more effective and pleasing to the occupant of the building. It saves car mileage in handling the passengers between their respective floors, and consequently reduces wear and tear on the machine and cuts down current consumption. It eliminates the necessity of dual control or the use of an operator, even during rush periods in apartment houses or hospitals. The cost of this cumulative feature is very little in excess of the cost of the ordinary push button automatic type.

This control can also be arranged to return the car automatically, and park it at the main floor after it has been used by any passenger.

Electric Passenger Elevators

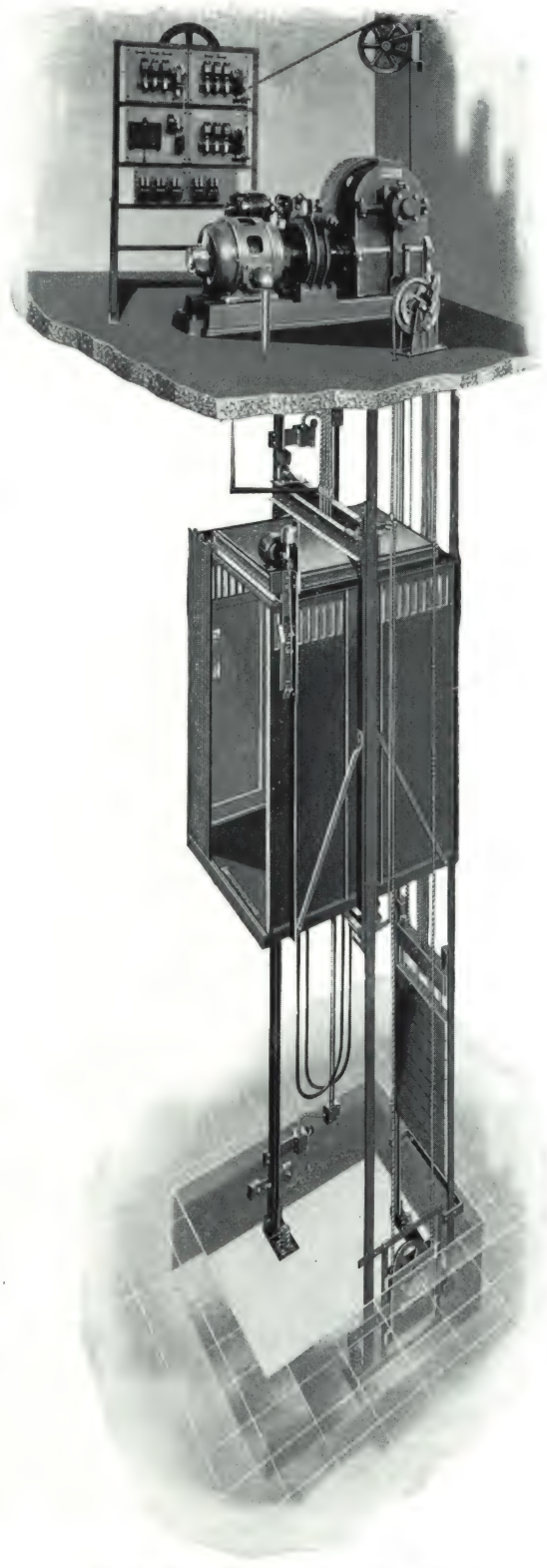
Smooth, quiet operation and accurate control, combined with every modern safety feature, are characteristic of Montgomery passenger elevators. Our variable voltage control gives the ultimate refinement for high-speed service.

Self-leveling Elevators

Where precision is desired at the landings, Montgomery self-leveling elevators are used, for either freight or passenger service.

Co-operative Services

Our engineering department is at the service of architects and engineers. Any required information concerning construction data relative to elevators and dumbwaiters, preliminary layout showing loading stresses, etc., also estimates, will be sent on request.



Cumulative Control Passenger Elevator

OTIS ELEVATOR COMPANY

GENERAL OFFICES
Otis Building, 260 Eleventh Avenue
NEW YORK, N. Y.

OFFICES IN ALL PRINCIPAL CITIES OF THE WORLD

FACTORIES
BUFFALO, N. Y. HARRISON, N. J. QUINCY, ILL. YONKERS, N. Y.
AND IN FOREIGN COUNTRIES

Products

ELEVATORS: Electric, of all kinds, including Automatic Signal Control; Automatic Collective Control; Automatic Department Store Signal Control; Micro-Leveling; Multi-Voltage Control; Car Switch; Operatorless; Automatic Push Button; and Double Button Control.

ELEVATOR ACCESSORIES of all kinds.

ELEVATOR SIGNAL SYSTEMS.

ELEVATOR CARS, CAR DOORS and GATES and OPERATING MECHANISMS.

ELEVATOR DOORS, and DOOR CLOSING AND LOCKING MECHANISMS.

DUMBWAITERS: Electric.

ELEVATORS: Hydraulic, Steam, Belt and Hand Power.

ESCALATORS or MOVING STAIRWAYS.

CONVEYORS: Gravity, Spiral.

HOISTS: Automatic Skip, Blast Furnace, Mine.

INCLINED ELEVATORS and DOCK ELEVATORS.

VERTICAL SCREW HOISTS.

INCLINE RAILWAYS.

COMMERCIAL STEEL CASTINGS.

Planning Service

Elevator service, particularly in the larger class of buildings with thousands of tenants, is an engineering transportation problem. The number, type and control of elevators can only be properly determined from extensive experience and records covering thousands of installations of all types.

The OTIS ELEVATOR COMPANY, with 78 years of experience in the elevator industry and maintaining 178 offices in this country, will gladly co-operate with architects, owners and tenants in supplying proper elevator installations for any building. Drawings showing hatchway sizes, clearances, overhead supports, loads on beams and all other details will be gladly furnished by any of its offices as a means of assistance in preparing building plans.

Design and Manufacture

Otis Elevators provide any type of service from the simplest to the highest speed automatic control for intensive service. They are not an assembly of non-related manufactured articles, but are complete equipment designed in their entirety by Otis Engineers with their years of experience, entirely fabricated in Otis factories, and especially designed for the work they are called upon to perform.

All parts are standardized and can readily be obtained in stock at any of the offices.

TRADE-MARK

Electric Elevators

Electric elevators have practically superseded all other types of elevator equipment, except for a few special purposes. The electric elevator is the most efficient and reliable type; requires less space than other types; is more easily operated and costs less to install and maintain.

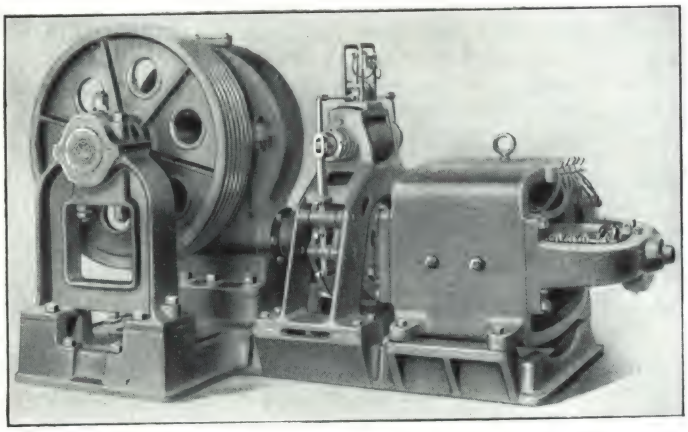
There are two types of electric elevators, the single wrap or geared traction, and the gearless traction. Both types have the inherent safety feature of the traction drive which prevents any possibility of the car or counterweight being drawn into the overhead work.

Both geared and gearless machines may be furnished with Otis Micro-Leveling and also may be equipped with the latest development in unit-multi-voltage control.

Single Wrap Geared Traction Elevators—On this type of elevator the car is driven through a driving sheave on the machine operated through worm gearing by a motor of 700 to 900 revolutions per minute. Car speeds range up to 400 ft. per minute. This type of machine is generally used for ordinary freight work and for moderate passenger requirements where conditions of rise, load, speed and service required would not warrant the use of the higher grade gearless elevator.

Gearless Traction Elevators—The gearless traction elevator is the highest development of the electric type and provides speeds up to 1200 ft. per minute, with the possibility of still greater speeds whenever building requirements warrant.

This type of elevator employs a slow speed high



Otis Single Wrap Geared Traction Elevator Machine

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torque motor, with a driving sheave mounted on a spider which is integral with the armature shaft. All intermediate gearing is thus eliminated, as the slow speed motor enables the car to be driven directly from the sheave, by means of ropes which pass around the sheave, and then to the car and the counterweight.

Easy and smooth operation, starting and stopping, and very high efficiency are features of this machine.

In cases where larger capacities at more moderate car speeds are required, this type of machine can still be utilized by roping the car and counterweight on a 2:1 arrangement.

Current Characteristics—Single wrap traction elevators can be operated on direct or alternating current of commercial current characteristics. Alternating-current passenger elevators of the single wrap type are available at car speeds of 400 ft. per minute with two speed motors and Car Switch Control. All gearless traction machines are operated by direct current motors. However, with unit-multi-voltage operation, using alternating-current source of supply, it is possible to use gearless traction, direct-current, high speed elevators in any location.

Micro-Leveling Elevators

The increasing demand for high efficiency in elevator service has been met by Otis Micro-Leveling Elevators for both high speed passenger and heavy duty freight elevator service. With this distinctive Otis feature, the elevator is automatically leveled with the floor landing, regardless of whether it has over or under run the landing. This level is automatically maintained regardless of stretch of ropes or change of load on the platform. This saves time by eliminating false stops, speeds up the service, reduces current consumption, saves wear and tear on the machinery and prolongs its life. It is available with Car Switch or automatic forms of control and for either geared or gearless machines.

Otis Gearless Traction Micro-Leveling Elevator Machine

Multi-Voltage Control

Unit-Multi-Voltage Control, with a separate motor generator set for each elevator, provides the smoothest possible rate of acceleration and retardation without discomfort to the passengers. This results in the highest quality of operation and, in connection with the gearless traction Micro-Leveling elevators, meets the most exacting demands of modern elevator service. It permits higher car speeds and smoother operation than has heretofore been possible; handles more passengers per hour and is very economical in power consumption. It also makes it possible to use direct-current gearless machines where alternating-current source of supply only is available.

Control Systems for Electric Elevators

Signal Control—The finest type of elevator service is now provided by Otis Automatic Signal Control, designed primarily for the most intensive service in the highest class of buildings. This type of elevator, combined with Micro-Leveling and Multi-Voltage Control, is entirely automatic in operation and provides car speeds up to 1200 ft. per minute.

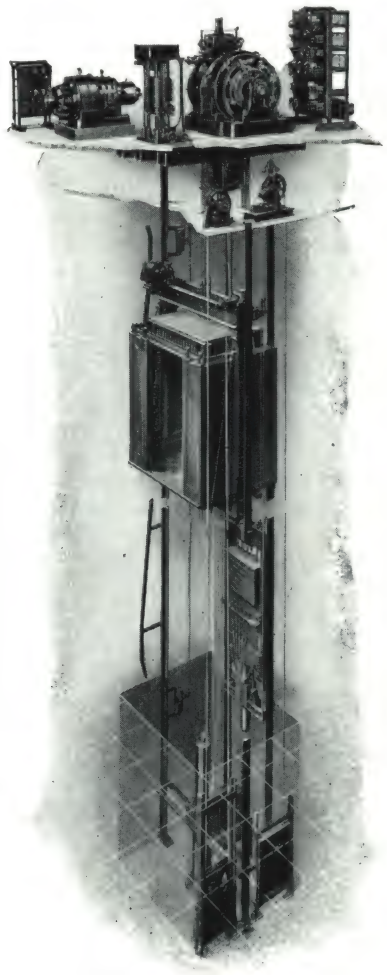
These elevators are operated by means of a bank of buttons in the car to correspond with the floors served by up and down buttons on the floors. The attendant in the car presses the proper button as each passenger, upon entering the car, announces the floor at which he wishes to alight. When the car is signaled to start from the first floor the operator releases the hatchway doors which close automatically; the car starts automatically and runs to the first landing for which a button has been pressed where it stops automatically and the doors open automatically. As soon as the transfer of passengers is completed the attendant releases the doors and the cycle of operation is repeated for each floor for which a button has been pressed. Intending passengers on the floors press the button indicating the direction in which they wish to travel, and this call is then registered directly upon the controller of the first car traveling in the desired direction. Signal lanterns are provided in front of each elevator to indicate to waiting passenegrs which car will serve their call.

Hatchway doors are power operated to insure the minimum time at landings.

Department Store Signal Control—This is an adaptation of Signal Control used primarily for department stores and is available for several conditions of service—uniform, intensive service necessitating stops at all floors; service with variable intensity, requiring stops only at floors at which passengers have indicated their desire to enter or leave the car; or it might be a combination of the two types. This latter condition might be such that for certain floors of the building, it would be desirable to have the elevator automatically stop at every floor and then arranged so that stops at other (usually higher) floors would be made only on signal from the hall buttons, or by pressing buttons in the car. However, any of these other

Continued on next page

floors could also be arranged for automatic stopping on every trip. When the car is stopping automatically in answer to hall buttons, or by intention of the operator at any particular floor, the doors open automatically as the car stops, and when the operator releases them they close automatically and the car starts automatically. Variations in automatic stopping arrangements are available. This type of elevator is also provided with



Micro-Leveling and Unit-Multi-Voltage Control. Car speeds up to 500 ft. per minute are available, depending upon the service requirements.

Collective Automatic Control—This is a development of the automatic push button control along the lines of Signal Control. This operation overcomes the disadvantages of the ordinary push button operation, which are comparatively slow speeds necessary to make landings automatically, and the necessity of having the car serve only one floor at a time.

With Collective Control the elevator stops at every floor for which a button has been pressed in the direction in which the car is traveling, thus picking up all waiting passengers in that direction. This type may be combined with Micro-Leveling and Multi-Voltage operation and car speeds of 600 ft. per minute are available. This control, therefore, considerably enlarges the field of automatic operation without operators so that they may now be used in large apartments and small hotels. Two elevators may be inter-connected to furnish automatic service when one elevator is insufficient during rush hours. Full details of varying conditions of service which can be met with the different types of automatic operation are available at any of our offices.

Hand Rope—This type of operation for electric elevators is practically obsolete and has been superseded by double button operation.

Double Button—This control consists of call buttons at each floor and up and down buttons in the car. Constant pressure on any hall button will call the car to that floor if the gates are closed and the elevator is not already in use. Pressure upon a button in the car will cause the car to travel in the corresponding direction. This control is only used for freight service and supersedes the hand rope control, having the advantage of operation without the necessity for having an operator constantly on the platform.

Automatic Push Button—This type of control meets, with full safety, the requirements of infrequent service without a regular operator. Call buttons are provided at each floor and a full set of operating buttons in the car. Safety and non-interference devices, together with gate and door locks and contacts, provide safety for the passengers and general public using the building.

This form of control is usually limited to use in private residences, private office buildings and the smaller apartment houses. It may also be used for heavy duty Micro-Leveling freight elevators as later described.

Another form of automatic push button control without an operator and for more severe traffic conditions is described under Collective Control.

Car Switch Control—This is the most generally used form of control for high class freight work and, heretofore, for nearly all passenger work. The car switch is arranged to return to stop position if released by the operator and the entire control system is fitted with every safeguard to prevent accidents. The higher speed passenger elevators are now, however, usually equipped with some form of automatic control.

Operatorless Elevators

In large warehouses or plants requiring a number of elevators capable of carrying industrial trucks, it has been found advantageous in some cases to group the elevators into banks of six to ten. These are then equipped with push button operation and Micro-Leveling, and the control of all those in each bank is in the hands of a central dispatcher working with an automatic telephone system and a conveniently located push button control board. Automatic door operating machines facilitate the service.

Car Safety Devices

All Otis power elevators are provided with steel car frames or slings in which the platform is securely fastened and braced, and with safety devices mounted underneath the car platform. These safety devices are operated by means of a centrifugal speed governor at the top of the hatchway.

In case of excessive descending speed of the car the safety device is operated by the governor and grips the car guides and prevents further descent of the car. On high speed elevators a governor switch first slows down the motor if the car speed should become excessive. If this does not suffice, the car safety device is then called into operation to stop the car.

Other Elevator Types

Hydraulic—Direct lift plunger elevators are still used advantageously for sidewalk and other short rise service, but geared hydraulic elevators are no longer installed except where electric power is not available.

Continued on next page

Belt Driven—This type is driven from a line shaft with car speeds not exceeding 50 ft. per minute and is very seldom used.

Steam—Used only under exceptional circumstances.

Hand Power—Used only where service requirements are light and infrequent and do not justify the expense of power driven elevators.

Escalators or Moving Stairways

Used wherever it is desired to move people in large numbers continuously and rapidly, such as department stores, subways, elevated railways, railroad terminals, and even in industrial buildings.

They operate continuously with no waiting intervals and carry large numbers of people conveniently, quickly and without exertion. As they are constantly running they require only small motors and do not require operators, hence the operating cost is very small. They are available in 2, 3 and 4-ft. widths, with passenger capacities of 4000, 6000 and 8000 people per hour, respectively.

Gravity Spiral Conveyors

This equipment facilitates the delivery of packages from upper floors, saves manual labor and relieves the elevator system. They are principally used in department stores and warehouses, are very efficient and require no operating expense. They are built of steel, of the open or closed type and the diameter of the conveyor and the pitch of the blades depend upon the size and character of the packages to be handled. Several blades may be installed in one shell and with other features, afford a selective service of considerable range.

Automatic Skip Hoist

Otis Automatic Push Button Control Skip Hoists raise and deliver bulk material, such as coal, ashes, etc., and automatically return to loading position.

The form of control may be varied to suit conditions. This apparatus permits of a reduction in manual labor required for this class of work, and thus effects a considerable saving in operating expense. They are rugged in design and built to withstand the heaviest character of service.

Blast Furnace and Mine Hoists

Otis equipment for these purposes fulfills every condition of this nature and is designed from broad experience in meeting severe requirements for such equipment. Each installation is an individual engineering problem and carefully studied and worked out as such. Many Otis installations of this nature attest the superior quality of the service provided.

Inclined Elevators

These are used for carrying trucks of merchandise from floor to floor in department stores, railroad and steamship terminals and warehouses, also for unloading freight from steamships to docks by means of trucks.

Vertical Screw Elevators

Otis Vertical Screw Elevators are now available for use as console, orchestra and stage lifts, as well as for other types of short rise elevator work where conditions warrant.

Incline Railways

These are used for a variety of purposes, such as handling passengers for sightseeing purposes, such as the ascent of Lookout Mountain near Chattanooga, or for ordinary business transportation of traffic between separate levels, such as the Weehawken Incline.

Installations of this character are also matters for individual study in order to select apparatus to meet the varying conditions of each case.

Commercial Steel Castings

We are now prepared to furnish the highest class commercial steel castings from customers' patterns or drawings. These are made by the electric processes in our steel foundry at Buffalo.

Latest Otis Developments

Electric Dumbwaiters — Otis Electric Dumbwaiters, of the same high class as elevator equipment, are now available. They are made entirely in our own factories, of an entirely new and very efficient design, based upon long experience.

These dumbwaiters are supplied in several types of push button control to suit varying conditions and service requirements.

Elevator Accessories—*Cabs*—Cabs, of new and attractive Otis design and manufacture, are now available for elevator work. These are new and modern designs following the trend of entrance hall and corridor decorations in the buildings of today.

Entrances—Otis hatchway entrances or fronts are now available in many pleasing designs and finishes to match the surrounding treatment in hallways.

Door Closers—Otis Manual Door Closers are Interlocks of the latest improved designs are available for all types of service. These are strong and rugged in character to meet the severe conditions of this type of service.

Door Operating Devices—Otis Power Operated Door Devices of either the pneumatic or electric type are now available. The use of either type materially reduces the time required at landings and so speeds up the service.

Signal Systems—Otis Signal Systems are now available for all service requirements. These systems are designed and built as an integral part of the elevator installation and not a separate system merely assembled with the elevator. They contain a number of improvements which eliminate false stops of the elevator; save waiting time and speed up the service. Signal fixtures of many modern and pleasing designs are available in many finishes to match the surroundings.

Under this new Otis policy of manufacturing and supplying all elevator accessories the purchaser has the advantage of buying a complete operating unit, manufactured under the same high class standards as elevators; serviced by Otis, and covered by the Otis guarantee which warrants the construction and operation of every part of the entire installation.

Otis Service, Maintenance, and Modernization

In the 178 offices of the Company throughout the country, there are available stocks of replacement parts and skilled elevator mechanics for any required work. Various types of Otis Service and also Otis Maintenance are available. Machines can be taken care of under ordinary inspection service at stated intervals, or contracts will cover furnishing of all small parts as well as examination service. Otis Maintenance undertakes the complete care of the machine including proper examination and furnishing of supplies and parts.

All offices are also ready to make recommendations for modernization of existing elevator equipment, including cars, signals and other accessories.

OILDRAULIC LIFT CO.

Industrial Elevators and Automobile Revolving Lifts

EXECUTIVE OFFICES AND FACTORIES
MEMPHIS, TENN.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Products

SINGLE or MULTIPLE POST ELEVATORS, electrically operated, for all industrial and commercial uses. Capacity from 50 to 40,000 lb., with platform capacity of 160 sq. ft. Specially designed in single story types, ash hoist types, freight elevator types, automobile elevator types, and garage elevator types.

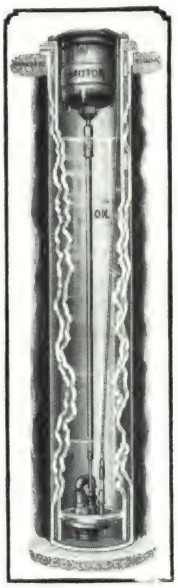
Uses

Oildraulic Elevators are built from specifications for each type of service, including special designs for sidewalks, machine shops, manufactories, chemical plants, dairies, laundries, lumber kilns, incinerator plants, quarries, loading docks, warehouses, freight terminals, mortuaries, mausoleums, organ consoles, theatrical sets, hospitals, assembly room platforms, marble works, aerodromes, for all types of transfer systems, baggage and freight conveyors; for overcoming any inequalities in floor level in straight line production problems in every phase of industry.

Features

Oildraulic Industrial Elevators embody the application of the Oildraulic principle so successful in automobile revolving lifts. Electrically operated, they hook on to any lighting or power circuit. No underground or extraneous mechanism or power equipment. Each is a unit within itself. Motor and pump are located in piston. Being hydraulic oil operated, Oildraulic Industrial Elevators are freezeproof. They are strictly one-man operated and subject to remote control if desired. Equipped with safety controls and all types of approved safety control switches according to specifications.

There are no overhead penthouses, cables, pulleys, racks, gears, windlasses. The design of the Oildraulic is a particular advantage in preparing old buildings for reconstruction as the elimination of overhanging structure ends the risk of weakening building structure incidental to elevator well. The Oildraulic is approved by elevator commissions, accident and industrial commissions.



The Oildraulic Principle

Installation

Oildraulic Industrial Elevators are designed to be installed and put into operation by the ordinary mechanic. Complete details and wiring diagrams are furnished with each design.

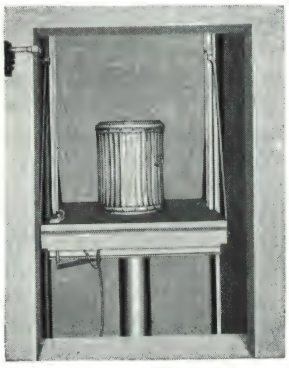
Guarantee

Oildraulic Industrial Elevators are guaranteed to be of high class construction, free from all operating defects. They are designed to be as distinctively satisfying and economical in service as the Oildraulic principle of operation is distinctive, sound, safe and economical in engineering principle.

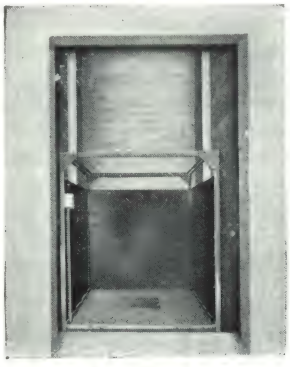
Service Staff

Our staff of consulting engineers is maintained for the benefit of architects and construction engineers, and renders advisory service without extra charge. This is due to the fact that each Oildraulic Industrial Elevator is a custom built job made to ideally fit the specific service needs. Address inquiries to Service Staff, OILDRAULIC LIFT CO., Memphis, Tenn. Quotations willingly furnished without obligation.

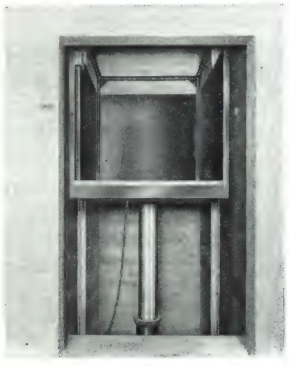
Oildraulic Sidewalk Elevator in Loading Position



Oildraulic Sidewalk Elevator in Lifting Position



Oildraulic Single Story Freight Elevator in Loading Position



Oildraulic Single Story Freight Elevator in Lifting Position

THE SHEPARD ELEVATOR COMPANY

Pioneer Manufacturers of Ball Bearing Electric Elevators

2413-2431 Colerain Avenue, CINCINNATI, OHIO

REPRESENTATIVES AT

AKRON, OHIO	CHICAGO, ILL.	DETROIT, MICH.	KNOXVILLE, TENN.	MONTGOMERY, ALA.	PORTLAND, ORE.
ATLANTA, GA.	COLUMBUS, OHIO	GARY, IND.	LITTLE ROCK, ARK.	NASHVILLE, TENN.	ST. LOUIS, MO.
BIRMINGHAM, ALA.	DALLAS, TEX.	INDIANAPOLIS, IND.	LOS ANGELES, CAL.	NEW YORK, N. Y.	WASHINGTON, D. C.
CHATTANOOGA, TENN.	DAYTON, OHIO	KANSAS CITY, MO.	MEMPHIS, TENN.	ORLANDO, FLA.	

SHEPARD

Products

A complete line of BALL BEARING EQUIPPED GEARED and GEARLESS ELECTRIC PASSENGER and FREIGHT ELEVATORS.

Ball Bearing Alternating and Direct Current Motors.

Ball Bearing Slow Speed Motor Generator Units.

All types of Control, including Full Automatic, Selective and Collective. Rectifier and Unit Multivoltage Types a specialty.

Shepard Service

THE SHEPARD ELEVATOR COMPANY is one of the few elevator manufacturers who build the complete equipment in their own shops.

This includes machines, brakes, motors, motor generator sets, controllers and all accessories.

Let our engineers explain to you in detail why Shepard equipment is a leader in the field *where refinement counts.*

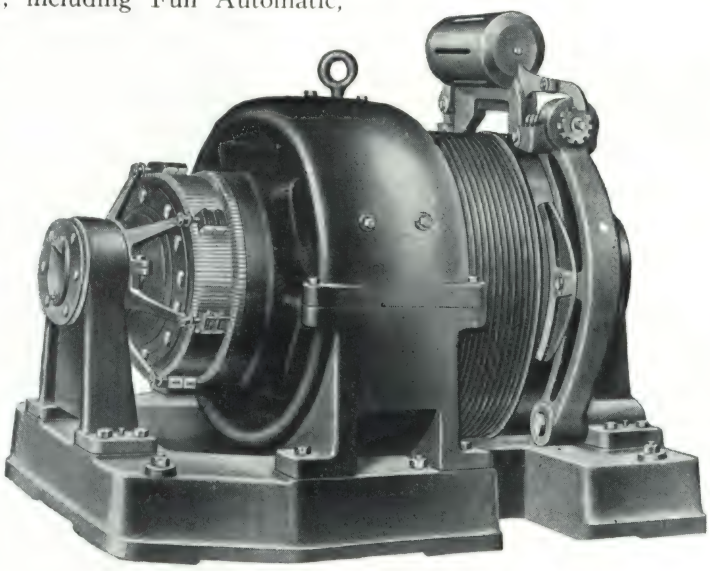
Distinctive Features of Construction

We are pioneers in the building of ball bearing electric elevators and Shepard Elevators have earned a reputation for service and reliability.

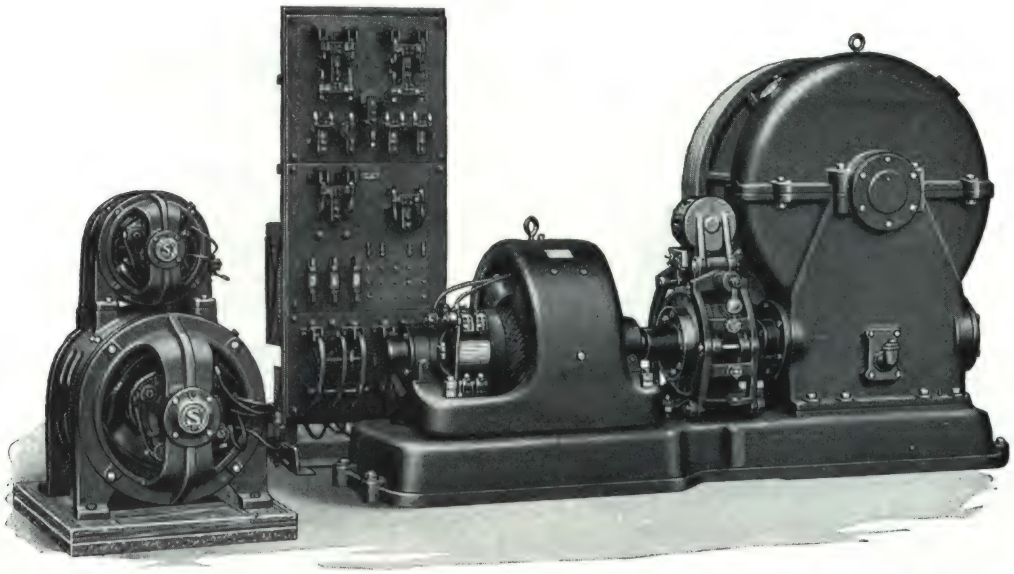
Shepard elevator apparatus, including electric motors, controllers, brakes, etc., is scientifically designed and accurately manufactured by our recognized elevator experts exclusively for elevator service. All equipment is the best that years of designing and experience can produce.

The use of ball bearings not only means durability with greatly decreased operating and maintenance cost, but gives assurance that Shepard elevators are built with great precision. Because of dynamically balanced parts and the use of flexible couplings, noise and vibration are eliminated.

Shepard elevators are refined in design, construction and operation.



Gearless Traction Elevator Machine Shepard Built



A Complete Variable Voltage Unit for Operation on Alternating-current Power Supply, Used on Speeds Up to 550 Ft. per Minute

ESTABLISHED 1903

F. S. PAYNE CO.

Elevator Manufacturers

GENERAL OFFICE AND WORKS

CAMBRIDGE, MASS.

BRANCH OFFICES

FRANKLIN, MASS. BOSTON, MASS. LOWELL, MASS. NEW HAVEN, CONN. PROVIDENCE, R. I. NEWARK, N. J.

Products

ELECTRIC and HYDRAULIC ELEVATORS: Passenger and Freight; Multivoltage; Automatic Control; all types of Manual Control.

Also manufacturers of Ash Hoists.

For Payne Dumbwaiters, see list of manufacturers.

PAYNE

TRADE-MARK

Experience and Services

This company was organized in 1903 under the present name and although its progress has been almost unparalleled, there have been few changes in personnel or policy.

During this period the expansion in equipment and facilities has anticipated the requirements of customers for new elevators, and repairs or remodeling of old apparatus.

Payne Electric Elevator Machines

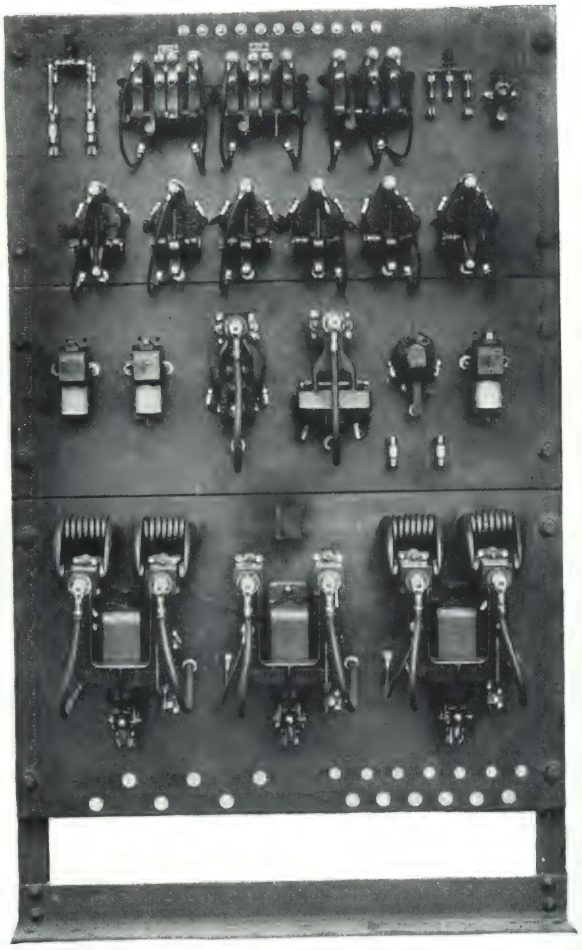
Payne machines are manufactured in two types—drum and geared traction—both of which are driven by a steel worm and bronze gear with the drum or driving sheave mounted directly on the gear shafts. No spur gears with steel working against steel are used.

This design is the most serviceable and efficient for all service.

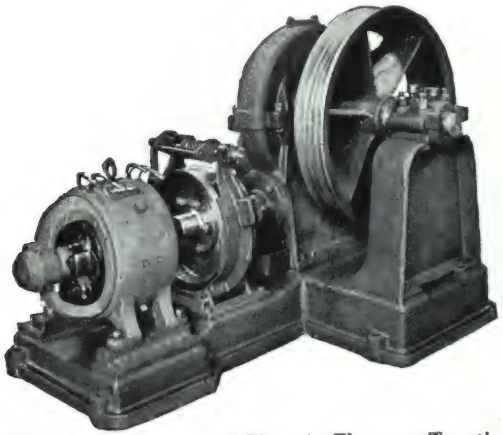
All machines with the exception of the smaller sizes have heavy continuous cast bedplates with an oil reservoir on all edges.

Electric brakes are a part of every Payne electric machine. The Payne brake is unequaled in the elevator industry.

Slow speed motors with long bearings especially designed for elevator service are connected directly to the worm shaft.



Payne Variable Voltage Elevator Controller



Payne Direct Connected Electric Elevator Traction Machine

Payne Direct Connected Electric Elevator Drum Machine

Continued on next page

Payne Elevator Controllers

Payne controllers are the product of an engineering corps who have designed elevator controllers for 25 years. These controllers are manufactured for every service and method of operation and embody no mechanical or electrical compromise. (See illustration on previous page.)

Automatic Push Button Control—Particular attention is directed to automatically operated elevators as they can be adapted to every service and effect a great economy by eliminating the cost of an operator's services, reducing electric current consumption and lengthening the life of the entire apparatus as it is not subjected to carelessness and abuse as are manually operated elevators.

The speed of automatic elevators should be as slow as is consistent with service required, as the car will stop more accurately at slower speeds and there will be no necessity of adding any further complicated apparatus to the equipment in an effort to obtain more accurate stops.

Payne automatic control systems are a model of simplicity in design, which is the greatest assurance of continuous service.

Information Required for Estimates

Building .....
Address .....
Service (passenger or freight) .....
Water pressure available (for plunger elevator) .... lbs.
Size of car desired (....ft. .... in. by .... ft. .... in.)
Location of machine (in penthouse over hoistway or on basement floor adjacent to hoistway) .....
Construction of hoistway (brick, concrete, steel, tile or wood. If tile or wood, also advise floor construction) .....
.....
Control desired (hand rope, car switch or automatic push button) .....
Load to be lifted ..... lbs.
Electric current—
Direct: ..... volts.
Alternating: ..... phase; ..... cycles; ..... volts.
Travel: Number of floors to be served .....
Actual distance elevator is to travel, i. e.:
Floor heights from lowest to top landing ..... ft. ..... in.
Distance from top floor level to underside of roof over hoistway .... ft. .... in.
Gates required, number and type preferred (semiautomatic or full automatic) .....
Number of openings to elevator hoistway on each floor....
Are all openings on one side or adjacent or opposite sides of hoistway? .....

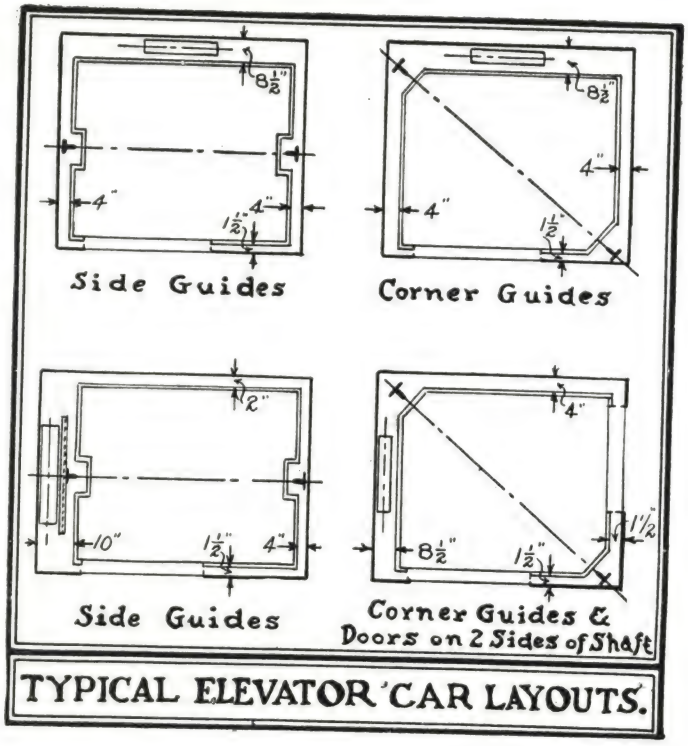
General Information Regarding Elevators

In deciding upon the most advisable capacity, car size and car speed and number of elevators for a building, there are many questions which arise in regard to the number of people or weight and area of freight to be carried in a given time. All these questions are usually disposed of by specifying a high car speed, due to the false impression that increased speed necessarily expedites service proportionately.

High speed means high initial, operating and maintenance costs and not infrequently there is little or no return for these charges.

All elevators are stopped at various landings, more particularly freight elevators, the greater part of the time; and the actual time elevators are in motion is very small.

More consideration should be given to increasing the width of the entrance to the car and having liberal



TYPICAL ELEVATOR CAR LAYOUTS.

sized corridors or loading areas at each floor, as delays at landings, due to congestion, are the principal cause of unsatisfactory service.

As the car speed increases, greater premium is placed on the human element—that is, the operator—which is contrary to the general practice of the day. An operator loses more time, and does untold damage to the apparatus in endeavoring to make accurate stops, than can be gained by having the car operate at a high speed.

If any apparatus is added to the equipment to assure accurate stopping, the operator will depend upon it entirely, which, with the additional complications involved requiring repairs and adjustments, will defeat the purpose of the increased expenditure.

The engineering facilities and experience of this company are at the service of all without any obligation being entailed.

References

Aberthaw Construction Company
Marc Eidlitz & Son, Inc.
Swift & Company
Stone & Webster, Inc.
Turner Construction Company
Standard Oil Company
United States Rubber Company
American Woolen Company
Colts Patent Fire Arms & Ammunition Co.
Manning, Maxwell & Moore, Inc.
Boston and Albany Railroad
Cadillac Automobile Company
Hegeman-Harris Company, Inc.
U. S. War, Navy and Treasury Departments
Amherst College
Smith College
Hartford Fire Insurance Company
Harvard University
Wellesley College
Lockwood Greene Engineers, Inc.
York & Sawyer
McKim, Mead & White
National Life Insurance Co.
Dartmouth College
Albert Kahn, Inc.
Vassar College
Boston & Maine Railroad
New England Power Association

FOUNDED 1860

ASSETS OVER $1,000,000.00

THE WARNER ELEVATOR MFG. CO.

GENERAL OFFICES AND FACTORY
CINCINNATI, OHIO

BRANCH OFFICES AND SERVICE STATIONS IN MORE THAN FORTY CITIES

Products

A complete line of ELECTRIC PASSENGER and FREIGHT ELEVATORS for every service, including Warner-General Electric Gearless Equipment; Warner Elevator Cars and Enclosures. Work of the highest quality and finish.

WARNER ELECTRIC and HYDRAULIC CELLAR HOISTS; WARNER ELECTRIC DUMBWAITERS.

Also Warner Hand Power Elevators and Dumbwaiters; Warner Motors, Controllers and Motor Generator Sets and Levelers; Warner Enclosure and Car Door Operators and Interlocks.

Engineering Service

This company maintains a competent staff of engineers to make surveys, layouts and specifications for any class of elevator work. Because of the rapid advance being made in this field such advice is necessary to architects and quite generally used by them.

Send us copies of your preliminary building sketches with notes about the nature of the service wanted and you will get a prompt response suggesting the proper equipment and approximate cost.

Manufacturing Facilities

A modern factory with 250,000 sq. ft. of well arranged and well lighted floor space, filled with the best machinery that money will buy, enables us to produce a large volume of exceptionally high grade equipment.

A consistently followed policy of making improvements adaptable to existing machines has saved our customers considerable money. The use of accurate jigs and fixtures and a uniformly high standard of workmanship through many years, makes Warner Elevator Service valuable because repair parts or improvements will fit.

Warner-General Electric Gearless Elevators

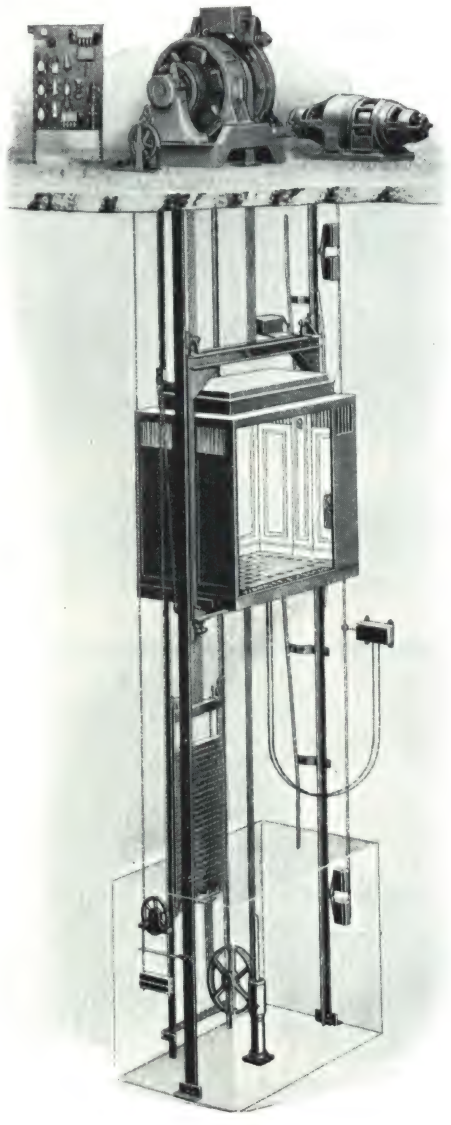
We manufacture a complete line of electric elevator equipment based on seventeen standard sizes of engines. These are manufactured on a production basis which permits the most accurate manufacturing practices.

Variations in the control and other features extend this line so we are usually able to bid on complete elevator equipment for any building that you may be planning.

We have had very successful experience with a new type of selective full automatic control known as Warner Multiple Call Control. This control enables the automatic elevator to handle successfully a large volume of traffic.

Our motor generator sets are of the highest quality—of moderate speed—run quietly and commutate successfully with considerable overloads.

Our variable voltage control systems are most dependable and require very little attention and upkeep. We advise such control when really fine passenger service is required, and on freight elevators where accurate floor level adjustments are necessary. With the variable voltage control a minimum for stop speed is about one-sixteenth of the full speed so that the brake becomes a holding, rather than a stopping means, and the factors causing variation in stopping are eliminated and extreme accuracy secured for car speed up to 500 ft. per minute.



Warner Electric and Hydraulic Cellar Hoists

These, as well as the regular passenger and freight elevators, are manufactured and installed. They are made to fit any conditions of building construction and in capacities to meet all requirements.

Warner Electric Dumbwaiters

The same careful design, rugged construction, exhaustive tests and many years' experience in building Warner Elevators are also applied in the Warner Electric Dumbwaiter. For all kinds of control.

WATSON ELEVATOR COMPANY

INCORPORATED

407 West 36th Street
NEW YORK, N. Y.

FACTORY
HOBOKEN, N. J.

Products

ELECTRIC ELEVATORS:
Passenger and Freight Elevators.
Combination Passenger and Freight Elevators.
Sidewalk Elevators.
Elevator Controllers.

Description

Products of highest quality materials—combined with precision of workmanship—assuring perfect operation and efficiency.

Machine (Illustrated)

Worm gear drive. Capacities range from 1000 to 20,000 lb. Speeds range from 25 ft. to 500 ft. per minute. Horsepower of motors, 5 to 100.

Brake

Electric brake equipment of modern design. Oil immersed—spring applied.

Controller

(The principal element of the elevator equipment.)

Watson Control Boards, both alternating and direct current, are manufactured in various sizes and fabricated to insure accuracy and efficiency.

Built in various designs with three modes of operation.

(a) Car Switch Operation—Services of operator required.

(b) Push Button Operation (or Self-service)—Operated by passenger.

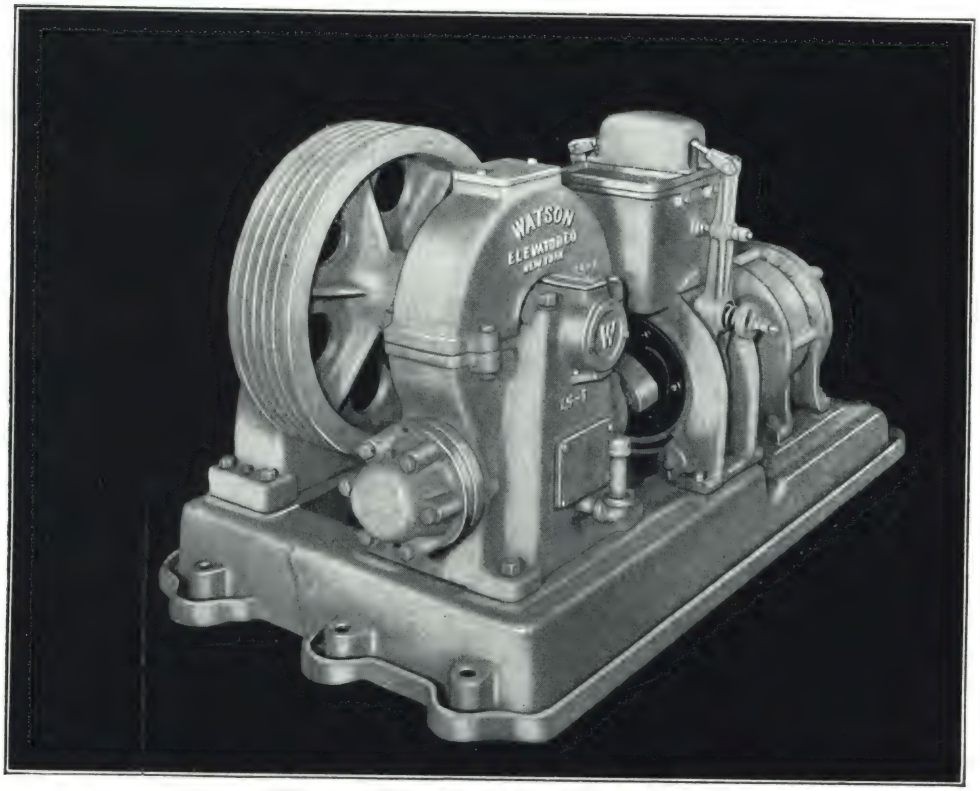
(c) Dual Operation—May be used with or without an operator.

Electric Car Gate

Watson Electric Gate insures maximum safety and comfort to passengers. An electric motor controls its functions—obviating the necessity of opening and closing the gate by hand.

Service

The expert engineering advice of the WATSON ELEVATOR COMPANY is at the disposal of architects and engineers requiring preliminary layouts, drawings or specifications—without cost or obligation.



Watson Electric Elevator Machine

AMERICAN STEEL & WIRE COMPANY

Subsidiary of United States Steel Corporation

Manufacturers of Wire Rope

SALES OFFICES

CHICAGO, 208 So. La Salle Street
CLEVELAND, Rockefeller Building
DETROIT, Foot of First Street
CINCINNATI, Union Trust Building
MINNEAPOLIS—ST. PAUL, Merchants National Bank Building, St. Paul
MILWAUKEE, 850 Bankers Building
ST. LOUIS, 506 Olive Street
KANSAS CITY, 417 Grand Avenue
OKLAHOMA CITY, Hales Building
BIRMINGHAM, Brown-Marx Building
MEMPHIS, Sterick Building
DALLAS, Praetorian Building
DENVER, First National Bank Building
SALT LAKE CITY, Walker Bank Building
NEW YORK, 30 Church Street
BOSTON, Statler Building
PITTSBURGH, Frick Building
PHILADELPHIA, Widener Building
ATLANTA, 101 Marietta Street
WORCESTER, 94 Grove Street
BALTIMORE, 32 So. Charles Street
BUFFALO, 670 Ellicott Street
WILKES-BARRE, Miners Bank Building

PACIFIC COAST DISTRIBUTORS, COLUMBIA STEEL COMPANY

SAN FRANCISCO, Russ Building
LOS ANGELES, 2087 E. Slauson Avenue
PORTLAND, 777 Nicolai Street
SEATTLE, 4th Avenue So. and Connecticut Street
HONOLULU, Castle & Cooke Building

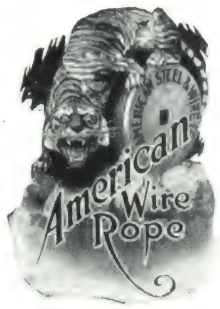
EXPORT DISTRIBUTORS, United States Steel Products Company, 30 Church Street, NEW YORK, N. Y.

Products

All kinds of Wire Rope in the following qualities: Iron, Cast Steel, Extron Steel, Plow Steel and Monitor Steel Silver Strand.

Also a full line of Wire Rope Fittings: Slings, Thimbles, Clips, Clamps, Sockets, Hooks, Turnbuckles, Shackles, etc.

For our catalogues on Concrete Reinforcement, Triangle Mesh for Stucco Base, and Electrical Wires and Cables, see List of Manufacturers.



Qualities of Wire Rope and Their Uses

Wire rope is made in the following five qualities.

Iron Rope—The wires are made from the best quality iron, being soft, tough and flexible. Iron hoisting rope is most generally used for elevator hoisting, where the strength is sufficient. It is almost universally employed for counterweight ropes, except on traction elevators. For traction elevators we recommend special traction rope.

Cast Steel Rope—This is a medium strength material, tough and pliable, of moderate cost and general utility. Weighs only about half as much as iron for same strength; is harder, and better resists external wear. This rope is applicable to a great variety of uses, among which may be noted mine hoisting, elevators, derricks, hay presses, dredges, cableways, inclined planes, coal hoists, conveyors, ballast unloaders, skip hoists and many other uses.

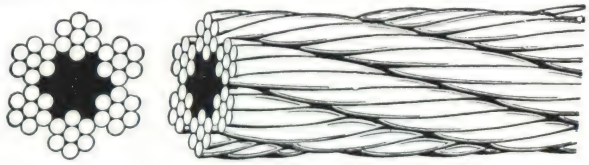
Extron Steel Rope—Of higher tensile strength than the cast steel, and is tough, pliable, a little lighter for the same strength than cast steel, and about two and one-half times the strength of iron. It has been found particularly useful for oil well drilling and tubing lines. Its other general uses are similar to those of the cast steel, except that it may be used where loads are somewhat heavier. (This grade formerly known as Extra Strong Cast Steel.)

Plow Steel Rope—Combines lightness and great strength; is somewhat stiffer than cast steel and nearly three times as strong, and nearly three times as strong as iron wire rope. Used particularly for heavy mine hoisting, derricks, inclined planes, dredges, cableways, for heavy logging and similar uses. It is the most economical rope to use where the weight of the rope has to be considered, or where the capacity of the machinery is to be increased without a corresponding increase in sheaves and drums.

Monitor Steel Rope, Silver Strand—This is the highest strength rope made. It is somewhat stiffer in the same diameter than the plow and cast steel grades, but, strength for strength, it is equally flexible. Very useful where great strength, lightness and abrasive resisting qualities are required. Is identified by having one galvanized strand throughout entire length.

Transmission, Haulage or Standing Rope

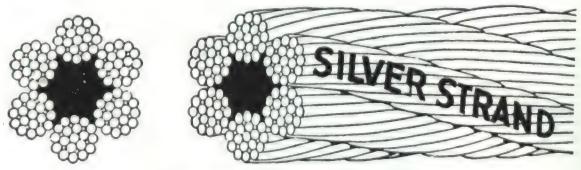
The coarsest rope *i.e.*, 6x7 construction, a relatively stiff rope with large wires, capable of resisting external wear or abrasion; but it is the least flexible.



Transmission, Haulage or Standing Rope (6x7)

Hoisting Rope

Composed of 6 strands of 19 wires each, with hemp core. Used for elevators, mine hoisting, derricks, dredges, cableways, logging, inclined planes, coal hoists, conveyors, ballast unloaders, skip hoist, oil well drilling and tubing lines.



Hoisting Rope (6x19)
Silver Strand marker appears only in the Monitor Grades

Extra Flexible Hoisting Rope

This rope is composed of 8 strands of 19 wires each, laid around a hemp core. The addition of these two strands over the standard hoisting rope increases the flexibility and permits the rope being used over comparatively smaller sheaves and drums.

Adaptable for derricks, steam dredges, coal and ore handling machinery, pile drivers, and also for logging purposes, as well as tubing lines for oil wells.

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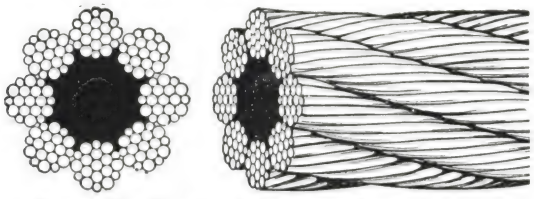
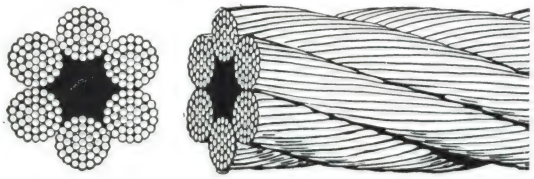


Extra Flexible Steel Hoisting Rope (8x19)

Special Flexible Hoisting Rope

This rope usually composed of 6 strands of 37 wires each, laid around a hemp core, is also manufactured in 6x29 and 6x33 constructions. These special constructions are specially adapted for dredging, clamshell bucket work, locomotive cranes, shovels, etc. For details of these special constructions, see nearest Sales Office.



Special Flexible Steel Hoisting Rope (6x37)

VARIOUS CONSTRUCTIONS AND GRADES OF WIRE ROPE

Diameter, inches	Weight per foot, pounds	Iron: Breaking strength in tons of 2000 pounds, each	Iron: List price per foot	Cast Steel: Breaking strength in tons of 2000 pounds, each	Cast Steel: List price per foot	Extron Cast Steel: Breaking strength in tons of 2000 pounds, each	Extron Cast Steel: List price per foot	Plow Steel: Breaking strength in tons of 2000 pounds, each	Plow Steel: List price per foot	Monitor Steel, Silver Strand: Breaking strength in tons of 2000 pounds, each	Monitor Steel, Silver Strand: List price per foot
Transmission, Haulage or Standing Rope—6 Strands, 7 Wires to Strand, 1 Hemp Core											
1 1/2	3.38	29.7	$0.51	62.5	$0.60	68.7	$0.75	75	$0.90	86.5	$1.05
1 3/8	2.84	25.2	.43	53	.51	58.2	.64	63.5	.76	73.5	.88
1 1/4	2.34	21	.36	44.5	.43	48.7	.53	53	.62	61	.72
1	1.90	17.2	.30	36.4	.36	40	.44	43.6	.51	50	.58
1	1.50	13.7	.24	29	.29	31.9	.35	34.8	.41	40	.48
7/8	1.15	10.5	.18 1/2	22.4	.23	24.6	.27	26.8	.32 1/2	30.8	.37
3/4	.84	7.86	.14	16.5	.18 1/2	18.1	.22	19.8	.26	22.8	.28 1/2
5/8	.59	5.52	.10	11.5	.13 1/2	12.6	.16	13.8	.19	16	.20 1/2
9/16	.48	4.49	.08 1/4	9.4	.11 1/2	10.3	.13 3/4	11.3	.16 1/4	13	.17
1/2	.38	3.57	.06 1/2	7.5	.09	8.2	.10 1/2	9	.12 1/2	10.3	.13 1/2
7/16	.29	2.76	.05 1/2	5.8	.07	6.3	.08 1/2	6.9	.10 1/2	7.9	.11 1/2
3/8	.21	2.05	.04 1/2	4.3	.05 3/4	4.7	.06 3/4	5.15	.08	5.9	.08 3/4
5/16	.15	1.43	.03 3/4	3.1	.04 1/2	3.35	.05 1/2	3.65	.06 1/2	4.2	.08 1/4
9/32	.12	1.17	.03 1/4	2.52	.04 1/4	2.72	.05 1/4	2.95	.06 1/4	3.4	.07 1/2
1/4				2	.04	2.15	.05	2.35	.06	2.7	.07
Hoisting Rope—6 Strands, 19 Wires to Strand, 1 Hemp Core											
2 3/4	12.1	95	$1.70	212	$2.10	234	$2.55	256	$3.00	294	$3.45
2 1/2	10	79.1	1.40	176	1.75	195	2.10	214	2.50	246	2.80
2 1/4	8.1	64.8	1.17	144	1.44	160	1.70	176	2.00	202	2.50
2	6.4	51.8	.95	114	1.16	127	1.34	140	1.58	161	1.85
1 7/8	5.63	45.8	.88	100	1.02	112	1.25	123	1.46	142	1.75
1 3/4	4.9	40.1	.80	88	.90	98	1.10	108	1.30	124	1.60
1 5/8	4.23	34.8	.65	76	.77	85	.94	94	1.08	108	1.30
1 1/2	3.6	29.7	.57	65	.66	72.5	.80	80.5	.93	92.5	1.10
1 3/8	3.03	25.2	.49	55	.56	61.5	.68	68	.79	78.5	.90
1 1/4	2.5	21	.40	46	.46	51	.56	56.5	.65	65	.75
1 1/8	2.03	17.2	.33	37	.38	41.5	.46	46	.54	53	.62
1	1.6	13.7	.26	29.5	.31	33	.37	36.5	.43	42	.50
7/8	1.23	10.6	.21	22.8	.25	25.4	.29	28	.34 1/2	32.2	.39
3/4	.9	7.86	.17	16.8	.20 1/2	18.7	.24	20.6	.28	23.7	.31
5/8	.63	5.52	.13 1/2	11.8	.15 3/4	13.1	.18	14.4	.21	16.6	.22 1/2
9/16	.51	4.49	.11 1/2	9.6	.13 3/4	10.6	.15 3/4	11.7	.18 1/4	13.5	.19
1/2	.4	3.57	.09 1/2	7.7	.12	8.5	.13 3/4	9.4	.16	10.8	.17
7/16	.31	2.76	.08 1/2	6	.10 1/2	6.6	.12	7.3	.14	8.4	.15 1/2
3/8	.23	2.05	.07 1/2	4.5	.09 1/2	5	.11	5.5	.13	6.3	.14 1/2
5/16	.16	1.43	.06 3/4	3.2	.09 1/4	3.5	.10 3/4	3.9	.12 1/4	4.5	.13 1/2
1/4	.1	.97	.06 1/2	2.1	.09	2.3	.10 1/2	2.5	.12	2.9	.13
Extra Flexible Hoisting Rope—8 Strands, 19 Wires to Strand, 1 Hemp Core											
1 1/2	3.26			57.5	$0.73	63.3	$0.88	69	$1.06	79.5	$1.19
1 3/8	2.74			48.6	.62	53.4	.75	58.3	.90	67	.98
1 1/4	2.27			40.4	.51	44.4	.62	48.4	.75	55.7	.82
1 1/8	1.84			32.8	.42	36	.51	39.4	.62	45.2	.68
1	1.45	12.2	$0.29	26	.34	28.6	.41	31.2	.50	35.8	.55
7/8	1.11	9.4	.23	20	.28	22	.34	24	.41	27.6	.43
3/4	.82	6.95	.19 1/2	14.8	.23	16.3	.27 1/4	17.8	.32 1/2	20.5	.34
5/8	.57	4.86	.15 1/2	10.4	.17 1/2	11.4	.20 1/2	12.5	.24	14.4	.25
9/16	.46	4.06	.13	8.5	.15 1/2	9.4	.18	10.3	.21	11.8	.22
1/2	.36	3.28	.11	6.8	.13 1/2	7.5	.15 1/2	8.2	.18 1/4	9.5	.19
7/16	.28	2.40	.09 1/2	5.3	.12	5.8	.14 3/4	6.3	.17	7.3	.17 1/2
3/8	.2	1.60	.08 1/2	3.94	.10 1/2	4.33	.12 1/2	4.7	.15	5.45	.16 1/2
5/16	.14	1.10	.074	2.79	.10 1/4	3.07	.12 1/4	3.34	.14 1/2	3.85	.16
1/4	.09	.80	.07	1.79	.10	1.97	.12	2.15	.14 1/4	2.47	.15 3/4
Special Flexible Hoisting Rope—6 Strands, 37 Wires to Strand, 1 Hemp Core											
3 1/2	19			323	$3.75	357	$4.60	392	$5.35	451	$6.10
3 1/4	16.37			281	3.25	311	3.95	341	4.65	392	5.25
3	13.95			241	2.75	267	3.35	293	3.95	337	4.50
2 3/4	11.72			204	2.30	226	2.80	248	3.30	285	3.75
2 1/2	9.69			170	1.92	188	2.35	206	2.75	237	3.15
2 1/4	7.85			139	1.60	153	1.90	168	2.20	194	2.75
2 1/8	7			125	1.48	138	1.70	151	2.00	174	2.40
2	6.2			111	1.35	123	1.55	135	1.80	155	2.10
1 7/8	5.45			98	1.20	108.5	1.40	119	1.65	137	1.90
1 3/4	4.75			86	1.05	95	1.28	104	1.50	119.5	1.75
1 5/8	4.09			74.3	.89	82	1.07	89.8	1.25	103.3	1.45
1 1/2	3.49			63.5	.79	70	.95	76.7	1.15	88.2	1.25
1 3/8	2.93			53.5	.65	59	.78	64.6	.93	74.3	1.05
1 1/4	2.42			44.3	.55	48.9	.65	53.5	.78	61.5	.86
1 1/8	1.96			36	.46	39.7	.55	43.5	.66	49.9	.75
1	1.55			28.6	.37	31.5	.44	34.4	.52 1/2	39.5	.59
7/8	1.19			22	.30	24.2	.36	26.5	.43	30.5	.46
3/4	.87			16.4	.24	18.1	.28 1/2	19.8	.34	22.8	.36
5/8	.61			11.6	.18 1/2	12.8	.21 1/2	14	.25	16.1	.27
9/16	.49			9.5	.16 1/2	10.5	.19 1/4	11.5	.22 1/2	13.2	.23
1/2	.39			7.7	.14	8.4	.16 1/4	9.2	.19	10.6	.20
7/16	.3			6	.12 1/2	6.6	.15	7.2	.17 3/4	8.3	.18 1/2
3/8	.2			4.4	.12	4.9	.14 1/4	5.3	.17	6.1	.17 1/2

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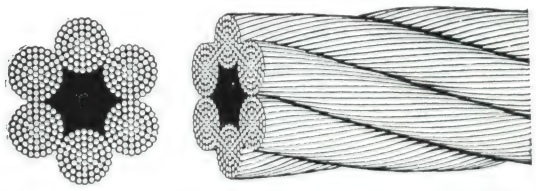
Extra Special Flexible Hoisting Rope

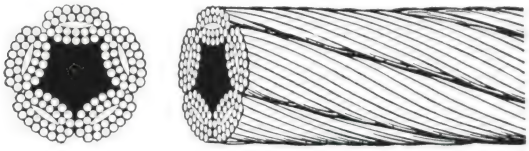
Composed of 6 strands of 61 wires each, with hemp core, and recommended for dredging purposes, for which it is usually made with special wire center.



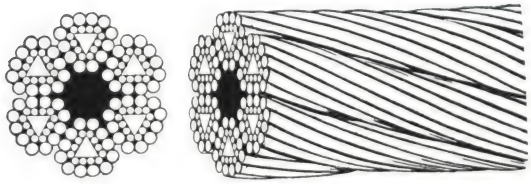
Extra Special Flexible Hoisting Rope (6x61)

Flattened Strand Hoisting Ropes

These ropes compare in flexibility with the standard hoisting rope, but possess about 150% greater wearing surface than the round strand ropes of same diameter and have been used generally in the same places. Made in all grades.



Type A (5x28)

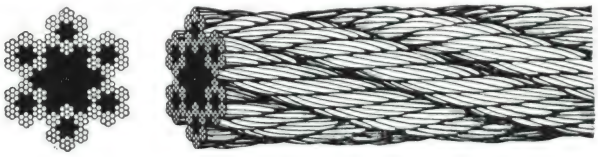


Type B (6x25)

Flattened Strand Hoisting Ropes

Tiller or Hand Rope

Used principally for signal pull purposes in mines and factories, and in connection with the operating or controlling device on passenger and freight elevators. Also used to limited extent for steering lines on yachts and motor boats.



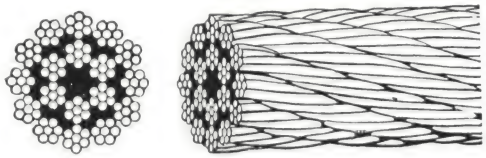
Tiller or Hand Rope

6 strands of 42 wires, each, 7 hemp cores

Diam., in.	Weight per ft., lb.	Breaking strength in tons of 2000 lb., each		List price per ft.	
		Iron	Cast steel	Iron	Cast steel
1	1.10	8.6	16.7	$0.33	$0.43
7/8	.84	6.6	13.	.27	.36
3/4	.62	5.1	9.7	.22	.30
5/8	.43	3.5	6.9	.17	.24
9/16	.35	3.02	5.6	.14	.20
1/2	.28	2.39	4.46	.11½	.17
7/16	.21	1.91	3.44	.10	.15
3/8	.16	1.40	2.54	.09	.14
5/16	.11	.977	1.77	.08	.12½
1/4	.07	.625	1.14	.07½	.11
3/16	.042	.35	.65	.07	.10

Non-spinning Hoisting Rope

This type of rope is so constructed that it prevents the rotating of a free load suspended on the end of a single line. It is recommended for "back haul" or single line derricks.

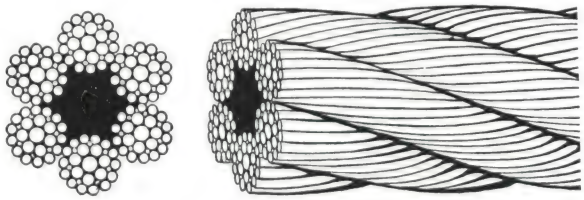


Non-spinning Hoisting Rope (18x7)

American Special Hoisting Rope Type "P"

Six strands, 29 wires to a strand, 1 hemp core, made in 2 grades, plow steel and monitor steel.

This is an excellent rope for clamshell buckets, steam shovels, and general hoisting purposes requiring a greater degree of flexibility than standard 6x19 construction.

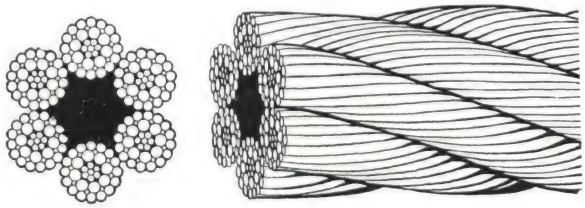


American Special Hoisting Rope Type "P"

American Special Hoisting Rope Type "R"

Six strands, 33 wires to a strand, 1 hemp core, made in 2 grades, plow steel and monitor steel.

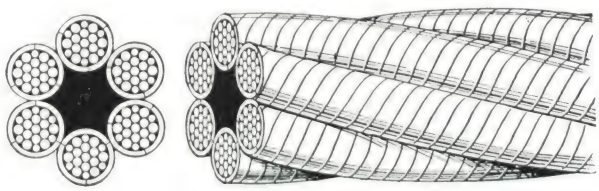
For use on coal cutting machines, this rope, 5/8-in. diameter, Monitor grade, will be found superior to other constructions. It will also give good service on cranes, where abrasion is too severe for 6x37 construction.



American Special Hoisting Rope Type "R"

Steel Clad Hoisting Rope

Each strand is spirally wound with flat steel strips, which gives considerable wearing surface over the ordinary type. When the flat strips of a steel clad rope have worn through, there still remains the complete



Steel Clad Hoisting Rope

6 strands, 19 wires to strand

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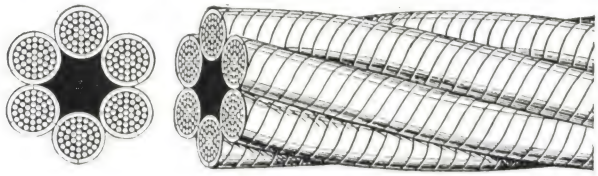
hoisting rope with unimpaired strength. Where ropes wear out quickly, this feature is a distinct advantage.

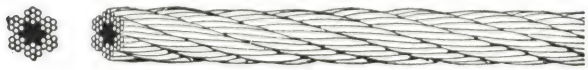
Made in 3 constructions: 6x9 wires each; special flexible, 6 strands of 37 wires each; and extra special flexible, 6 strands of 61 wires each.



Steel Clad Hoisting Rope
6 strands, 37 wires to strand

Sash Cord

Made "dead soft" unless ordered to the contrary. Used principally for window weights, bell cords, automobile brakes and whistles. $\frac{3}{32}$-in. diameter galvanized sash cord is used on electric open car curtain fixtures; $\frac{1}{16}$-in. galvanized sash cord is used on car curtain fixtures.



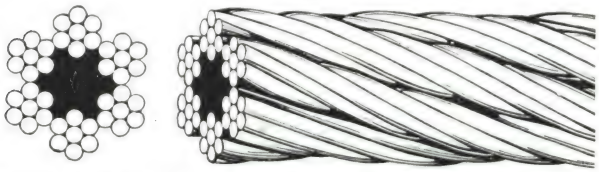
Sash Cord (6x7)

SASH CORD
6 strands of 7 wires each, 1 cotton core

Trade No.	Diam., in.	Weight per ft., lb.		Breaking strengths, lb.			List price per ft.		
		Iron	Copper	Bright iron	Annealed iron	Bright copper	Iron annealed or bright	Tinned or galvanized iron	Copper
26	1/4	.094	.108	2040	1225	1225	$0.03	$0.04	$0.09
27	7/32	.072	.083	1570	940	940	.02 3/4	.03 1/2	.07 1/2
27 1/2	3/16	.053	.061	1150	688	688	.02 1/2	.03	.06
27 3/4	5/32	.038	.044	840	478	478	.02	.02 3/4	.05 1/4
28	1/8	.023	.026	560	306	306	.01 3/4	.02 1/4	.04 1/2
28 1/2	3/32	.013	.015	315	172	172	.01 1/2	.02	.03 1/2
29	1/16	.006	.007	140	77	77	.01 1/4	.01 3/4	.03

Galvanized Iron or Steel Guy Rope

For supporting derricks, and for general standing rope service; it is not designed to run over drums or sheaves.



Galvanized Iron or Steel Guy Rope (6x7, 1 Hemp Core)

Perfected Steel Strand

Used for guying smokestacks, telephone, telegraph and overhead transmission line poles; for supporting telephone, signal and transmission cables in overhead work and trolley wire in catenary construction; also as a ground wire in protecting transmission lines from lightning.

Perfected Steel Strand
Standard galvanized or extra galvanized 7 steel wires twisted into a single strand

PERFECTED STEEL STRAND
Standard galvanized or extra galvanized 7 steel wires twisted into a single strand

Diam., in.	Size of wire used, in.	Approx. weight per 1000 ft., lb.	Approx. strength, lb.
3/4	.250	1,200	16,700
5/8	.207	813	11,600
9/16	.188	671	9,600
1/2	.165	517	7,400
7/16	.145	399	5,700
3/8	.125	296	4,250
5/16	.104	205	3,200
9/32	.093	164	2,570
1/4	.080	121	1,900
7/32	.072	98.3	1,540
3/16	.062	72.9	1,150
5/32	.052	51.3	870
9/64	.047	40	700
1/8	.041	31.8	540
7/64	.035	25	450
1/32	.031	20	400
5/64	.026	13	300

Extra Galvanized Special Strands—Three special grades which meet all requirements for durability, strength, toughness and light weight; Siemens-Martin strand, High Strength (cast steel) strand, and Extra High Strength (plow steel) strand.

Galvanized Mast Arm or Arc Light Ropes

Furnished in sizes 1/4 to 1/2-in. diameter.

Galvanized Mast Arm or Arc Light Rope

Tiger Wire Rope Clips

These are not recommended for permanent fastenings on hoist rope, but are universally used on ropes supporting screens, loading booms, etc.

Tiger Wire Rope Clips

Size clip corresponding to rope, diameter, in.	Size of U-bolts (standard), in.	Approximate weight per 100 clips, lb.	Size clip corresponding to rope, diameter, in.	Size of U-bolts (standard), in.	Approximate weight per 100 clips, lb.
3	1 1/4	2335	1 1/8	3/4	350
2 3/4	1 1/4	2100	1	3/4	288
2 1/2	1 1/8	1570	7/8	3/4	240
2 1/4	1 1/8	1330	3/4	5/8	140
2	1	1015	5/8	9/16	93
1 3/4	1	800	1/2	1/2	70
1 5/8	7/8	680	7/16	1/2	65
1 1/2	7/8	570	3/8	3/8	38
1 3/8	7/8	510	5/16	3/8	32
1 1/4	7/8	450	1/4	3/8	29

Hot galvanized finish (Western Union specifications) can also be furnished.

High Strength Bronze Tiger Wire Rope Clips

High strength bronze clips are designed for use in places where the life of galvanized steel clips is short, due to electrolysis or corrosion. They are much stronger than copper clips and because of their greater hardness are much more dependable. Their strength is approximately 75% that of steel so that four bronze clips may be used in place of three steel clips.

Galvanized Oval Thimbles

Our oval thimbles are heavily coated with zinc and made in various sizes.

Oval Thimbles

EVANS ELEVATOR EQUALIZER CO.

BEDFORD, IND.

SALES OFFICES

NEW YORK, Chanin Building, 122 E. 42nd Street — CHICAGO, Daily News Building, 400 W. Madison Street

Evans Elevator Equalizer

Elevator cables, even when all possible care has been taken in cutting them to equal lengths, will vary considerably in stretch, and it is generally recognized that unequal loading of the hoisting cables occurs due to this variation in cable stretch. This results in shortened life of the group as the entire load is often carried by one or more cables. Cables are condemned by municipal or insurance inspectors when one or more cables have begun to show broken wires in their strands.

The Evans Equalizer is designed to overcome the difficulties encountered due to unequal stretch of the cables and the differential travel caused by the uneven wear of the sheave grooves, and the Evans Equalizer automatically distributes the load evenly over all the cables, thus wearing each and every cable alike, and each and every sheave groove alike.

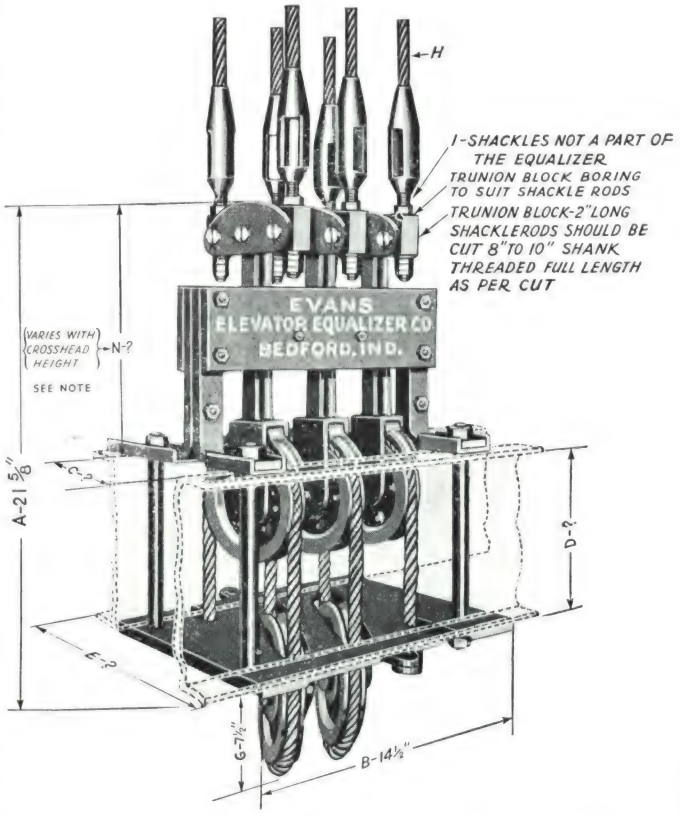
Unequal loading due to this variation in stretch of the hoisting ropes on traction elevators not only reduces traction, but causes differential sheave groove wear, which forces a differential travel of the ropes. A rope that passes over a higher or lower sheave groove than the others travels either faster or slower as the driving sheave revolves, the load on this rope is increased or diminished accordingly, thus some of the ropes are forced to slip. This slippage not only wears the ropes, but also the sheave grooves until it becomes necessary to regroove or replace the sheaves. The loss of traction due to unequal loading and the forced slippage due to unequal depths of sheave grooves causes false stops, as the traction on the ropes varies, making it difficult to stop the elevator level with the floor during regular service. These false stops increase power consumption, operating time, and again decrease cable life, due to the increased flexing in sections corresponding to the position of the car at the floor landings.

The Evans Equalizer hangs all the hoisting cables on to an equalizing assembly instead of the rigid structure of the car. You will note that the bottom plate has a cable dead ended at one end which passes over the floating sheaves and the fixed sheaves, and is again dead ended on the bottom plate which places all the stress on the bottom of the car's crosshead. The tension of the ropes of any pair is equalized by the swing of the equalizer bar to which each pair is attached, and each equalizer bar is attached by a drop forged pull bar to a floating sheave that floats within the compoundings of the equalizing cable, thus each and every cable automatically carries its portion of the weight regardless of the differential stretch of the cables, and the equalizer constantly compensates for the differential travel of the cables due to uneven sheave wear.

Tested and Listed by Underwriters' Laboratories, Inc.

Evans Equalizers have been tested and listed by the Underwriters' Laboratories, Inc., approved and installed in the home office buildings of liability and insurance companies, and passed by state and city engineers.

They are recommended by many of the leading elevator manufacturers from coast to coast, and wire rope manufacturers generally approve of their use on elevator cables.



Dimensions of the Evans Elevator Cable Equalizer

Dimension "B" for 4-8-10 and 12-rope equalizers 11¾ in., 1 ft. 5¾ in., 1 ft. 9½ in. and 2 ft. ¾ in.

Dimensions of equalizers in excess of 12-rope furnished on request.

Note: N-plus-D = 1 ft. 9⅝ in.

Note: In cases of 2-to-1 roping equalizer is mounted in place of hitchplate in the overhead.

STANDARD STEEL SPECIALTY COMPANY

Manufacturers of Quality Planed Elevator Guides

EASTERN PLANT AND MAIN OFFICE
BEAVER FALLS, PA.

WESTERN PLANT
HAMMOND, IND.

BRANCH OFFICES
NEW YORK, N. Y., 52 Vanderbilt Avenue
HAMMOND, IND., P. O. Box 1256
DETROIT, MICH., 1130 Book Building
LOS ANGELES, CALIF., New Orpheum Building
BOSTON, MASS., 683 Atlantic Avenue
SAN FRANCISCO, CALIF., Monadnock Building

Products

Quality Planed Elevator Guides.

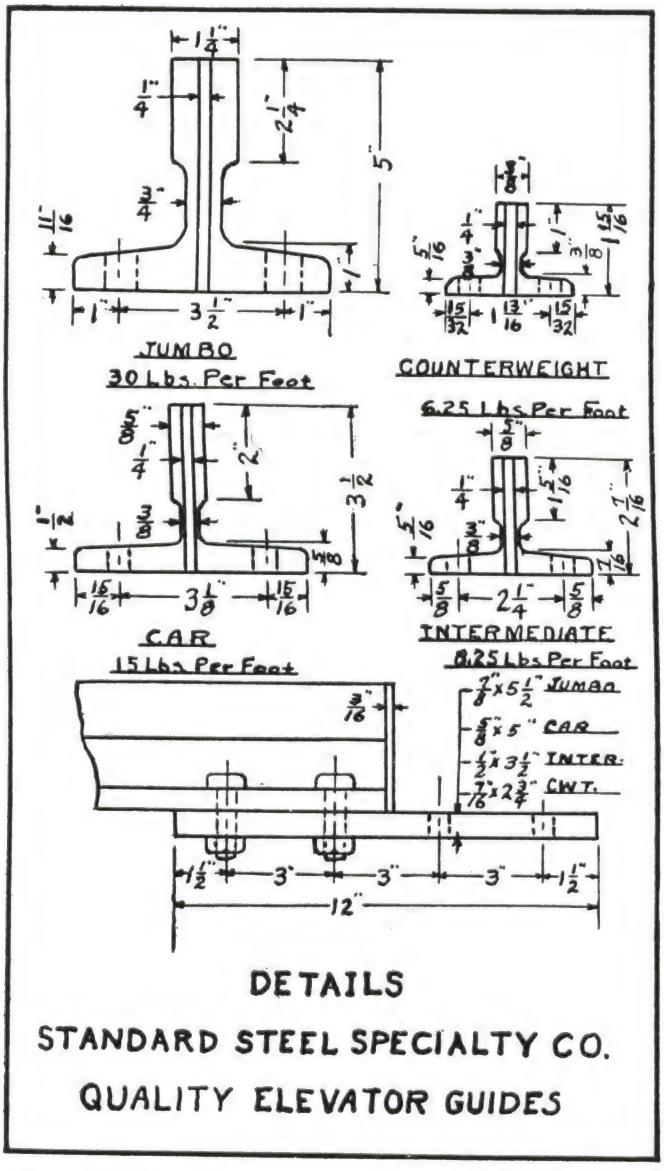
Also Shim Plates; Brackets; Clips; Dumbwaiter Channels.

Advantages

Savings in labor when erecting. No joint filing. No re-aligning. Smooth operation. Excellence of finished job.

Range of Application

Quality Planed Guides excel for car running at high speed due to the fact that they are machined straight and true to size. Experience has taught us the art of finishing these parts with a hard glass finish. Ends are matched so that all joints are perfect.



Due to these qualities our Planed Guides are naturally specified on low speed requirements.

Type, Sizes and Lengths

Quality Planed Guides are made in four standard "undercut" sizes: jumbo, car, intermediate, and counterweight.

Standard lengths carried in stock for immediate delivery are 7, 9 and 16 ft. When specified, runs to the required length are furnished without extra cost.

Fish plates, bolts and nuts are furnished with all rails.

Accessories

A full line of angle and channel brackets, shim plates and clips are carried in stock for immediate shipments.

Specifications

Where quality counts specify Standard Steel Specialty Company Quality Elevator Guide Rails.

Recent Installations

Hilton Hotel, El Paso, Tex.
Atlanta National Bank Building, Atlanta, Ga.
Santa Fe Building, Amarillo, Tex.
Delco Company, Dayton, Ohio
National Cash Register Co., Dayton, Ohio
Peoples State Bank Building, Pontiac, Mich.
Woodycrest Avenue Apartment, Bronx, N. Y.
California Bank Building, Los Angeles, Calif.
R. H. Macy Company, New York, N. Y.
Sun Life Assurance Company, Montreal, Que., Can.
So. California Edison Co. Building, Los Angeles, Calif.
Phoenix Title & Trust Building, Phoenix, Ariz.
Bartlett Building, Los Angeles, Calif.
F. W. Woolworth Company, Boston, Mass.
Malden Gas & Electric Co., Malden, Mass.
Medico-Dental Building, Sacramento, Calif.
El Cortez Hotel, San Francisco, Calif.
Business Men's Assurance Co., Kansas City, Mo.
Badgerow Building, Sioux City, Iowa
Rhodes Medical Arts Building, Tacoma, Wash.
Exchange Building, Seattle, Wash.
High Bridge Towers, New York, N. Y.
Dominion Garage, New York, N. Y.
American Museum of Natural History, New York, N. Y.
Madison Hotel, Atlantic City, N. J.
Cornell Medical Hospital, New York, N. Y.
Yale University Buildings, New Haven, Conn.
Endicott Johnson Co., Johnson City, N. Y.
State Library, Sacramento, Calif.
City Hall, Boston, Mass.
Marine Building, Vancouver, B. C.
Canadian National Hotel, Halifax, N. S.
Bell Telephone, Building, Toronto, Ont., Can.
Y. W. C. A. Building, Minneapolis, Minn.
Swedish Hospital, Minneapolis, Minn.
Abe Lincoln Hotel, Reading, Pa.
Women's Medical College, Germantown, Pa.
Temple University, Philadelphia, Pa.
Union League Club, New York, N. Y.
Cathedral of Learning, Pittsburgh, Pa.
Par Chateau Apartment, Forest Hills, N. Y.
Flaherty's Garage, Shenandoah, Pa.
Caledonia Hospital, Brooklyn, N. Y.
Claridge Hotel, Atlantic City, N. J.

UNION DRAWN STEEL COMPANY

Manufacturers of Elevator Guides

BEAVER FALLS, PA.

Product

PLANED and COLD DRAWN ELEVATOR GUIDES.

Manufacturing Practice

Planed Guides—Produced with a smooth machined finish; accurate in dimension and straightened on specially designed equipment by trained men.

Cold Drawn Guides—Die drawn to a smooth surface, highly resistant to wear, to the same accuracy requirements as the planed guides.

Physical Properties

Planed Guides—Furnished in selected *open hearth* analysis, low in phosphorus and sulphur to eliminate any danger of failure under the most arduous service requirements.

Cold Drawn Guides—Special tests conducted by the Robert W. Hunt Company have shown cold drawn steel guides to be highly resistant to transverse bending under load. Furnished in same grade as planed guides.

Shipped Ready for Installation—Our guides are made in standard 16-ft. sections (dumbwaiter guides are furnished in 8-ft. sections) with matched joints and are fitted with fish plates, bolts and the necessary drilling. When desired, we can assemble them in runs of any required length without extra cost. They can then be easily and quickly erected and do not usually require any filing or shimming on the part of the erector.

Types and Sizes—Made in two types: "Undercut" in the planed condition and "Fillet" in the cold drawn condition.

Sizes are as shown in the illustration. Note, however, that only two sections are shown of the planed guides. Facilities are provided for producing any required section in the planed condition.

"High Speed" guides (Section T-168) are used for rapid operation where additional strength is essential and to provide added rigidity at the joints. Patented, specially designed fish plates are furnished with rails normally used in high-speed installations such as T-168; T-164; T-165; T-160; T-161.

All sizes as shown in the illustration are carried in finished stock for immediate shipment.

We are ready to furnish expert field assistance or other co-operation connected with the planning, erection and handling of elevator guides.

Specifications

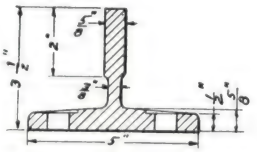
On elevator specifications include the following:

All elevators to be equipped with guides, either in the planed or cold drawn conditions, as manufactured by the UNION DRAWN STEEL COMPANY of Beaver Falls, Pa.

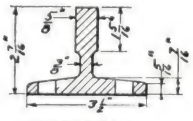
Detail of

Union Drawn Steel Co. Elevator Guides

PLANED GUIDES

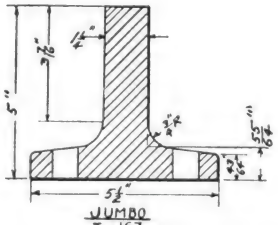


STANDARD CAR T-160
Weight per Lineal Foot 15 Lbs.

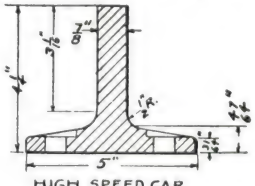


INTERMEDIATE T-161
Weight per Lineal Foot 8⅛ Lbs.

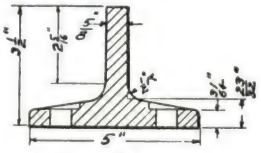
COLD DRAWN GUIDES



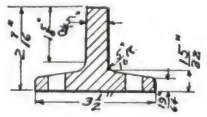
JUMBO T-167
Weight per Lineal Foot 33.6 Lbs.



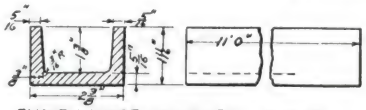
HIGH SPEED CAR T-168
Weight per Lineal Foot 21.4 Lbs.



STANDARD CAR T-164
Weight per Lineal Foot 16.7 Lbs.



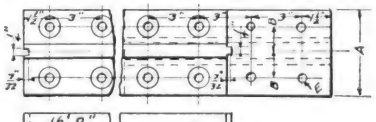
INTERMEDIATE T-165
Weight per Lineal Foot 9.53 Lbs.

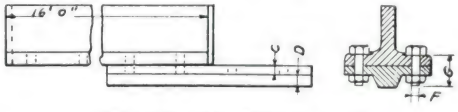


DUMB WAITER CHANNEL C-640
Weight per Lineal Foot 5.80 Lbs.

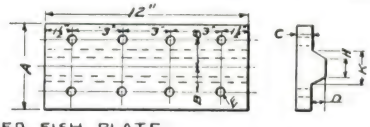
COUNTERWEIGHT AND DUMB WAITER T-166
Weight per Lineal Foot 7.17 Lbs.

GUIDE ASSEMBLIES

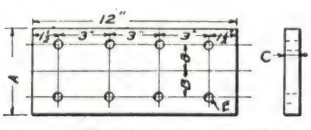




DRILLING AND END MILLING



RIBBED FISH PLATE



PLAIN FISH PLATE

GRANT ELEVATOR EQUIPMENT CORP.

Elevator Signal Systems, Elevator Door Closers, Electric Interlocks and Hangers

101 Park Avenue, NEW YORK, N. Y.
CALIFORNIA REPRESENTATIVE, Grant Products Company, Builders Exchange, LOS ANGELES
AGENCIES IN ALL LARGE CITIES

Products

Grant Electric Elevator Signals.

Grant Elevator Door Closers and Electric Interlocks.

Grant Bar Interlocks.

Grant Cold Drawn Steel Door Hangers.

For Sash Pulleys, Revolving Window Devices and Drawer Slides, see Grant Pulley and Hardware Co. in Manufacturers' Index.

Grant Electric Elevator Signals

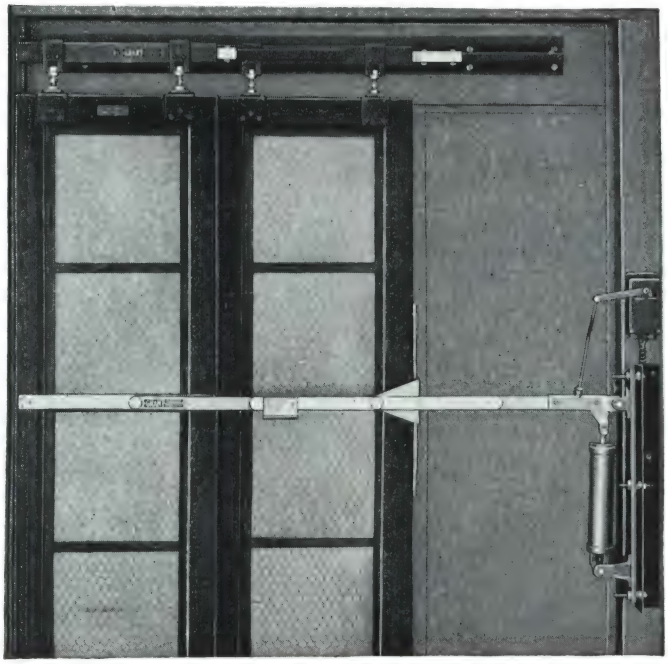
We make and install elevator signal systems of all types—flashlight, department store, target, etc. Dial indicators of electric, electro-mechanical and mechanical types furnished. Our elevator signal systems are both rugged and refined, adaptable to both old and new buildings. Data furnished on request.

Grant Elevator Door Closers and Electric Interlocks

A practical and effective device for the prevention of accidents in connection with elevator service.

Frequent accidents have created the necessity for perfect safety appliances on all doors leading to elevators. To fill this requirement this company has perfected the device shown. It is thoroughly efficient, reliable and a positive safeguard. When released, the action of the doors is rapid until within a few inches of the closing point. The liquid checking device then takes control, checks the rapid movement, and brings the doors to a noiseless, slamless stop.

All Grant closer arms are full bronze bushed at wearing points or joints. We use the highest grade bearing bronze obtainable and at no point do we have friction of steel to steel. This insures long life to the closer arm—heretofore the weakest part of any closer installation. With these bronze bushed joints, long life is assured even though lubrication be neglected.



Grant Elevator Door Closer and Interlock

The Grant Interlock prevents movement of the elevator while any door is open.

No gears are required in the hanger for two-speed operation, the omission of which is a saving toward the cost of Grant Door Closers for two-speed doors.

It will be noted that the closer arms themselves create the 2:1 action and also form a perfectly noiseless lock.

Grant Door Closers can be applied to any type of sliding door.

Grant Bar Interlocks

Practical, economical and effective for freight elevator door openings, etc., where quiet operation is not essential. We recommend the installation of these Grant Bar Interlocks for such conditions. Safety is assured through their use.

Grant Cold Drawn Steel Door Hangers

Construction—Grant hangers are made of special cold drawn steel. In all types there are two rows of ball races, one at the top and one at the bottom of the track with the balls fitted in between the track and the hanger. The double races prevent any upthrust of the doors. The grooves are drawn accurately so that the balls roll perfectly free, without binding at any point. The balls are retained in their respective places by metal spacers; these spacers keep the balls from being lost when adjustments are made. The hangers are made to suit the weight of the doors and have a very large factor of safety.

Installation—Tracks should not be secured to brick, terra cotta or concrete with expansion bolts, but should have steel or wood backing. All doors should be stopped with rubber bumpers. The hanger should not act in this capacity as it is not made for this purpose.

Finish—All hangers and tracks are painted black unless otherwise ordered.

Swing Device—Swing device can be applied to any of our standard hangers for either single or two-speed doors where combination slide and swing units are called for.

Special Features—(A) Each hanger track is provided with patented pendant bolts which permit *lateral, perpendicular* and *plumbing* adjustment for the proper alignment of the doors without removing them from the tracks.

(B) The traveling and stationary tracks are cold drawn for the ball bearing raceways to insure smoothness and noiselessness in operation; no possible binding.

(C) The ball bearings are of the best case hardened steel obtainable and set in spacers of heavy sheet steel so stamped that the balls have a perfectly free motion and can not drop out while making adjustments.

Grant Quality

Grant products are quality products. Each item—either signal, door closer, interlock, bar lock or door hanger—has its own improved features.

Grant builds for long "troubleproof" service and welcomes requests for general information and specific installation data.

NORTON-BLAIR-DOUGLAS, INC.

Elevator Accessories

TELEPHONE
MEDallion 5800

460 West 34th Street, NEW YORK, N. Y.

N-B-D Electric Operator for Elevator Doors

The system comprises an individual unit for each door and a separate unit for car door operation. Wiring between the corridor door and car door unit is in parallel—the action of one motor is tied in electrically with that of the other. Each corridor door unit is made up of a motor, thrust bearing, flexible coupling, screw, nut, oil jacket, bed plate, fulcrum and upthrust arm.

To energize the individual or particular hatch door an induction relay is mounted on the guide rail which is thrown into the operative position upon the stopping movement of the car. This is done through means of an inductor coil on the car, which becomes energized when the latter slows down, and pulls in the contacts in the inductor relay located in the hatch, thus causing that particular motor to be connected into the main operating circuits.

A master control panel is provided in the penthouse consisting of three relays which serve to energize the motors in the proper direction and hold them so until both doors have fully operated.

No mechanical connection whatever is made between the car and the landing door. Neither is there any mechanical connection made between the car and the induction relay mounted in the shaft.

The motors also provide the checking force, retarding the doors at the end of their travel, thus preventing slamming. This is accomplished by introducing resistances across the motor armature for dynamic action at several fixed points of travel of the door.

Safety Features for Passengers—In the closing motion of the door sufficient power is given the motor to accelerate the doors rapidly but this power is substantially reduced when the door has been fully accelerated, and for the greater percentage of their travel the power is so slight that a person struck by the doors will not be squeezed between them.

The "Safe-T-Ray"—An additional protective device which may be purchased at a slightly added cost. This apparatus utilizes the well developed photo-cell which has been applied to a great many uses but our company is the first to apply it for the protection of elevator passengers. Many engineers who have inspected "Safe-T-Ray" have stated that it is one of the most important developments in elevator safety in many years.

N-B-D Elevator Door Opener for Manual Operation

This closer differs radically from all others both in operative principle and constructional details. Its several important departures have been made with a view to:

The elimination of many unnecessary parts; the reduction of wear; insurance against breakage of springs; the prevention of leakage; and, finally, the provision of a uniform, unvarying check or "cushion" which, year in and out, without cleaning, readjustment or refilling, will insure perfect silence in closing.

Closer Bars—Cold rolled steel, extra heavy in section.

Pivots—Bars are connected at all joints by hardened steel pivots ⅝ in. or larger—longer wear.

Pivots Grease Lubricated—All pivots are drilled for lubrication by the Zerk compression gun. Grease is thus applied directly between the pivot and the bushing.

Fulcrum Bearing—The part which wears most rapidly in a door closer is the pin of the fulcrum bearing. In the N-B-D closer this is not only made ⅝-in. diameter (twice the usual size) but, in an ingenious manner, is held from turning with the fulcrum casting to which the door bars are attached, thus minimizing wear.

Cylinder—The cylinder is the heart of the closer, the source of power and control on which the effective action of the entire assembly depends.

The cylinder of the N-B-D Closer eliminates many parts heretofore considered essential. It has so few interior parts that space is available for a spring longer than that of any other closer we know of. So proportioned the spring is unbreakable.

A cushion effect of great smoothness is accomplished by substituting a simple cylindrical dash pot for complicated arrangements of by-pass tubes and throttling screws. The highly adjustable cushion is adapted to control of both heavy and light doors. The cushion, once adjusted, will remain constant and unvarying for *the life of the closer*. A solid, unperforated base prevents leakage of cushion liquid.

Handle—Pressed steel, chromium plated.

N-B-D Electric Interlocks

Master Interlock—One master interlocking switch of generous proportion carried by the elevator. This eliminates the traveling cable, suspended from the bottom of elevator, which is necessary with all other systems.

Simplicity—Economy—Reduced upkeep cost. Burn-outs and short circuits eliminated.

Bar Interlock—A reliable door lock combined with a new and improved "electric contact." The bars are made of ⅝-in. seamless drawn steel tubing.

Series Type Interlock—Designed in the same generous proportions as the master type.

Electro-mechanical Interlock for Push Button Elevator Doors—For use with push button elevator doors of sliding type.

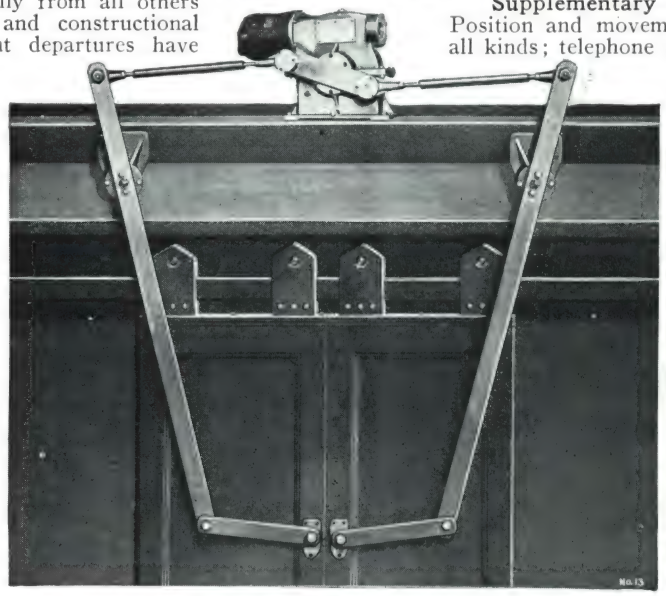
N-B-D Elevator Door Hangers

Ball bearing sheave type suitable for hand or power operation, special ball bearings, cold drawn rolled track of high carbon content, vertical and lateral adjustment.

N-B-D Elevator Signal Systems

Complete or zone signal systems; flashlight annunciator systems; department store signal systems; target annunciator systems; also special systems to meet special requirements.

Supplementary or Auxiliary Signal Systems—Position and movement indicators; starter systems of all kinds; telephone systems; dispatching systems.



N-B-D Electric Operator Applied to Center Opening Car Doors

The operator is used with all types of sliding doors, such as single speed, 2-speed and center opening

N-B-D Electric Operator
Applied to sliding hatchway doors

Suppliers to A. B. See Elevator Co., Inc., and Westinghouse Electric Elevator Co.

RANDALL CONTROL & HYDROMETRIC CORPORATION

Manufacturers of Elevator Door Operators, Locks and Signal Systems

1014 East 9th Street
LOS ANGELES, CALIF.

EASTERN REPRESENTATIVES: Door Motive Corp., 270 St. Aubin Street, DETROIT, MICH.
PACIFIC NORTHWEST REPRESENTATIVES: D. E. Fryer & Co., 1223 Utah Street, SEATTLE, WASH.
SAN FRANCISCO REPRESENTATIVES: H. D. Saville, Merchants Exchange Building, SAN FRANCISCO, CALIF.

Products

"Randall" Pneumatic Elevator Door Operators.

"Randall" Interlocks for manually operated elevator doors.

"Randall" Elevator Signaling Systems.

All devices fully covered by patents.

WITH A TWIST OF THE WRIST · CONTROL & SAFETY ·

TRADE-MARK

"Randall" Pneumatic Door Controls

The "Randall" pneumatic system is designed for the complete mechanical operation of all types of horizontal sliding doors for car switch, automatic or signal control passenger and freight elevators. The system consists of a double cylinder pneumatic engine mounted over each set of doors and applying power through a set of levers to speedily and quietly open and close same. All moving points on lever system are fitted with renewable bronze bushings. Momentum of doors is checked by a combination of air cushion built into pneumatic engine and auxiliary double acting oil check mounted on engine bed plate and attached direct to door lever system. This combination of air cushion and oil check provides a smooth and rapid deceleration of doors under all varying temperature changes.

The "Randall" system is also applied in the same manner to cab doors or collapsible gates, and operates same in full synchronism with hatchway doors.

The "Randall" mechanical strap lock with single master switch is provided as an integral part of the pneumatic system. Doors cannot be opened from corridor side and car cannot be operated while any door is open. Pneumatic cam carried on car is under complete control of operator to unlatch doors, break master interlock switch and operate door engine air valves.

"Randall" Pneumatic Engine—The "Randall" pneumatic engine has two single acting cylinders mounted on frame with crosshead attached to piston rod. Engine, interlock assembly and oil check are all securely fastened to one bed plate. Pistons are of double cup full-floating type and there are no stuffing boxes. Air cushion is built into each cylinder with separate adjustment and engines are provided with special oiling device, permitting easy injection of oil into cylinders without necessity of moving facier plates or getting on top of cab.

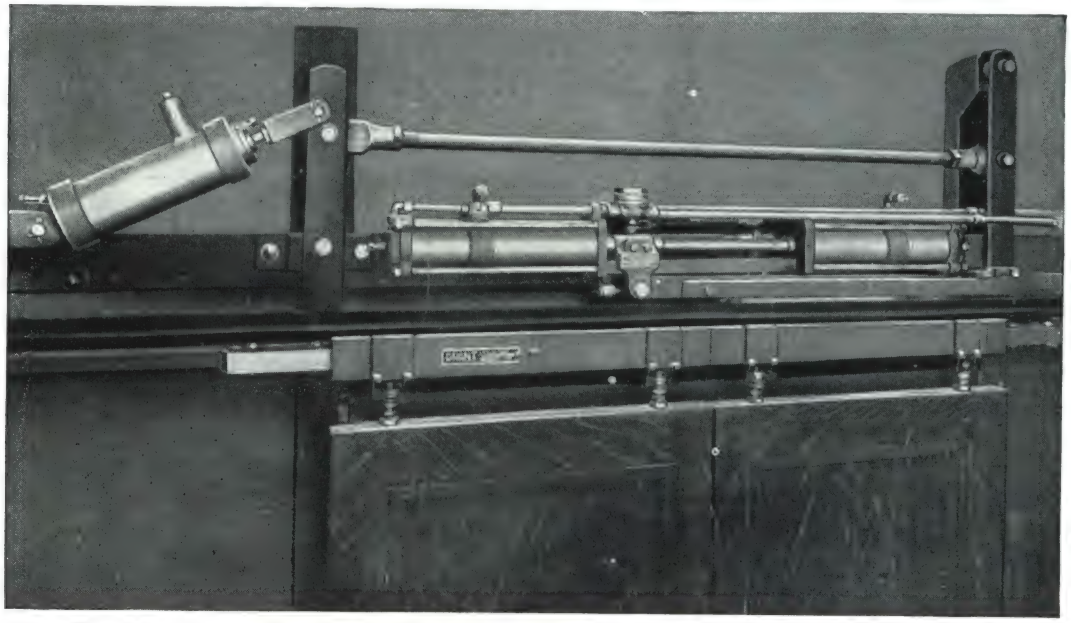
The "Randall" pneumatic system requires a pocket space but 18 in. high above top of door hanger and 4¼ in. in depth back of flush hatch line.

Types of Control—The standard control regularly furnished for car switch elevators has handle or throttle placed convenient to operator's hand and giving him complete and instant control of doors at all times. Electric solonoid control of cam gun air valve is also furnished for automatic opening of doors off car switch for self-levelling or "signal control" elevators.

Type 18 Strap Lock and Master Switch—All hatchway doors equipped with the "Randall" system are mechanically latched by a steel hook engaging bar moved by pneumatic engine. A heavy spring steel wire operating master switch runs through a wire stud attached to latch hook, which, when raised by cam on car opens master switch contacts before door is unlatched. Roller on latch hook engaging top of bar keeps car circuit open while doors are unlatched. Closing of doors latches same before master switch is closed. Only one master switch is required per hatchway. This switch is of rugged construction and may be located at any convenient place in hatch.

The Type 18 master switch is also furnished for foot pedal and handle bar type interlocking systems for manually operated doors, as well as for use with any standard make of spring door closer.

This Type 18 master switch is made under Underwriter's Laboratory inspection and its use permits the building receiving the best insurance rate obtainable.



"Randall" Standard Pneumatic Engine with Oil Check, Center Parting Type Doors

"Randall" Signal System

Automatic transfer and re-set signal systems of the most modern type, employing many novel features, can be furnished for all classes of buildings.

Hundreds of buildings throughout the country have "Randall" Pneumatics and Signals; many upwards of twenty years. Consult our nearest representative regarding your problems.

RICHARDS-WILCOX MANUFACTURING CO.

INCORPORATED

Manufacturers of Elevator Door Equipment and Hardware Specialties

AURORA, ILL.

CABLE ADDRESS
"RICHWILCO, AURORA"

BRANCH OFFICES

ATLANTA, GA., 406 Southeastern Trust Building
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CINCINNATI, OHIO, 512 Provident Bank Building
CLEVELAND, OHIO, 1517 Builders' Exchange Building
DES MOINES, IOWA, 619 Hubbell Building
DETROIT, MICH., 505 Donovan Building
INDIANAPOLIS, IND., 1939 North Meridian Street
KANSAS CITY, MO., 206 Reliance Building
LOS ANGELES, CAL., 500-501 California Reserve Building
MILWAUKEE, WIS., 445 Milwaukee Street
MINNEAPOLIS, MINN., 321 Plymouth Building
NEW ORLEANS, LA., 528 Canal Bank Building
NEW YORK, N. Y., 79 Walker Street
OMAHA, NEB., 228-229 City National Bank Building
PHILADELPHIA, PA., 507 Arch Street
ST. LOUIS, MO., 2665 Washington Avenue
SAN FRANCISCO, CAL., 557 Market Street
SEATTLE, WASH., 1214 Hoge Building

LONDON, ONT., RICHARDS-WILCOX CANADIAN CO., LTD.

CANADIAN FACTORY, LONDON, ONTARIO

For Fire Doors and Garage Door Hardware, see Manufacturers' Index

Service from Sea to Sea

No matter where you are located, a Richards-Wilcox branch office is not far distant.

The Richards-Wilcox organization is not content to merely make and sell quality hardware.

R-W Elevator Door Equipment Gives Super-excellent Service in Every Type of Building

R-W elevator door equipment gives super-excellent service in every type of building. In office and loft buildings, it is selected because of its ability to stand up under long, hard usage. In hotels, clubs and apartment houses it is preferred for its noiselessness and dignified appearance.

Its perfect operation not only contributes to the comfort and safety of guests and tenants, but Richards-Wilcox equipment is economical, requiring only periodical lubrication.

Good elevator service cannot be maintained with inferior door hangers and closers. Elevator doors equipped with R-W elevator door hardware close easily, swiftly, noiselessly and completely with one motion.

R-W hangers, closers, checking devices, safety interlocks and operators are separate mechanisms, yet so constructed that they synchronize perfectly, forming a *complete unit control.*

Hangers—Evenly distribute the weight of the doors. Doors so equipped operate smoothly and noiselessly.

Closers—Designed to allow easy and rapid operation. Quietness is assured by an adjustable liquid check.

Interlocks—Electric, electro-mechanical, or mechanical, may be added to the above closers at any time without changing the closer mechanism.

Power Operators—An electric operator mounted on elevator itself, opening and closing doors more smoothly and quickly than with manual operation.

Signal Systems—Improved complete signal systems require greatly reduced maintenance charges.

RICH-WIL ELEVATOR DOOR HANGERS

The reception accorded and results achieved by Rich-Wil Ball Bearing Elevator Door Hangers in their slightly more than three years of use are quite remarkable. They have been installed in some of the finest buildings in the country and without exception they have made friends on every job and have been specified and used over and over again.

The quietness and smoothness of operation is gained by the high quality of materials and workmanship, and the splendid design incorporating the use of large size perfectly round .750 ± .001-in. ball bearings of best grade of steel, which are spaced at not over 3-in. centers and contained in a ball retainer consisting of two 7/8-in. channels back to back, separated by spacers, which keep the balls in perfect alignment. The balls roll in a heavy section hard cold rolled steel track, into which a perfectly smooth runway has been machined.

The hanger is composed of three main parts:

(1) Steel angle wall plate to which is attached the stationary track with its limit stops.

(2) Ball retainer.

(3) Running track.

Steel Angle and Stationary Track

The steel angle wall plate is designed to be attached to the wall.

The projecting ledge of the steel angle above the top of the track serves to protect the hanger from falling dirt and also makes a very convenient place for attaching a cover, if required.

The steel angle also makes a much stiffer construction than a flat plate.

The stationary track, with a limit stop at each end, is firmly attached to the wall plate. The track proper is a heavy section of hard cold rolled steel into which a perfectly smooth runway for the large ball bearings has been machined.

Ball Retainer

Composed or two pieces of channel shaped steel fastened together and slotted every 3 in., into each of these slots a large high duty stationary track, and the running track runs on the top of the balls. The ball retainer is located above the stationary track and below the running track.

Continued on next page

Running Track

The running track, also termed a rider bar, which runs over the top of the balls, is formed from a hard cold rolled steel bar, into which a very smooth runway is accurately machined. This track is attached to a steel angle (resembling a housing), one leg of which drops over the front of the hanger to enclose it.

Limit Rollers

One at either end, are adjustable. They prevent doors from jumping or raising.

Hanger Pendants

Permit lateral and vertical adjustment of the doors.

Apron Attachments

Are furnished for wood or kalamein doors.

Plate Attachments

For angle iron or grill doors; hollow metal doors are drilled and tapped to receive the pendant bolts. Finish, dead black. Packed with screws for attaching.

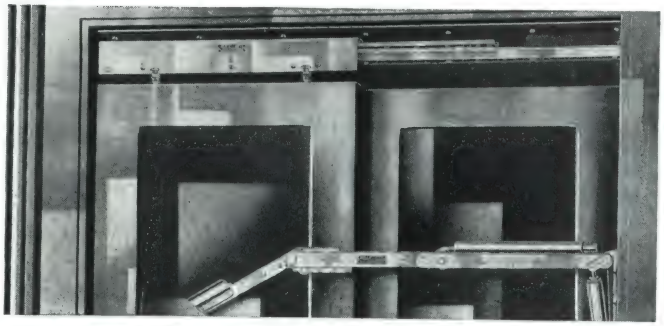
Information Required to Specify

(1) Width of sliding doors.
(2) Width of hinged door, if any.
(3) Width of door opening.
(4) Thickness of doors.
(5) Laps of sliding doors over jambs.
(6) Lap of sliding door over hinged door, if any.
(7) Specify distance between jambs.
(8) Whether attached to wood or metal.
(9) Whether doors are wood, kalamein, hollow metal, grill or angle iron.
(10) Are doors right or left hand?
(11) Send sketch or blueprint showing doors, doorway and width of elevator shaft if possible.

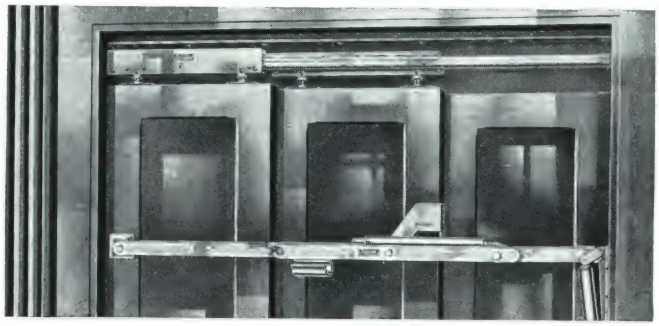
Rich-Wil Hangers are built for single slide, two-speed, three-speed, bi-parting, two-speed bi-parting, combination slide and swing and combination two-speed slide and swing openings.

They are made in two weights: our standard and heavy duty. The standard hangers are used on most elevator door openings, but the heavy duty are recommended for very heavy doors and power operated doors.

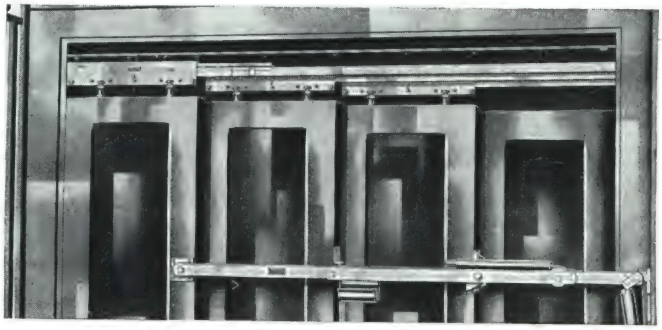
Types of Rich-Wil Elevator Door Hangers



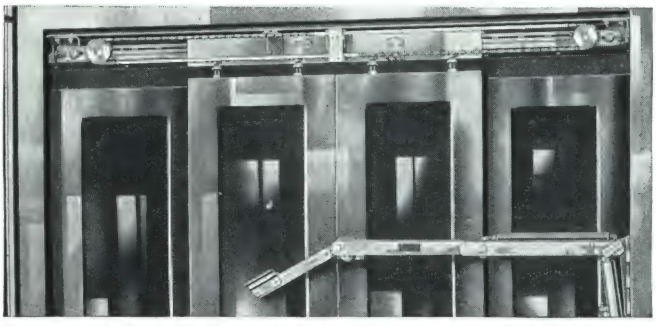
For Single Sliding Doors No. 827



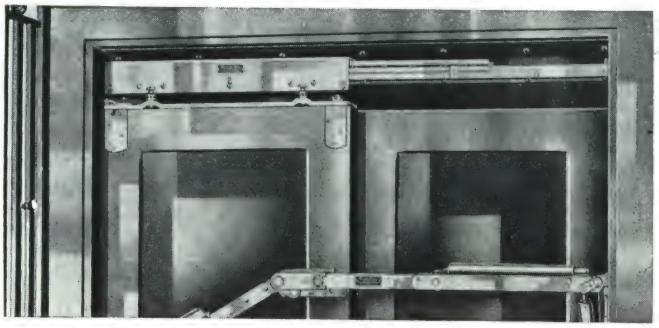
For Two-speed Doors No. 828



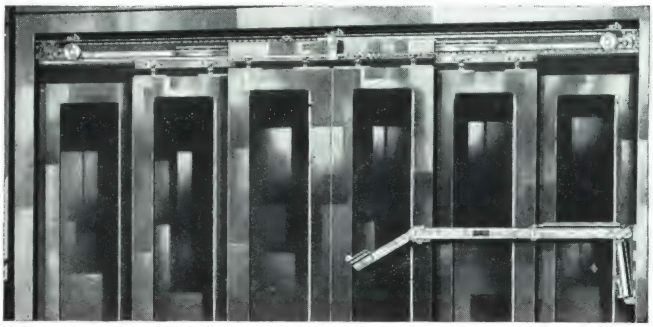
For 3-speed Doors No. 829



For Bi-parting Doors No. 830



For Combination Swing and Slide Doors No. 832



For 2-speed Bi-parting Doors No. 834

Continued on next page

No. 743 RICH-WIL ELEVATOR DOOR CLOSERS

Rich-Wil Elevator Door Closers incorporate the patented feature of having separate closing and checking mechanisms which are regulated independently of each other to suit varying conditions of doors. This feature not only permits very accurate regulation of manner of operation of doors, but also reduces to ¾ in. the space required in back of the doors in the open position to the closer support.

Closers are made for all types of openings for both car switch and push button elevators. All bearing points of these closers are large size and where necessary are fitted with hardened steel bushings to prevent excessive wear.

Bars are 1½ in. wide, strong and heavy, and made to withstand long and rigorous service. Each type is made in two sizes—1 and 2 of the same construction, for lighter or heavier doors.

Device to unlock from corridor side furnished if requested.

The standard finishes for all types are: Dead black with polished brass handles, and brass plated. Special finishes may be had on application.

Closers are shipped packed with screws.

Information Required to Specify

(1) Distance from where jamb bracket is attached, to back edge of door to which closer handle is attached.

(2) Width of stile of door to which closer handle is attached.

(3) Distance from face of door to edge of elevator shaft.

(4) Distance from edge of elevator shaft to car platform.

(5) Whether doors are made of wood, kalamein, hollow metal, grill or angle iron.

(6) Whether jamb bracket is to attach to wood, metal or masonry.

Note: Most satisfactory installations are obtained when steel angles are provided.

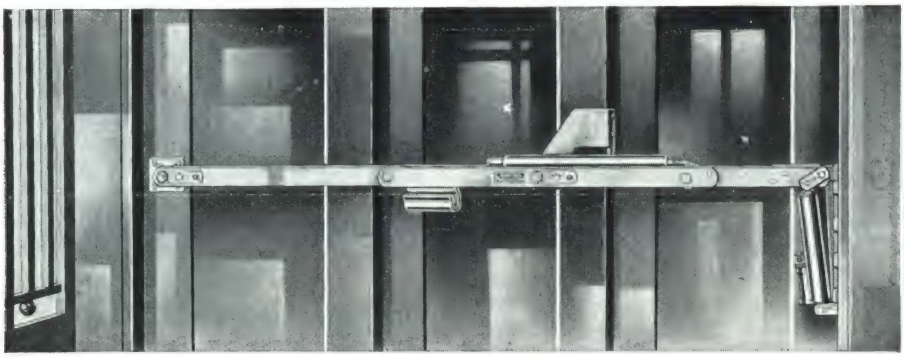
(7) Width of each door.

(8) Whether to be used with single, 2-speed or 3-speed doors, doors in pairs or combination swing and slide doors.

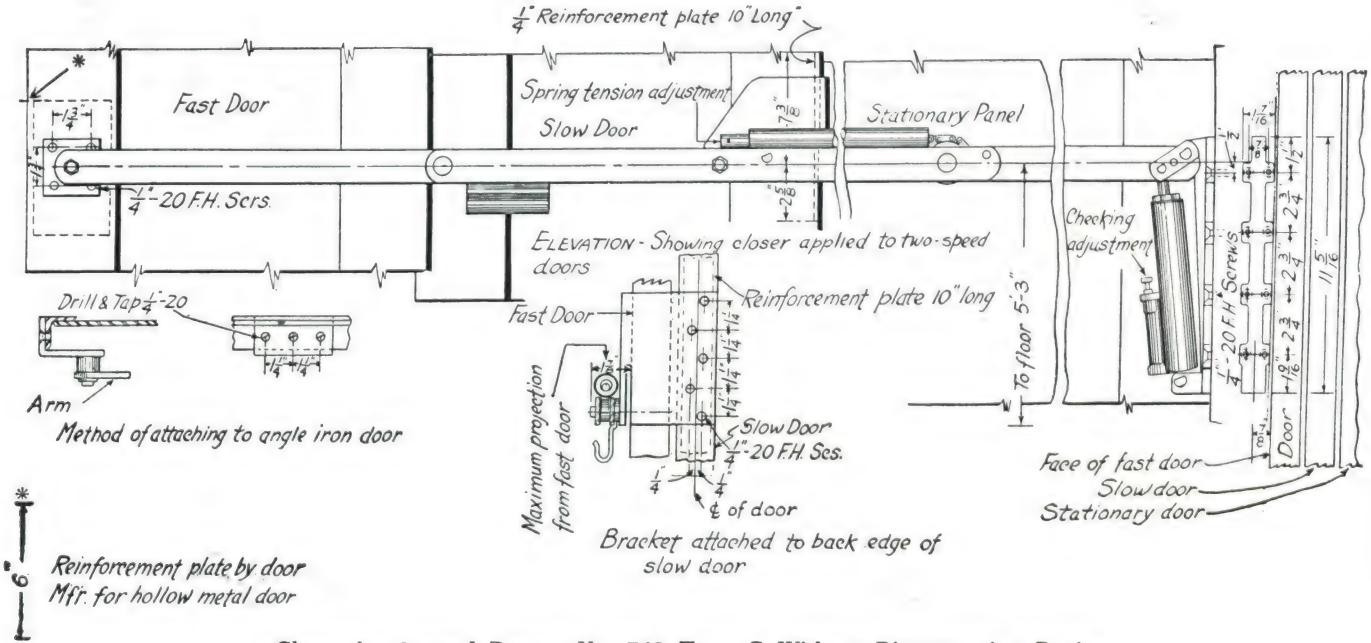
(9) Whether right hand (as in cut) or left hand.

(10) Thickness of doors.

(11) Send sketch.



Application of Rich-Wil Closer for 2-speed Doors
No. 743 Type F with Disconnecting Device



Closer for 2-speed Doors—No. 743 Type C Without Disconnecting Device

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RICH-WIL ELECTRIC INTERLOCKS FOR ELEVATOR DOORS— No. 743-IL

Approved by the Underwriters' Laboratories and the Bureau of Standards

Many large cities and some states have passed ordinances requiring the use of interlocks on passenger elevators which prevent the starting of elevator cars until the doors are closed and locked.

The casualty insurance companies have granted a 10% reduction in the premium on liability risks covering elevator door openings when such openings are equipped with approved interlocks, as illustrated.

Special consideration should be given the 743-IL Interlock because of its simplicity, which is due to a great extent to its Master Switch. The Master Switch is located in the pit at the bottom of the elevator shaft and is the only switch needed to operate the interlocking mechanism of an elevator throughout its travel of many floors.

Some interlocks require an individual switch at each floor. When for one reason or another the power is cut off it is then necessary to inspect all of these individual switches until the trouble is located before the elevator operator can move the car. This is a real task and requires considerable time.

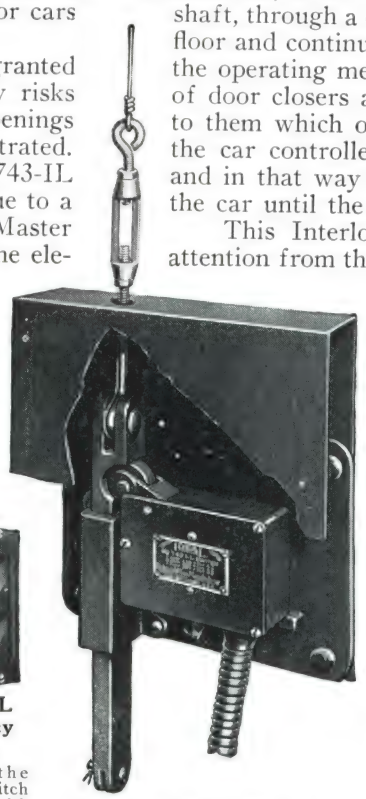
Therefore one switch is more desirable than many.

The No. 743-IL Rich-Wil Electric Interlock Equipment consists of a Master Switch, readily accessible; of a pulley located in the pent house at the top of the elevator shaft; of a wire, with weights at each end, which runs over the pulley at the top of the shaft, through a connection to the door closers at each floor and continues down the shaft and is attached to the operating mechanism of the Master Switch; and of door closers at each floor, with a device attached to them which opens the Master Switch and breaks the car controller circuit when the doors are open, and in that way automatically prevents operation of the car until the doors are closed.

This Interlock, or Safety Device, requires no attention from the operator and provides a device that is positive, of great simplicity and not liable to get out of order.

No. 743-IL Emergency Switch

To use the Emergency Switch break the glass with the mallet and press button



Master Switch with Part of Dust Cover Broken Away so That Upper Portion of Mechanism May Be Seen

Its Operation

When any door in the shaft is opened, the closer on that door raises the wire which extends the full height of the shaft and connects with the Master Switch, opening the circuit to the car control and preventing operation of the car. When doors are closed, the door closers allow the wire controlling the switch to be pulled down by the bottom weight, closing the circuit through the Master Switch and allowing the car to be operated.

Detail at the upper right of illustration shows pulley, weights and weight box which are located at top of elevator shaft in pent house

No. 743-IL Type B Interlock

Detail at lower right of illustration shows cut-out or master switch which is located in pit at bottom of elevator shaft

No. 743-IL Rich-Wil Electric Interlock Assures Superior Service Because:

1st—Uses a single Master Switch for each elevator. (Eliminates using a switch at each door.)

2nd—Its construction is unusually substantial, durable and efficient.

3rd—Operates by gravity (no springs or small parts to give trouble).

4th—The Master Switch is located where readily accessible.

5th—Inspection may be made in an instant. (Avoids onerous task examining switches at each door.)

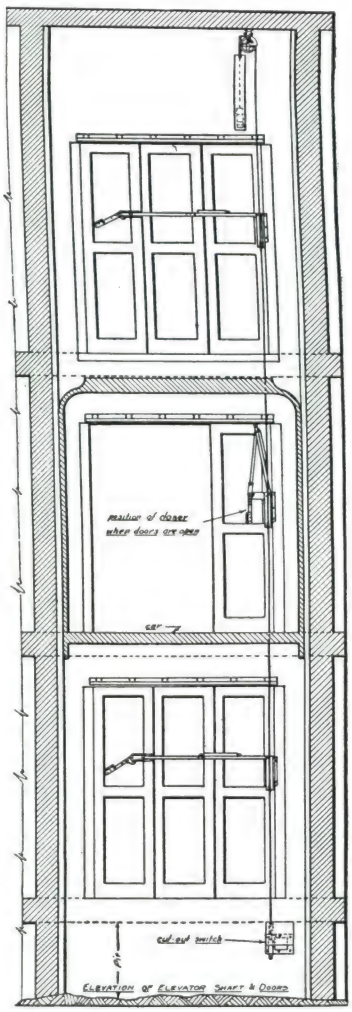
6th—Vastly excels in simplicity, construction, positiveness, ease of attention and thereby provides unusual dependability.

An emergency switch, by means of which the car can be operated in emergencies regardless of whether the doors are open or closed, is furnished for each car as regular equipment.

Non-reversing devices to prevent opening the doors after they have been nearly closed, until they have first been fully closed, can be furnished when required.

Floor range devices, to prevent opening the doors except when the car is within a range of 3 or 4 in. above or below the landing, furnished when required.

Sequence relays, to prevent starting the car unless the car controller is started from neutral position after the doors are closed, can also be furnished if required. (Priced on application.)



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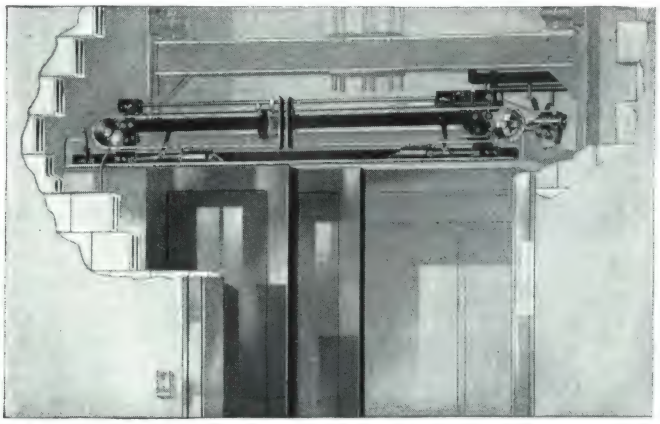
No. 1400 ELECTRIC POWR-WAY ELEVATOR DOOR OPERATOR

Combination Elevator Door Opener, Closer and Interlock

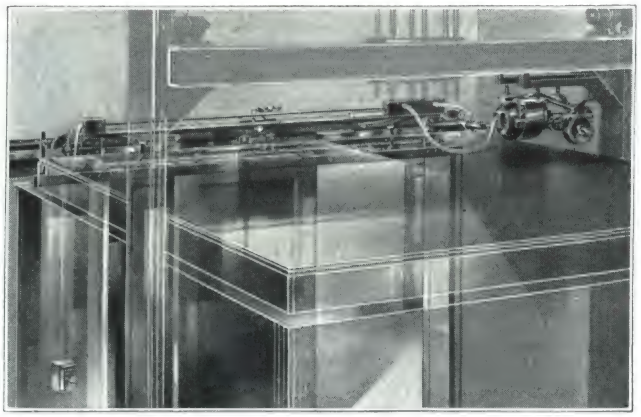
Only one of these machines is required in each elevator hatch. It is mounted on the elevator car directly above the door opening. With it the doors are opened and closed electrically at a higher and more constant speed, in a more sure, safe and uniform manner, and with less noise than if manually operated. Permits of faster and more satisfactory elevator service, as no time is lost at various floors while the attendant reaches for the door handle, which is often times difficult in crowded cars. This saved time is very appreciable wherever high speed elevators are concerned.

In a building of say twenty floors, where elevators are equipped with this device, six elevators will do the work of seven not so equipped. The installation of six of these devices will save the entire cost of an extra elevator or its equipment, installation, operation, maintenance and the valuable space occupied by it on every floor.

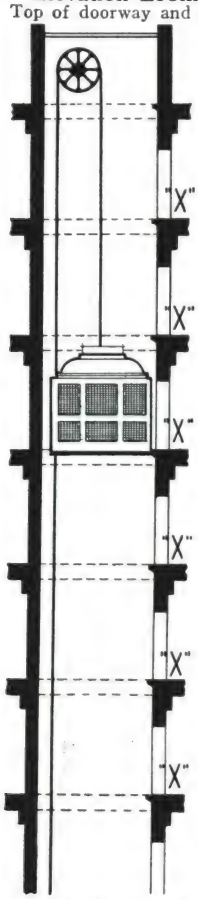
No. 1400 equipment will operate any number of sliding doors single; two-speed; bi-parting single as well as bi-parting two-speed doors.



Elevation Looking Toward the Cab from Corridor Side
Top of doorway and hangers are cut away to allow a clear view of the operating machine



View Looking Toward Corridor Doors from Top of Cab
Showing motor drive unit suspended from elevator cross beams and operating machine mounted on top of cab just above the entrance



"X"-Individual Door Opening Devices at Each Floor Are Eliminated by PowR-Way

Speed

Doors can be made to operate at practically any required constant speed. A speed of 2 seconds for opening or closing a 3 ft. 6 in. two-speed opening is recommended for office buildings and 1 to 1½ seconds where center parting doors are used. A somewhat slower speed should be used in hotels, department stores and apartment houses.

Excessively high speeds are naturally detrimental upon the doors and hardware and require closer maintenance.

Safety

Should anyone attempt to enter the car while the doors are being closed, accidents may be prevented by reversing instantaneously the direction of travel of the doors by the car attendant through the control switch. Also, doors may be held while the power is on and, after the opening is cleared, they will finish closing.

Interlock

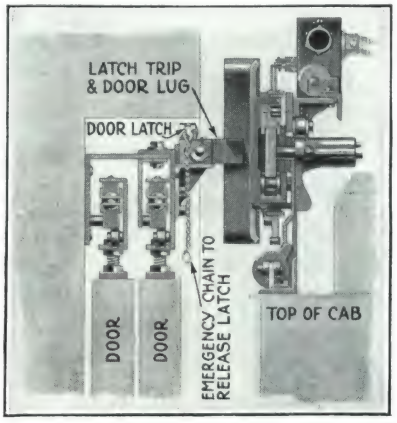
Interlocking equipment is incorporated in this operator which prevents the car from being moved until all doors are closed and locked.

Maintenance

One door operating machine on the elevator handles all the doors in the hatch and car doors or gate when used. The maintenance is, therefore, minimized.

Construction

Only the best material obtainable is built into this equipment. Timken bearings, ball bearings, a specially designed motor and highest grade reduction gears, checking device, relays and switches are built into and used with this machine.



Vertical Section Through Door and Operator
Operator grips latch trip and door lug to release the latch and operate the doors. Operator releases its grip at the instant the door is fully closed and latched

Operation

On all new elevator installations, the operating circuits are so arranged that the doors open automatically when the car comes to within a few inches of a floor preparatory to making a stop on self-leveling elevators, and when the car stops on other types of elevators. The doors close when the car switch is moved in either direction from the neutral position.

Requirements

PowR-Way Operators can be used in nearly all elevator shafts, which makes them readily adaptable to modernizing equipment in older buildings. 1¼-in. clearance is required between the car and sills, and a 3½-in. horizontal ledge on the front canopy of the elevator cab. No special hatchway construction is necessary. Weight of equipment per car approximately 300 lb.

Continued on next page

RICHARDS-WILCOX ELEVATOR SIGNAL SYSTEMS

Electrical Indicators

Design DE7
Made in two sizes: diameters, 12 and 16 in.

Design HE1

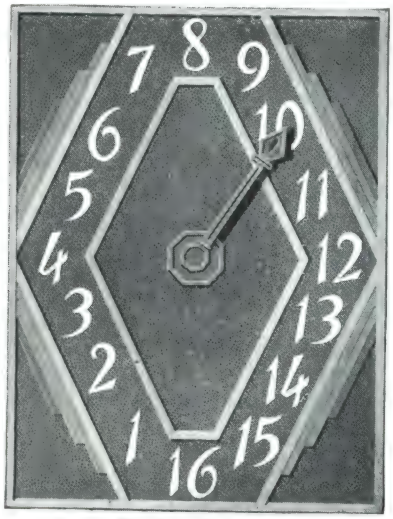
Richards-Wilcox Elevator Signal Systems are the outgrowth of years of intensive study on the part of engineers especially trained in the elevator industry who have bent their efforts toward the solution of the many problems of vertical transportation. All forms of signal systems are available from the simplest mechanical reset annunciator and mechanical dial indicator to the most complicated flashlight system.

The Richards-Wilcox Signal Controller is the acme of controller construction. Maintenance has been minimized by the elimination of brushes and commutators, which have been replaced by a patented metal contactor and contact board. The contacts will last many times longer than brushes and commutators. And the contact board can be renewed in a small fraction of the time required to build a commutator. All sprocket shafts are mounted on ball bearings and roller chain is used to reduce friction and wear. If required, the signal equipment can be electrically driven at a point remote from the elevator machines at a slight increase in cost.

The relay panel is built up of "Togglelock" relays which eliminate mercury pots and latching devices. Silver to carbon contacts are used and the design of the relay is such that once the contact is made it cannot be broken except by the operation of the resetting mechanism. A few of our fixtures are shown. Many types and designs are available.

Mechanical Indicators

Design D.M. 1
Made in two sizes
Diameter 16½ in. and 12 in.

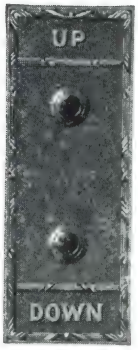


Design D.M. 4
Made in two sizes
Width 12 in., height 16 in.
Width 9 in., height 12 in.

Waiting Passenger Lantern

Design P.S. 4A

Push Buttons

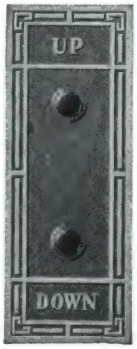


Design P.B. 1

Design P.B. 2

Design P.B. 3

Design P.B. 4



Design P.B. 5

Design P.B. 6

WAGNER MANUFACTURING COMPANY

MAIN OFFICE AND WORKS

CEDAR FALLS, IOWA

SALES AND SERVICE OFFICES

CHICAGO, ILL., 1418 Engineering Building, 205 West Wacker Drive
CLEVELAND, OHIO, 358 Hippodrome Annex
DETROIT, MICH., 1758 Penobscot Building
LOS ANGELES, CALIF., 1461 Griffith Avenue
NEW YORK, N. Y., Room 1102, 114 East 32nd Street
ST. LOUIS, MO., 2135 Railway Exchange Building

MELBOURNE, AUSTRALIA, R. S. Ward Company, 5 Bank House, Bank Place

SALES AGENCIES IN ALL LARGE CITIES

Wagner Ball Bearing Elevator Door Hangers

Hanger tracks are machined from a one-piece high carbon special steel I-beam section which insures a strong, rigid, long wearing hanger. Hanger bars are made from high carbon rolled steel channel sections riveted together. Length of hanger bar is equal to width of door.

Ball raceways in tracks and hanger bars, and guide roller rails are machine milled (not rolled), insuring perfectly true surfaces and straight raceways; 5/8-in. diameter chrome nickel steel balls are held in place by a heavy steel floating retainer bar. Ball holders are riveted into ball retainer bars; it is impossible for the balls to fall out.

Track extends to full travel of doors. Balls are spaced to provide at least a five-point bearing under the hanger bar at any point of its travel.

Flanged guide thrust rollers prevent derailing, and absorb upthrust.

Guide thrust roller treads and guide roller rails are machined to a radius to coincide with distance from ball centers, which permits the hanger to adjust itself to slight irregularities in the enclosure construction without binding.

Clearances between guide rollers and thrust rails are adjustable to take up wear by means of adjusting screws which are locked with lock nuts.

Pendant bolts provide vertical adjustment and lateral adjustment of 1/4 in. inward and 3/8 in. outward from center of track. Safety pendant bolts make it impossible for doors to become accidentally disengaged from the hanger.

Catalogue, etc.—Hanger catalogue and set of cross sections showing clearances required for each type of hanger will be furnished upon request.

Single Sliding Hangers—Type 100—For doors up to 200 lb.
Type 103—For doors from 200 to 400 lb.
Type 104—For doors from 400 to 600 lb.
Can also be furnished for doors up to 3000 lb.

Two-speed Hangers—Type 200 (with two-speed device)—For doors up to 150 lb.
Type 201 (with two-speed device)—For doors 150 to 300 lb.
Type 202 (without two-speed device)—For doors up to 150 lb.
Type 203 (without two-speed device)—For doors 150 to 300 lb.

Center Parting Hangers—
Type 500 (Silent Chain Drive)—For doors up to 200 lb.
Type 501 (Silent Chain Drive)—For doors 200 to 400 lb.
Type 503 (Without Bi-parting Device)—For doors up to 200 lb.
Type 506 (Without Bi-parting Device)—For doors 200 to 400 lb.
Type 504 (Without Bi-parting Device)—For doors 400 to 800 lb.

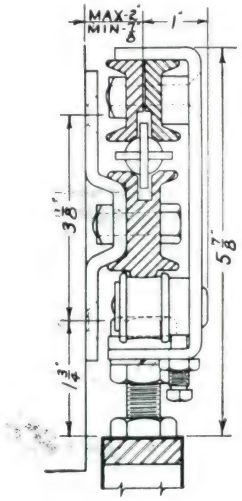
Pivoting Devices—Pivoting devices can be furnished with Types 100, 200 and 202 for use in connection with swinging panels.

Hanger cover plates can be furnished for any type of hanger.

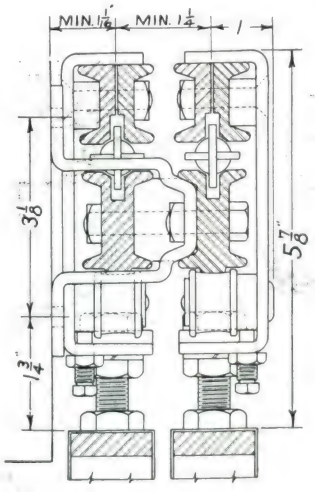
When barlocks are ordered with the hangers, brackets and strikes for the barlocks are shipped attached to hangers. When barlocks are ordered separately no brackets for strikes are furnished.

Atlas Sheave Type Hangers

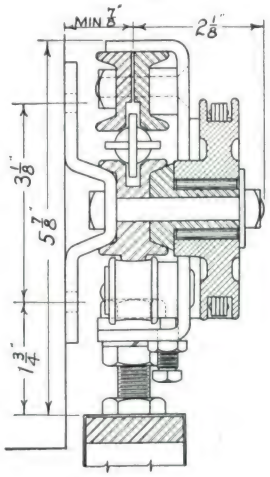
Made in two sizes—designated as Type "A," which is intended for use in connection with power door operation, and Type "B" for use in connection with manually operated closers and other uses where the heaviest type is not required.



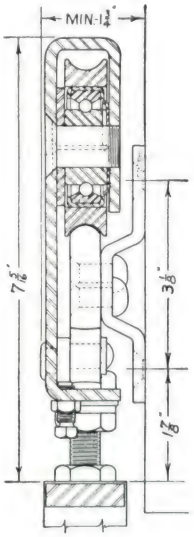
Type 100 Section Single Sliding Hanger



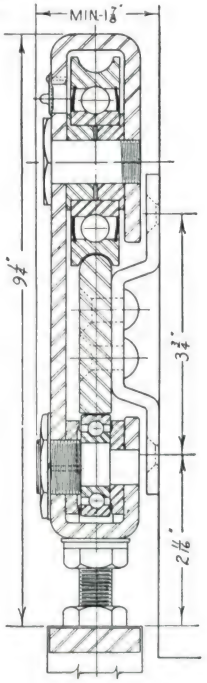
Types 200, 202 Door Hangers



Type 500 Section Center Parting Door Hanger



Atlas Type "B" Sheave Hanger



Atlas Type "A" Sheave Hanger

Continued on next page

Wagner Elevator Door Closer and Check

The Wagner Elevator Door Closer insures automatic, noiseless, positive closing, checking and locking of sliding elevator doors.

Regulation of the speed of closing and checking of the doors is controlled by a regulating screw located in the closer cylinder base casting, and the regulation of the spring tension by means of an adjustable cylinder cap.

All bearings and pivots are fitted with large bronze pins and ball type lubricators for oil or grease. Bearings are extra long to insure against objectionable lateral motion.

Wagner Electric Safety Interlocks used in conjunction with Wagner Closers insure the closing and locking of elevator enclosure doors before the car can be started.

Wagner Door Closers and Interlocks can also be provided with cam operated mechanical lock for push button operation.

Wagner Vertical Type Pneumatic Elevator Door Operator

Doors equipped with Wagner Vertical Type Pneumatic Elevator Door Operator are opened by air and closed by spring pressure. A liquid check cylinder governs the opening movement and a similar cylinder governs the closing movement. All parts are heavy and designed for long service. The air valve is operated by a car cam shoe which engages a sill trip that is connected to the valve.

Wagner Overhead Type Pneumatic Elevator Door Operator

The overhead type of pneumatic operator is designed for use when the space is available over the opening. It is especially adaptable to center parting doors but may be applied to any type of sliding door or car gate. The doors are opened and closed by air pressure. Each movement is governed by a separate liquid check cylinder. Fast and quiet operation may be obtained with this type of operator.

Complete data covering pneumatic operators, door closers and interlocks will be furnished upon request.

Wagner Master Pneumatic Door Operator

The Wagner Master Pneumatic Elevator Door Operator consists of a master engine of the pneumatic type which is attached to the elevator platform and an elevator door closer equipped with opening and closing checks at each opening.

As the elevator car stops at an opening the pneumatic cylinder of the master engine extends a cam shoe which engages with a roller on a bell crank attached to the enclosure sill. This bell crank is in turn connected to the elevator door closer links and the extending of the cam shoe thus opens the doors.

Before the car leaves the floor the cam is receded by exhausting the air in the pneumatic cylinder allowing the doors to be closed by the spring pressure of the door closing mechanism. The master operator is equipped with mechanical and electrical interlocks and the door closer is equipped with Wagner Electric Safety Interlocks. All pivots are either ball or roller bearing of high quality with provision for pressure lubrication.

An attachment can be furnished to operate elevator car doors or gates simultaneously in conjunction with the elevator entrance doors.

Wagner Master Electric Door Operator

The Wagner Master Electric Door Operator is similar to the Wagner Master Pneumatic Door Operator in design and method of operation, except that an electric motor driven power unit is employed to extend and retard the cam shoe instead of a pneumatic cylinder. The motor driven power unit consists of an electric motor, reduction gear, limit switches and brake.

An attachment can be furnished to operate the elevator car doors or car gates simultaneously in conjunction with the elevator entrance doors.

Wagner Elevator Signal Equipment

Wagner Elevator Signals include a complete line to meet the requirements of modern vertical transportation. The Wagner Elevator Signal Commutator Machine is of the vertical type which takes up as little space as possible, and prevents the accumulation of dust and dirt on the commutator segments.

The Wagner Elevator Signal Relays are mechanically rugged and electrically efficient. The relays are equipped with wiping contacts which insure clean contact points. The relay panel is enclosed in a cabinet fitted with two hinged doors so that the magnets and contacts are readily accessible for inspection.

Wagner Signal Fixtures can be supplied in cast iron or solid bronze. We are also prepared to furnish designs to meet special requirements.

Boardman Elevator Control

The Boardman Elevator Control, recently purchased by the Wagner Manufacturing Company, is an Elevator Dispatching System of the selective type, which, when applied to an elevator system, greatly increases its efficiency. Carrying capacity can be increased from 15% to 25% without addition to the elevator plant and 20% to 40% better service will result due to cars running on regular schedule. Car travel mileage also can be greatly decreased on any elevator system.

Boardman Traffic Engineers making a specialty of elevator traffic control are recognized by leading authorities, and building owners installing Boardman Control are benefited by the results of years of study and experience in this line.

Boardman Elevator Control is applicable to all types of building, old or new. The fact that the large majority of Boardman installations have been placed in buildings with elevator installations that have been in operation for some time indicates the need for such a system, and the results obtained from the installation of a Boardman system are positive proof of its success.

ELEVATOR SUPPLIES COMPANY, INC.

Manufacturers of ES Products of Quality

HOBOKEN, N. J.

DISTRICT OFFICES

BOSTON, MASS., 80 Federal Street
CHICAGO, ILL., 165 West Wacker Drive
CINCINNATI, OHIO, 407 First National Bank Building
CLEVELAND, OHIO, 407 First National Bank Building
DALLAS, TEX., Santa Fe Building
DETROIT, MICH., Insurance Exchange Building
LOS ANGELES, CAL., 1120 South Hope Street
PHILADELPHIA, PA., 1720 Ludlow Street
PITTSBURGH, PA., Century Building
SAN FRANCISCO, CAL., 186 Fifth Street
CANADIAN REPRESENTATIVE: Canadian Elevator Equipment Co., Ltd., TORONTO, ONT.

Products

Complete Flashlight Signal Systems.
Flashlight Annunciator Signal Systems.
Preregistering Signal Systems.
Selective Signal Systems.
Flashset Annunciator Signal Systems.
Locdrop Annunciator Signal Systems.
Elevator Car and Floor Indicators.
Elevator Dispatching Systems.
Elevator Door Closers.
Electric Safety Interlocks.
Pneumatic Door Operators.
Electric Door Operators.
Sheave Type Sliding Door Hangers.
Collapsible Elevator Cab Gates.
Gate Closers for automatic elevators.
Guide Rail Lubricators.
Electric Dumbwaiters.

Also, Miscellaneous Signal Systems, Starter's Call Back, Telephones, Standard and Special Signal Auxiliaries, Safety Gate Curtains, Fireproof Theater Curtains, Theater Orchestra Platform Lifts and Organ Console Lifts.

Elevator Signal Systems

The efficiency of elevator service depends on the quality and reliability of the signal system.

ES Signal Systems are the products of craftsmen with over thirty-five years' experience in design and execution. A complete line of signals of the highest quality is offered for your selection. A few of the prominent types are: Complete or Full Flashlight Signal System, Flashlight Annunciator Signal System, Preregistering Signal System, the Department Store Signal System and the Selective Signal System.

We are illustrating below a few of the fixtures that are used with basic signal systems. However, we have numerous other designs from which to select.

Push Button Box

Signal Lantern

Car Operator's Signal Fixture

Signal Lantern

Flashlight Annunciator with Glass Numerals

Preregistering Signal System—This signal system is designed for use with elevators having a rated speed of 600 to 800 ft. per minute. The signal light notifies the car operator to stop when his car enters the zone of a stop signal which has been previously registered upon the push button panel within the car, or by a waiting passenger pushing the button at a corridor floor landing. When consecutive floor stops are required the signal light will extinguish when the car stops and immediately re-light, thus notifying the operator that he must stop at the next floor. The corridor floor lanterns are illuminated in advance of the car's arrival at a floor.

Operator's Preregistering Panel

Selective Signals—When installed with the Complete Flashlight Signal System or Preregistering Signal System, the Selective Signal System and Automatic Signal Transfer provide that the first car receiving the waiting passenger signal will assume exclusive control over that signal and prevent any following car from receiving same. The automatic signal transfer will permit a car to pass a floor where a waiting passenger signal has been given, without canceling the call, and will allow a following car to receive same.

Flashset Signal System—This system is suitable for use where there are not more than two elevators operating in one group, and was developed to meet the demand for a reliable annunciator of the flashlight type for use in elevators where an illuminated signal is deemed more desirable than a target type signal. While the car fixture is similar in appearance to that used with the well-known flashlight annunciator system, the operating mechanism is self-contained, and the signals are canceled by the operator by pressing a button at the bottom of the fixture. One re-set button cancels all the up calls and the other button cancels all the down calls.

Locdrop Annunciator

Locdrop Annunciators—This is the simplest and least expensive type of elevator signal system in use at the present time. It may be furnished for either manual or automatic re-set.

Continued on next page

Indicators

To show the position of the car in the hatch we manufacture a complete line of mechanical and electric indicators.

Horizontal Electric Position Indicator

Mechanical Indicator

Composite Electric Position Indicator—This electric position indicator consists of an ornamental bronze plate located in the main floor corridor, on which is mounted a vertical row of glass numerals for each elevator. Each row has a numeral for every floor, which is illuminated as the car travels up or down, this indicating to the starter the position of the cars at all times.

Telltale Annunciator—The above fixture may be equipped with a "telltale annunciator" which consists of two additional rows of numerals for floor indications, one row for *up* and one row for *down*. When a passenger presses a button the call is registered on the "telltale annunciator" and the starter is immediately informed of the signal, and by observing the travel of the elevator he can tell whether the call has been answered. This serves as a check on the operators and insures the passengers of prompt and efficient service.

Type "B" Dispatching System

This dispatching system for passenger elevators is arranged to start cars in rotation at regular intervals from terminal floors by means of individual lights in each car. A light automatically flashes notifying the operator when the car is to leave the bottom and top terminal floors.

With this system elevators are operated on a fixed schedule, which results in more efficient elevator service and produces more useful car miles per hour than a haphazard method of dispatching.

Type "CB" Elevator Dispatching System

This system gives an automatic signal to start the cars at predetermined intervals from bottom, top or both terminals in sequence. Switches are provided in the Dispatcher's Panel for cutting cars in and out of service, and for varying the starting interval to adjust departure schedules to meet changes in traffic conditions.

In comparatively high buildings where the cars of necessity pass each other during their up or down travel this system is particularly valuable as it assures efficient traffic control.

Elevator Door Closers and Interlocks

ES Double Cushioning Door Closer and Rotary Interlock—The ES Double Cushioning Elevator Door Closer automatically closes the door quickly without slamming, and locks it. This closer is equipped with a liquid checking device to prevent all noise due to slamming when the door is either opened or closed, and is designed for use on any type of horizontal sliding door.

There may be included with each installation a device to hold the door open while the elevator is at rest. When ready to travel the operator releases the door by pressure on a pedal in the car floor.

When an ES Rotary Interlock is installed with this closer it prevents movement of the elevator if any door is opened or unlocked.

ES Double Cushioning Door Closer, Rotary Electric Interlock and Type "B" Sheave Hanger

Single Cushioning Door Closer—In addition to the above we continue to manufacture the ES Single Cushioning Door Closer which is similar in design and appearance to the double cushioning closer, except that it is furnished with a single check to prevent the door from being slammed "closed."

Type "C" Master Interlock—The master interlock switch is designed to take the place of individual interlocks at each elevator door.

Positive Electro-mechanical Interlocks—This interlock prevents movement of the elevator until every door is closed and locked.

The operator must not only fully close the door but also positively lock it before the elevator can be started.

Note: We can supply interlocks to meet any State or municipal requirement.

Typical Elevator Door Equipped with Type "B" Side Arm Pneumatic Operator

The door is hung on Type "B" sheave hanger

Continued on next page

Power Door Operators

Type "B" Side Arm Pneumatic Door Operator—The efficiency of the modern high speed elevator can be materially increased by the use of pneumatic door operators. This will be readily appreciated when it is taken into consideration that at least one-half of the time consumed in making a round trip is devoted to opening and closing heavy doors and taking on or discharging passengers.

This door operator speedily and quietly opens the elevator doors by means of compressed air and closes them by spring action.

To prevent the door from slamming, a double acting hydraulic dashpot is connected to the door operator arm which silently stops the door at each end of its travel.

If desired, we can design this equipment to operate both the corridor door and the collapsible gate on the elevator simultaneously.

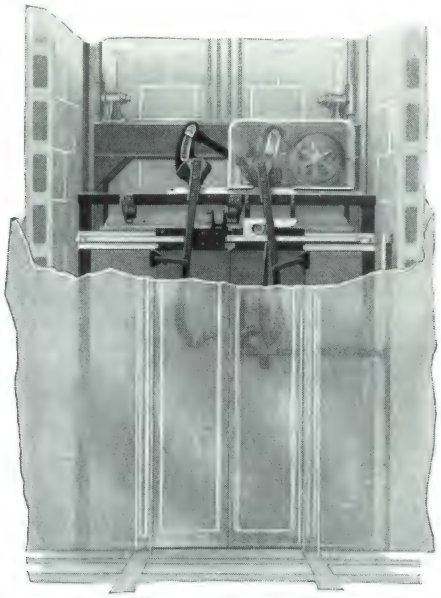
Overhead Pneumatic Door Operator—This device is an overhead door opening and closing engine operated by compressed air.

The action of this door operator is faster and more quiet than manual operation and is equipped with a hydraulic dashpot which silently stops the door without rebound at each end of its travel. It can also be arranged to operate the corridor door and the elevator gate simultaneously.

It is regularly used for operating center opening doors but may be applied to any type of horizontal sliding elevator doors or gates, and for four-fold doors generally known as "butterfly" type.

Electric Door Operator—The ES Electric Door Operator is used extensively on high speed elevator doors.

This device consists of a single electric motor driven operator mounted on top of the elevator cab, arranged to operate both the cab doors (or cab gates) and the corridor doors simultaneously as the elevator stops at a landing. This operator is constantly under the control of the elevator attendant and the doors may be instantly and quietly reversed during the opening or closing motion.



Typical Elevator Door Equipped with Electric Door Operator

When installed with self-leveling or automatic leveling elevators the electric operator is arranged to automatically open the doors as the car comes to a landing. For other types of elevators a small conveniently operated switch control is provided.

Compactness, simplicity of design and ruggedness of construction have been incorporated in this electric door operator, all based on years of experience in manufacturing pneumatic door operating equipment and other types of electric door operators.

Door Hangers

As the pioneers in the elevator accessory business and after a careful study of stresses set up in elevator door hangers, we offer the most complete line of sheave type door hangers for your selection.

We have hangers for any type of horizontal sliding doors, both for manual and power operation. Different types have been designed for panels weighing from 150 to 1000 lbs. each. The features of these hangers are simplicity in design, rugged construction of ball bearing and roller bearing types, and ability to meet the most exacting requirements. The Type "B" sheave hanger is illustrated with the ES Double Cushioning Door Closer on preceding page.

Elevator Cab Gates

The ES Elevator Cab Gate is designed to meet the ever-growing demand for a sturdy, quiet operating gate, capable of withstanding the severe stresses imposed by pneumatic or other power operation.

Although similar in general appearances to the usual elevator cab collapsible gate it is radically different in design and embodies many new features which prevent sagging, buckling and rattling.

Gate Closers

ES Gate Closers are designed for use on push button and dual control elevators and make it unnecessary for passengers to close the gate upon leaving the car.

Guide Rail Lubricators

ES Triple Feed Lubricator—This is attached to the guide rail and the flow of oil is controlled by means of wicks. In addition to this a regulator is also provided on each lubricator for further adjustment if desired.

ES Positive Guide Rail Lubricator—Combines all features essential in perfect elevator guide rail lubrication. It is attached to the car, feeds the proper amount of oil required for each trip and the rail is thus lubricated in exact proportion to the activity of the elevator.

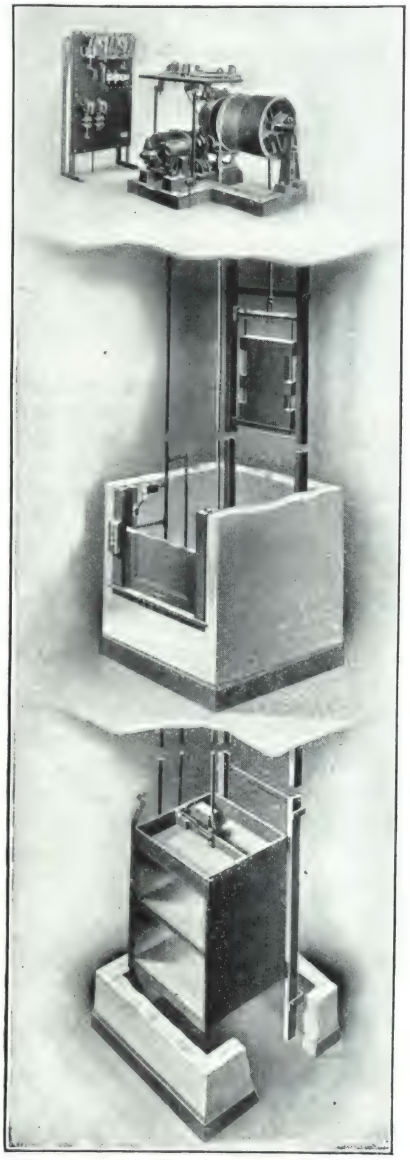
ES Electric Dumbwaiters

ES Electric Dumbwaiters are built with the precision of a passenger elevator by experienced workmen and with the best of material. The gears are bronze with a cast iron center; the shaft and worm is made from a one-piece drop forging; all parts are mounted on a solid cast iron base, and are readily accessible for oiling.

The entire mechanism is so arranged that noise and vibration are eliminated.

Because ES Electric Dumbwaiters are of proper design, high grade workmanship, proper gearing and adequate lubrication, their life is practically unlimited. We have a line of electric dumbwaiters suitable for every purpose.

We will build any type of control to meet special requirements. Selection of proper control is important and this is governed by the duty it is expected to perform, its load-pound carrying capacity and its speed per minute. We have available a great deal of data on this subject, and our engineers will be glad to consult with you without obligation on your part, and will assist in any manner possible in the preparation of plans and specifications.



Typical Dumbwaiter Installation

THE CAPITAL LIFT & MANUFACTURING CO.

Manufacturers of Electric and Hand Power Lifts

Town and Lucas Streets
COLUMBUS, OHIO

For our pages on Freight and Passenger Elevators and Ash Lifts, see Manufacturers' Index

Ball Bearing Hand Power Dumbwaiters

Our simple, inexpensive, general purpose dumbwaiters are used in hospitals, hotels, restaurants, offices, apartments, residences, etc.

Cars—Have a 75-lb. lifting capacity and are furnished in three standard sizes, noted in table below. They are built of wood, sheet steel, or combination of both, with one fixed or removable shelf, unless otherwise ordered.

Operation—Is by manila hand rope on ball bearing shaft. Thus the car with balance weights works very easily in its finished guideways of selected pine.

Automatic Brake—Has the car under instant control to hold the load in any position at all times. For loads over 75 lb., beyond average dumbwaiter requirements, a hand operated self-adjusting brake replaces the automatic brake.

In Ordering—Or for prices, give dumbwaiter number from table below; height of travel and maximum loading.

DUMBWAITER SIZES, HAND POWER TYPE

Size No.	A in.	B* in.	C in.	D in.
1	20	16	30	22
2	24	20	30	26
3	28	24	30	30

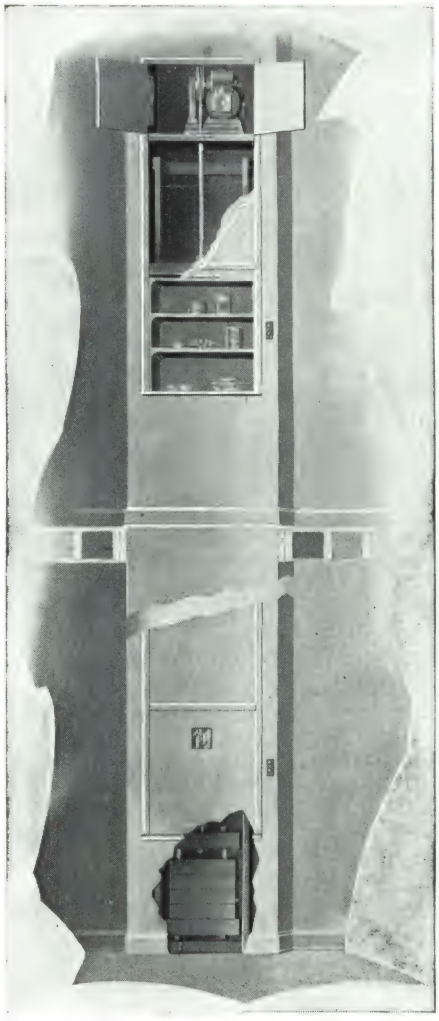
Dimension B may be varied from the standard to suit conditions.

Roller Bearing Freight Lift

This lift, shown below, easily operated by hand rope, is used in stores, hotels, apartments, schools, office buildings, etc., for supplies and all kinds of merchandise including special service in printing plants and various manufacturing industries.

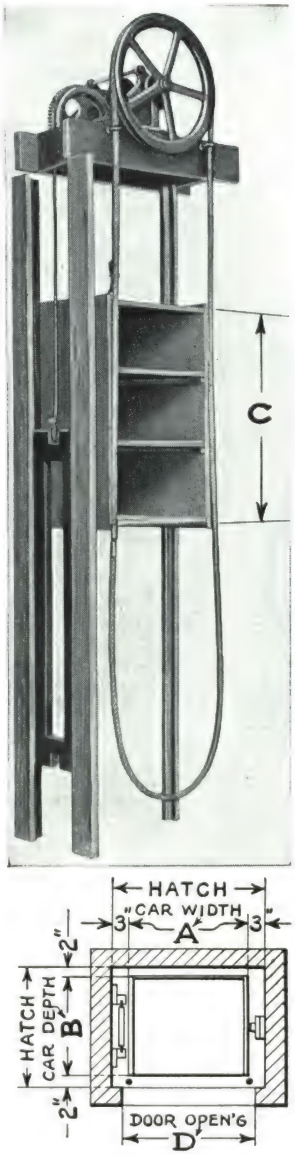
Car—Being balanced, one man easily handles about 1000 lb. and may travel up and down with the load. Cars built in any size to suit building, and with or without wainscoting on two or three sides; also safety gates, etc. All as ordered.

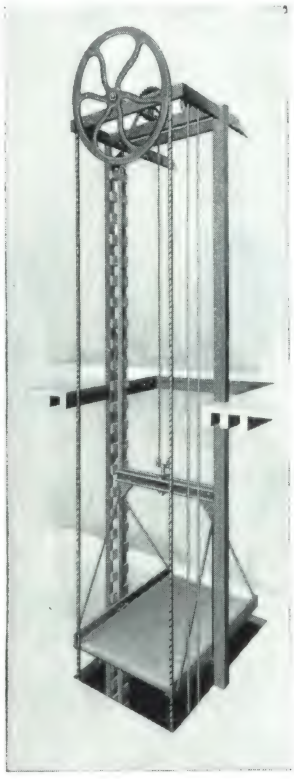
Brake—Is hand operated and self-adjusting to hold loaded car in any position and to lower loads quickly and easily.



Capital Electric Dumbwaiter, Push Button Operated Type

This type is built to:
Any size
Any capacity
Any height of travel





Roller Bearing Freight Lift

ACTIVE ELEVATOR COMPANY

TELEPHONES
BELL: Lombard 5398
KEYSTONE: Main 1335

212 Chancellor Street
PHILADELPHIA, PA.

Products

HAND and ELECTRIC POWER DUMBWAITERS and ELEVATORS for interior and exterior service; ELECTRIC SIDEWALK ELEVATORS; ELECTRIC FREIGHT ELEVATORS; ELECTRIC AUTOMOBILE ELEVATORS; ASBESTOS FIRE CURTAIN HOISTS.

Also Invalid Elevators; Steel Sidewalk Doors and Frames.

TRADE MARK
(Reg. U. S. Pat. Office)

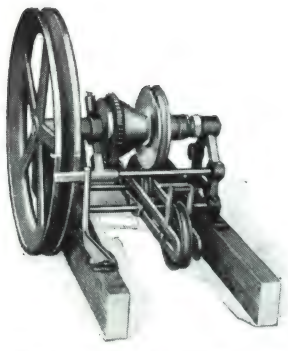
Some Installations

E. J. Kenney & Co., New Britain, Conn.
Wright, Haw y Jaen Guardia Ltd., Panama
Haskell & Durfey Company, Elmira, N. Y.
J. S. Mathers, Covington, Va.
E. W. Marland, Ponca City, Okla.
School for Blind, Talladega, Ala.
Dresser Company, Cleveland, Ohio
Norfolk & Western R. R., Roanoke, Va.
Algernon Blair, Montgomery, Ala.
E. J. Roper & Son, Paducah, Ky.
U. S. Battleship Wyoming, for U. S. Navy Department
A. L. Oesendorf, Dayton, Ohio
Braeckels, Joplin, Mo.
Hotel Pennsylvania, Philadelphia, Pa.
Cramp & Company, Philadelphia, Pa.
New York Shipbuilding Corporation, Camden, N. J.
State of West Virginia, Beckley, W. Va.
Memorial Library, Gettysburg, Pa.
Girard College, Philadelphia, Pa. (John T. Windrim, Archt.)
Washington Heights School, Battle Creek, Michigan.

Residence and Commercial Dumbwaiter

Capacity 75, 150, 300 and 500 lb.

Type 21 has one door opening. Type 22 has door opening on opposite sides. Equipped with automatic lock, antifriction roller bearings, wire hoist rope, adjustable guide shoes and exposed weights.



Type 21 Hand Power Dumbwaiter Machine with Automatic Brake

Geared Hand Power Dumbwaiter Machine with Automatic Brake

RESIDENCE AND COMMERCIAL DUMBWAITERS

Type	Car size, in. *WxDxH	Compartments		Cap., lb.	Shipping weight for 10-ft. travel, lb.
		Number	Height, in.		
21 22	24x20x30	2	14 and 12	75	300
27	30x24x34	2	16 and 14	150-300	450
28	30x42x48	1		150-300	500
29	30x42x48	1		500	

*W=width. D=depth. H=height.

Hoisting Machine—Mounted in iron frame, including wheels for deflecting hoist rope, and has a polished, turned steel shaft, rotating smoothly on roller bearings. All parts are machined and accurately fitted.

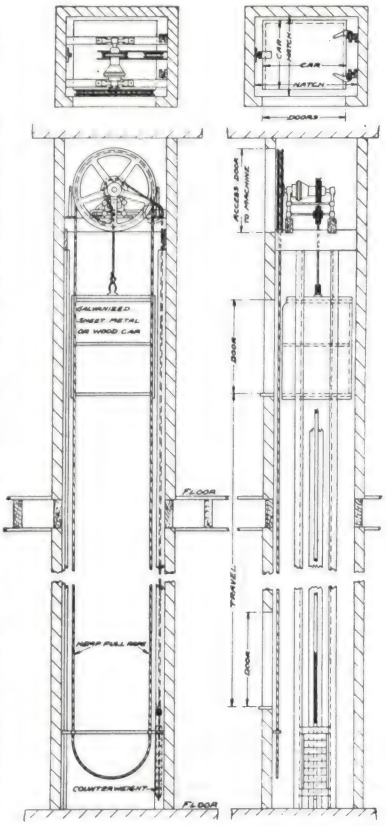
Type 27, 28 and 29 hoisting machines are of the geared type with lift wheel cast directly on the side of large spur gear, eliminating keys and setscrews, thereby relieving the main shaft of all torsional strain. Gears are cast from machine cut patterns.

Car—Made of either galvanized sheet steel, rigidly riveted and well braced, or of hardwood and fitted with adjustable guide shoes.

Counterweight—Slightly heavier than car to aid in lifting the load and is sectional to permit accurate adjustment.

Guides—Made of hard maple and yellow pine runs to guide both car and weight, and insure smooth, quiet operation. Counterweight guides are in sections to avoid warping. This construction conserves shaft space and eliminates the usual weight box.

Cable—Flexible steel cable with all attachments necessary to secure to car and weight. Hemp operating rope without splinters.



Typical Layout of Active Hand Power Dumbwaiter

Exterior Dumbwaiter for Apartments

Capacity 75 to 150 lb.

Type 31 is rapidly coming into general use because of exclusive features appealing to apartment house owners, operators and tenants. It requires no inside space as the entire equipment is placed outside, permitting delivery men to serve tenants without entering the building.

Hoisting Machine—This is a self-contained unit similar to Type 21 protected from the weather by a galvanized iron hood.

Car—The car size, capacity, etc., is similar to the Type 21. Shipping weight for 10-ft. travel, 425 lb.

Ornamental Dumbwaiter

Capacity 25 lb.

Type 41 is suitable for hotels, offices, restaurants and stores where light, quick service is necessary. Attractive brass work and ornamental design produce a handsome outfit.

Car—Made of hardwood carefully finished, with bottom and intermediate trays reinforced at the corners.

Guides—Two brass tubes, flanged top and bottom with intermediate clamps for securing.

Rope—Operating rope is $\frac{5}{16}$-in. hemp, free from splinters.

Continued on next page

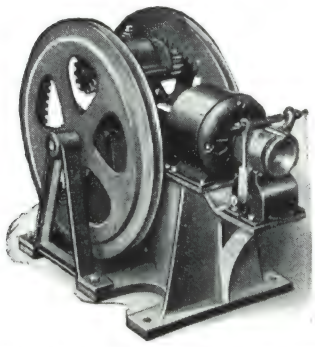
Electric Dumbwaiter (Type 51)

Capacity up to 500 lb.

Operated by a series of push buttons at each landing.

Construction—***Machine***—Worm gear reduction unit is equipped with a phosphor bronze worm gear, hardened steel worm with threads ground, giving the smoothest possible tooth bearing, which is so important with worm gears due to their sliding contact. Worm and worm wheel shafts are equipped with Timken roller bearings.

TIMKEN BEARING EQUIPPED



Type 51 Electric Dumbwaiter Machine

The lifting wheels which rotate on roller bearings are driven by spur gears, on worm wheel shaft, meshing with large internal gear on lift wheels. The electrically operated brake has a large gripping surface.

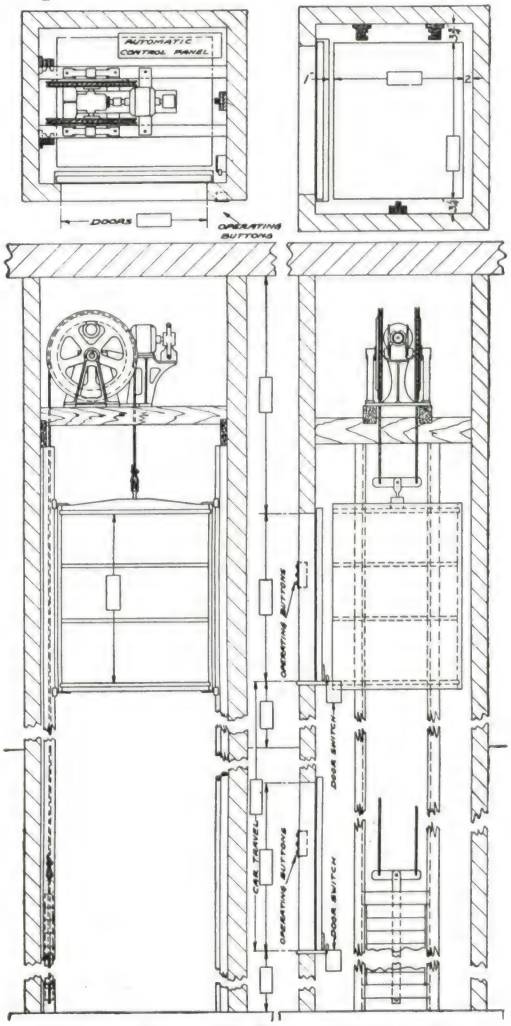
Shaft limit switches automatically stop the car at upper and lower landings.

Car—The car can be made of either hardwood or galvanized sheet steel, not over 3 ft. square or 4 ft. high.

Counterweight—The counterweight is sectional to secure accurate adjustment and is slightly heavier than the car to obtain uniform service in either direction of travel.

Guides—Guides consist of a maple run on one side and yellow pine on counterweight side to guide both the car and the weight.

The yellow pine guides are sectional to prevent warping and twisting.



Details of Type 51, Electric Dumbwaiter

Hand Power Elevator (Type 72)

Capacity 500, 1000, 1500 and 2000 lb.

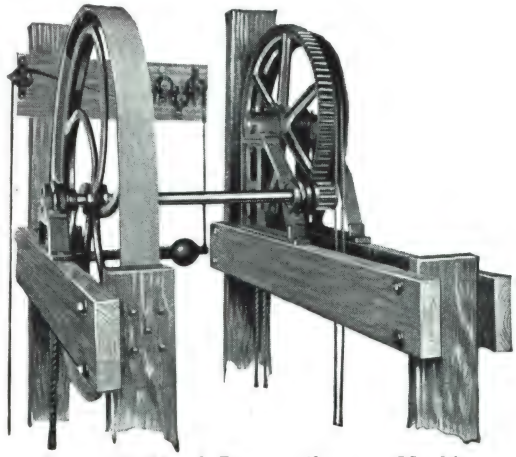
This machine is built to meet all standard requirements.

It is mounted in iron stands and the pull wheel shaft rotates on steel roller bearings. The lift wheel is cast on the side of the large spur gear and rotates on large steel roller bearings. This arrangement of lifting eliminates all keys and torsional strain on main shaft and simplifies erection. The band brake operates on both flanges of the large pull wheel and is operated from all floors by means of a brake rope.

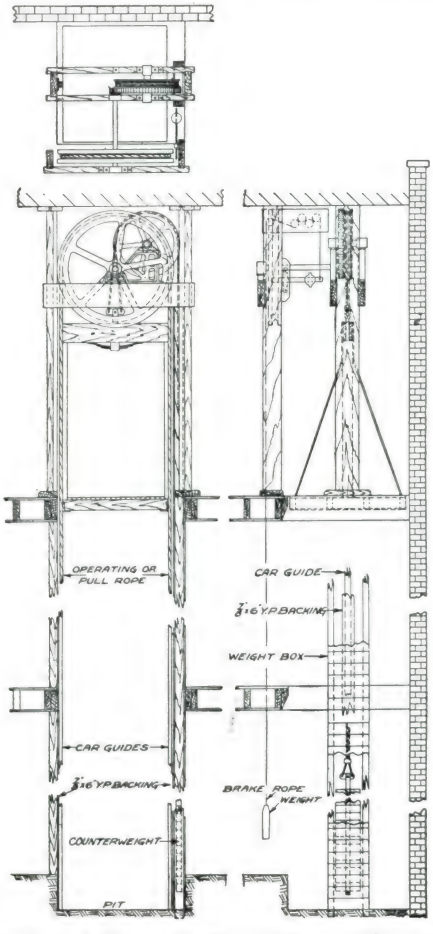
The car is built of hardwood with iron side braces and corner angles where upright stiles and crossbeam join. A safety attachment is provided that will instantly lock the car in the guides if the hoisting cables should break or become slack.

To quote prices we require the capacity, size of car, number and height of each floor from top to top.

Detailed instructions and blue prints for erection will be furnished with each order.



Type 72 Hand Power Elevator Machine



Details of Type 72, Hand Power Elevator

ESTABLISHED 1876

CHELSEA ELEVATOR CO.

INCORPORATED 1912

Manufacturers of Hand Operated Dumbwaiters and Elevators

OFFICE

101 Park Avenue, NEW YORK, N. Y.

FACTORY: NORTH BERGEN, N. J.

REPRESENTATIVES

BALTIMORE, MD.
BUFFALO, N. Y.
DETROIT, MICH.
HELENA, MONT.
KANSAS CITY, MO.
LOS ANGELES, CAL.
NASHVILLE, TENN.
PHILADELPHIA, PA.
PITTSBURGH, PA.
ROCHESTER, N. Y.
ST. PAUL, MINN.
ST. LOUIS, MO.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
SOUTH BEND, IND.
TAMPA, FLA.
WASHINGTON, D. C.
WICHITA, KAN.
WILKES-BARRE, PA.

LOCAL REPRESENTATIVE

CHELSEA TRADE-MARK

Products

HAND OPERATED DUMBWAITERS and ELEVATORS: Private House, Traction, Apartment House, Automatic Brake, Hospital, Plain Sheave, Hotel, Restaurant, Band Brake, Library, Book Lift, Brass and Steel Tube, Compensating Dumbwaiters; Invalid, Store, Trunk, Freight, Sidewalk and Automobile Elevators; Ash Hoists, Ash Cranes, Hoist Wheels.

Also Tellerwaiters, Film Conveyors, Automatic and Semi-automatic Gates.

For Electric Push Button Dumbwaiters, Electrically Operated Sidewalk Elevators and Electric Push Button Passenger Elevators, see Manufacturers' Index.

Experience

Over fifty years of manufacturing experience in one city assures reliability of products, and progressiveness in design and equipment assure highest quality in workmanship and materials.

Manually Operated Dumbwaiters

Data tables will be found on the following page giving information in detail.

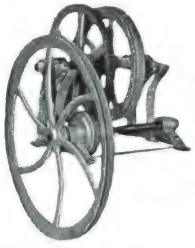
No. OT Dumbwaiters—Best adapted for light loads and rapid motion. Cars may be as small as desired and guide rails may be of wood, brass or steel tubes, steel tees or channels or of wire. Very satisfactory for letters, files, papers or books.

Representative Installations—
Library, South Orange, N. J., Arthur Dillon, Architect
Downtown Athletic Club, New York, N. Y., Starrett & Van Vleck, Architects
Blue Kitchen Restaurants, New York, N. Y., Harris & Sohn, Architects

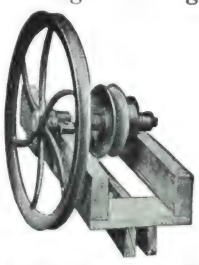
No. 5 Plain Automatic Brake Dumbwaiters—Recommended for high grade apartment houses.

Representative Installations—
Witherbee Court Apartments, Pelham, N. Y., Chas. G. Duffy, Architect
Casa Loma Apartments, Rochester, N. Y., M. J. Tierney, Architect
Hazelton Apartments, Hazelton, Pa., J. H. Schier, Architect

No. 5D to 5K Full Diameter Automatic Geared Iron Frame Dumbwaiters—The very latest development in first class dumbwaiter design and construction and can be used in any type of building with a guarantee of total satisfaction. A very large range of capacities is obtainable.



No. 5 Geared Automatic Brake
Iron frame patent No. 645,812



No. 5 Plain Automatic Brake
Brake patent No. 1,123,434, U. S.; 162,138, Canada

Representative Installations—
Morewood Gardens Apartments, Pittsburgh, Pa., Farrar & Watmough, Architects
Hotel, Shark River Hills, N. J., Warren H. Conover, Architect
Residence, Manhasset, N. Y., Delano & Aldrich, Architects
Union Theological Seminary, New York, N. Y., Allen & Collins, Architects
Elks Club, Ridgewood, N. J., Floyd Y. Parsons, Architect
Convent, Syosset, L. I., N. Y., Emil G. Perrot, Architect
Restaurant, Blue Kitchens, N. Y., Almindinger Schlendorf, Architect
High School, Fort Lee, N. J., Sibley & Lucht, Architects

No. 5 Plain and Geared Dumbwaiters—Used for undercounter work where small wheels or no wheels at all are required. Undercounter windlass is placed in basement.

Representative Installations—
Fireman's Pharmacy Co., Broad St., Newark, N. J.
Store, 361 West 125th St., New York, N. Y.

No. 6 Heavy Duty Band Brake Dumbwaiters—Desirable for use in banks, stores and factories.

Representative Installations—
Fischer Residence, Detroit, Mich.
Corn Exchange Banks, New York, N. Y.
Bakery, 149th St. and 8th Avenue, New York, N. Y.
Factory, 16 East 34th St., New York, N. Y.

No. 7, Invalid or Passenger Elevator, or Trunk Lift—An easy running reliable equipment and is fitted with all safety equipment.

Representative Installations—
Eldridge Residence, Locust Valley, N. Y., Delano & Aldrich, Architects
Nuchols Residence, Greenwich, Conn., Thompson & Churchill, Architects

No. 8 and No. 9 Store Elevators—Used for freight service in stores, factories, and elsewhere where a strong high quality head elevator is desired.

Representative Installations—
Butcher Store, 41 Sixth Avenue, New York, N. Y.
Florist, 103 West 28th St., New York, N. Y.
Hotel, Shark River Hills, N. J.
Factory, Elizabeth, N. J.

No. 10 Sidewalk Lift or Ash Hoist—Used extensively in all classes of buildings for merchandise and ashes.

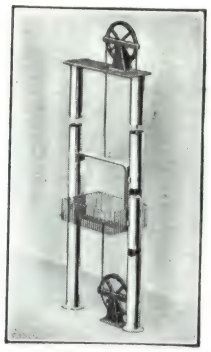
Representative Installations—
Corn Exchange Banks, New York, N. Y.
Y.M.C.A., East 17th Street, New York, N. Y.
Woodcliff Trust Co., Woodcliff, N. J.
St. Regis Restaurants, New York, N. Y.

No. 11 and No. 12 Automobile Elevators—Can be obtained in capacities up to 6000 lb. They are double geared, slow in motion but sturdy and reliable. Crosshead type and safety attachment furnished if desired.

Representative Installations—
615 Hudson Street, New York, N. Y.
Elizabeth, N. J.

On the two pages following, full details of all the above equipments may be found.

Continued on next page

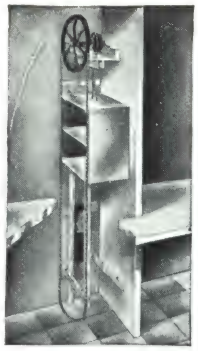


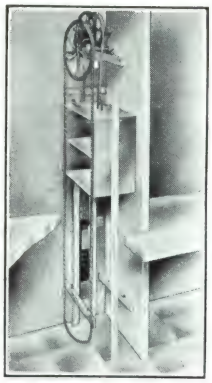
No. 0 Teller Type Rapid Dumbwaiter

1 to 20-lb. capacity
High speed

No. 5. Plain Double Automatic Brake Dumbwaiter

25 to 75-lb. capacity
Class AA, A, B, and C





No. 5. Full Diameter Geared Automatic Brake Dumbwaiter

15 to 150-lb. capacity
Class D, E, F, G, H, I, J, and K
Cut gears, iron frames

No. 6. Iron Frame Band Brake Dumbwaiter

100 to 500-lb. capacity
Band brakes. Slow speed

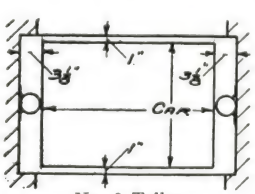
DATA OF SOME OF THE CHELSEA HAND OPERATED DUMBWAITERS

No.	Car size	Hatchway size, single face	Hatchway size, double face	Hatchway size, right angles	Headroom required above door for machine	Ratio	Maximum capacity, lb.	Normal capacity, lb.	Complete ship. wt., approx., lb.	Service best adapted for	Specification writers' data and general description
0A	9″ x 9″	17″ x 11″	.....	.....	1:1	20	5	.....	.....	Libraries, banks, offices, clubs, showrooms, restaurants, etc. Rapid motion for books, papers, letters, messages, files, small packages, etc.	**Specify**—MACHINE—Iron wheels set in iron frames; wheels of full diameters and to have self-oiling bearings. Guide rails of No. 16 gauge seamless drawn tubing of [steel, brass, aluminum] to suit surroundings. CAR—Of [ash, mahogany, steel, Monel, brass, wire mesh]. Rope of braided cotton neatly fastened to top and bottom of car and counterweight. Lead counterweight travels in one tube. Automatic catch sustains load at upper floors.
0B	14″ x 9″	22″ x 11″	.....	.....	1:1	20	5	.....	.....		
5AA	20″ x 16″	24″ x 19″	24″ x 20″	25″ x 20″	2′ 0″	1½:1	52	25	250	The plain automatic brake type is best adapted for use in residences, apartment houses and elsewhere, where a number of different people have the use of car and initial cost is considered. No check line required, as automatic brake holds loads within the capacity of machine.	**Specify**—MACHINE—Double automatic brake type as made by Chelsea Elevator Co., New York, N. Y., to hold any load within the capacity of the machine which is . . . lb. without the use of check line or fastening. Cold rolled steel shafts. Steel roller bearings. Cast iron flywheel of proper diameter securely fastened to steel shaft, cast iron center wheel bored to fit shaft; lock full automatic both on down and up motion of car set in a reinforced casing with double brake shoes of ample braking surface. CAR of first quality ash, dovetailed and varnished; of size to suit hatchway, shelved as directed, wrought iron eye for weight rope. Cast iron guide shoes. Guide runs of Georgia pine, grooved for guides on car and counterweight. Counterweight of size and weight to properly balance car. Rope for counterweight is manila. Hand rope, Russian hemp. All necessary hardware, rubber bumpers, etc. Machine timbers Georgia pine, sheaves cast iron. **Guarantee**—Equipment, 1 year; machine, 5 years.
5A	22″ x 18″	26″ x 21″	26″ x 22″	27″ x 22″	2′ 2″	2:1	70	50	275		
5B	26″ x 22″	30″ x 25″	30″ x 26″	31″ x 26″	2′ 6″	3:1	105	60	350		
5C	30″ x 24″	34½″ x 27″	34½″ x 28″	35″ x 28″	2′ 10″	3½:1	122	75	450		
5D	34″ x 28″	38½″ x 31″	38½″ x 32″	39″ x 32″	3′ 2″	8:1	280	150	600		
5E	30″ x 24″	34½″ x 27″	34½″ x 28″	35″ x 28″	3′ 0″	7:1	245	125	550	The geared automatic brake type is best adapted for service in high grade buildings of every character where heavy duty is required. Hospitals, sanitariums, schools, residences, apartment house, libraries, stores, restaurants, clubs and public buildings and elsewhere, where a number of different people have the use of car. No check line required, as automatic brake holds loads within the capacity of machine. Full diameter weight wheel reduces friction and increases ease of operation and more than doubles life of center rope.	**Specify**—MACHINE—Of the geared, double automatic brake, iron frame, full diameter wheel type as made by Chelsea Elevator Co., New York, N. Y. Wheels of full diameter; no leading sheaves permitted; automatic to hold any load within capacity of machine which is . . . lb., without use of check lines or fastenings; roller bearings throughout. Flywheel of proper diameter to suit car. Accurate cut tooth gears and full automatic brake both on up and down motion of car; reinforced casing, double brake shoes. CAR—First quality ash, dovetailed, varnished and shelved as directed, wrought iron eye for weight rope; cast iron guide shoes. Georgia pine guide runs and milled grooves. Counterweight at least 10 lb. heavier than car weight. Durable wire center rope; hand rope, Russian hemp. All necessary hardware, rubber bumpers, etc. Georgia pine machine timbers, etc. **Guarantee**—Equipment, 1 year; machine, 5 years.
5F	26″ x 22″	30½″ x 25″	30½″ x 26″	31″ x 26″	2′ 8″	6:1	210	100	475		
5G	22″ x 18″	26½″ x 21″	26½″ x 22″	27″ x 22″	2′ 6″	5:1	175	75	400		
5H	30″ x 24″	34½″ x 27″	34½″ x 28″	35″ x 28″	3′ 0″	4:1	140	50	550		
5I	26″ x 22″	30½″ x 25″	30½″ x 26″	31″ x 26″	2′ 8″	3:1	105	35	475		
5J	22″ x 18″	26½″ x 21″	26½″ x 22″	27″ x 22″	2′ 6″	2:1	70	25	400		
5K	20″ x 16″	24½″ x 19″	24½″ x 20″	25″ x 20″	2′ 4″	1:1	35	15	350		
6A	34″ x 28″	40″ x 32″	40″ x 33″	40″ x 33″	4′ 0″	10:1	350	150	975	Strong and substantial. Store service. Heavy packages, etc. Good for lowering.	MACHINE—Shafts of steel; wheels of full diameters; gears of size to suit hatch and capacity of machine; flywheel proper diameter; band and leather cushioned band brake; heavy babbitted boxes: necessary pulleys for check; lever for brake. CAR—As for 5 D, E, F, G, etc.

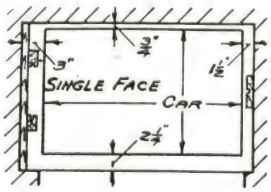
Note: Width means right to left; depth, front to rear. If doors are at right angles, use prices given for double face; machine has two flywheels and two hand ropes. Standard cars are to be 3 ft. 6 in. high with one loose shelf.

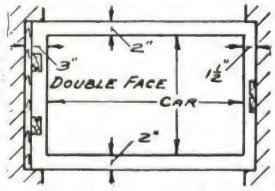
Ratio: Capacity and speed. Example: To raise a 280-lb. load in car with 8 to 1 ratio, 35 lb. of energy must be exerted when pulling hand rope. 8 ft. of rope through hands raises car 1 ft.

Note: All prices are f.o.b. New York, N. Y.

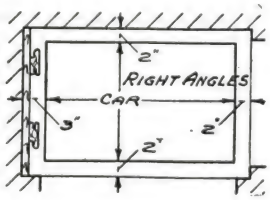


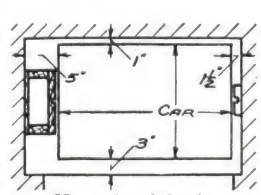
No. 0 Teller





No. 5 Automatic Brake





No. 6 Band Brake

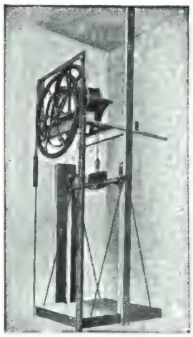
Usual door sill 2 ft. 6 in. up from floor—Door 1 in. higher and wider than car—Machine headroom, see tables above

Chelsea Dumbwaiter Hatchway Arrangements for Varying Conditions

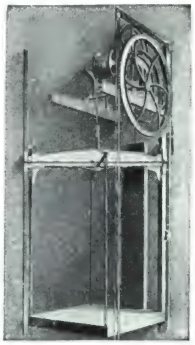
In ordering, state preferable arrangement, and give clear inside measurements and total height of hatchway; also door size in height and width

Continued on next page

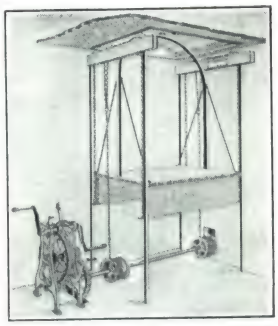
No. 7. Patent Frame Passenger Elevator
500 to 1000-lb. capacity



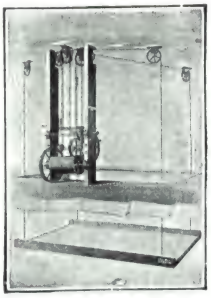
No. 8. Patent Frame Side-Post Store Elevator
1000 to 3000-lb. capacity



No. 9. Patent Frame Corner-post Store Elevator
1000 to 3000-lb.



No. 10. Hand Power Sidewalk Elevator
1000 to 6000-lb. capacity



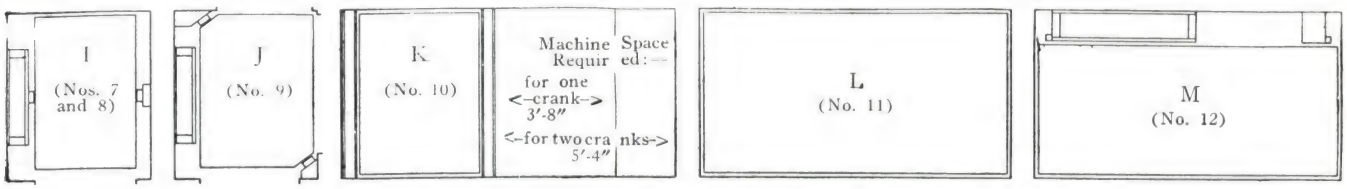
No. 11. Four-cable Windlass Elevator
2000 to 6000-lb. capacity

No. 12. Four-cable Hand-rope Carriage Elevator
2000 to 6000-lb. capacity

DATA OF SOME OF THE CHELSEA HAND OPERATED ELEVATORS

No.	Type	Platform size, outside	Hatchway size, single face	Hatchway size, double face	Capacity lb.	Complete ship. wgt., approx., lb.	Service best adapted for	Outline specifications
7A	Patent frame passenger elevator	3′ x 3′	4′ x 3′-4″	4′ x 3′-6″	600	1800	General passenger service, invalids', hospitals, sanitariums, schools, public buildings, private residences, trunk lifts, etc.	MACHINE—Patent iron frames; steel shafts; drums, wheels and gears keyed to shafts. Steel keys; drums spirally grooved for cables; roller bearings; babbitted boxes; lubricating candles; finished brake; steel brake band, leather cushioned; wrought iron lever; iron pulleys and pulley supports. CAR—Ash or other hardwood, dovetailed, filled, varnished and rubbed, iron braced. Safety attachment; guide shoes; cushioned counterweight; car and counterweight cables Swedish iron; drop forged sockets; Russian hemp hand and check ropes; fair leaders; check weights; maple guide runs.
7B	Patent frame passenger elevator	4′-6″ x 4′	5′-6″ x 4′-4″	5′-6″ x 4′-6″	1000	1950		
8A	Patent frame store elevator, side post	4′-6″ x 4′	5′-6″ x 4′-4″	5′-6″ x 4′-6″	1500	2000	Stores, lofts, factories, banks, bakeries, laundries, etc., wherever used from one side or opposite sides.	MACHINE—Same as 7A and 7B above, except brake is not turned and brake band not leather cushioned. PLATFORM—Side post type. Shoes, post and crosshead, ash or other hardwood; flooring strongly lagged to shoes; crosshead and shoes tenoned and bolted to posts; posts braced with iron straps and rods and reinforced with iron brackets; safety attachment; guide shoes; cushioned counterweight; platform and counterweight cables Swedish iron; drop forged sockets; Manila hand and check ropes; check weights; fair leaders; maple guide runs.
8B	Patent frame store elevator, side post	5′-6″ x 5′	6′-6″ x 5′-4″	6′-6″ x 5′-6″	2000	2500		
9A	Patent frame store elevator, corner post	4′-6″ x 4′	5′-2″ x 4′-4″	5′-2″ x 4′-6″	1500	2200	Stores, lofts, factories, banks, bakeries, laundries, etc., wherever used from right angles or three sides.	MACHINE—Same as 8A and 8B above. PLATFORM—Corner post type. Floor framing, post and crosshead of ash or other hardwood; frame for floor of platform tenoned and bolted securely fastened to posts; crosshead tenoned and bolted to posts; flooring N. C. pine; posts braced with iron brackets; iron straps and rods secure floor frame to crosshead; safety attachment, etc., as for 8A and 8B above.
9B	Patent frame store elevator, corner post	5′ x 5′-4″	5′-8″ x 5′-8″	5′-8″ x 5′-10″	2000	2800		
10A	Sidewalk elevator or ash lift	3′ x 3′	3′-10″ x 3′-2″	See hatchway, Plan K for machine room	1000	1600	Stores, lofts, etc., basement service, ashes, boxes, etc. Operated from one floor only.	MACHINE—Frames; cast iron; steel shafts; iron drums, gears, pulleys keyed to shafts; steel keys; brake and steel brake band; wrought iron lever; pinion can be put out of mesh and loads lowered with brake lever; lip to hold pinion in mesh; pawl to hold loads; iron trough. PLATFORM—Hardwood, iron braced; iron guides; solid iron posts or T iron guideways; proof chain to four corners of platform and to drums; iron overhead sheaves grooved for chains; wrought iron frames for sheaves; iron boxes; one or two cranks with maple handles.
10B	Sidewalk elevator or ash lift	4′ x 4′	4′-10″ x 4′-2″		2000	1800		
11	Carriage or auto elevator, windlass type	7′-6″ x 16′	7′-8″ x 16′-2″	C. W. T. box outside of hatch about 6″x30″	2500	3800	Garage, stables, etc., for short rise. No part shows below ceiling.	MACHINE—Same as for 10A and 10B above, except drum has back drum counterbalance and is grooved for cables. PLATFORM—Hardwood shoes; flooring lagged to shoes; hung from four corners with Swedish iron cables; leaded in steel sockets. Counterweight hung similar cable; overhead sheaves on steel shafts set in iron brackets; additional wrought iron safety straps; cushioned counterweight.
12A	Carriage or auto elevator, hand-rope type	7′-6″ x 16′	8′-11″ x 16′-3″	Counterweight box in hatch	2500	4500	Garage, stables, etc. Operated by hand-rope and controlled by brake rope from any floor.	MACHINE—Frames hardwood; steel shafts; iron wheels, drum, gears keyed to shafts; steel keys; drums spirally grooved for cables; roller bearings; babbitted boxes; brake and steel brake band; wrought iron lever; pulleys and pulley supports; back drum counterbalance; babbitted wall box or bearing. PLATFORM—Same as 11 above, except fitted with iron guides; maple guide runs.
12B	Carriage or auto elevator, hand rope type	8′ x 18′	8′-11″ x 18′-3″		5000	6600		12B same as 12A, except double geared for increased capacity.

Note: In the above, stock sizes and capacities are given. No extra charge if size varies slightly. Prices quoted on request for outfits of any capacity; also on steel platforms and steel rails. Estimates quoted for erection anywhere. Above prices are for complete machines, including machine lumber and bolts. Weight-boxes, blocking and supporting timbers not included. Detail plan and instructions sent with each outfit. Prices f.o.b. New York City.



Chelsea Hand Power Elevator Hatchway Arrangements for Various Types
In ordering send sketch showing location of hatchway in building, show entrance to platform, give size of hatchway, and total height

ESTABLISHED 1887

ENERGY ELEVATOR COMPANY

TELEPHONE
MARket 0821

210-218 New Street, PHILADELPHIA, PA.

AGENTS IN ALL PRINCIPAL CITIES

Products

DUMBWAITERS, HAND-POWER and ELECTRIC.

SIDEWALK ELEVATORS, HAND-POWER and ELECTRIC.

INVALID LIFTS, HAND-POWER and ELECTRIC.

FREIGHT ELEVATORS, HAND-POWER and ELECTRIC.

ENERGY ELEVATORS & DUMB WAITERS
WHEREVER A LIFT IS NEEDED

Energy Features

Energy vertical transit equipment is backed by over 43 years of engineering experience and performance. It is characterized by simplicity of design, adaptability to the varying conditions in the building industry. Tested materials of adequate strength or wearability, plus careful workmanship have resulted in the long and satisfactory service for which Energy Equipment is noted. All Energy Hand-operated Equipment is designed and fitted for easy erection by local mechanics.

Engineering Department

Energy Engineers are constantly at work on improvements and designs to meet the ever increasing variety of lifting needs. They are responsible for the many Energy features which have made possible the 43-year record of Energy performance. This department is at your service.

Drawings and blue prints are always furnished for an installation. Blue prints of standard sizes of various types of equipment furnished on request.

Energy invites inquiries for special quotations on any unusual installation found necessary or advisable.

Guarantee

Energy Equipment is fully guaranteed for materials and workmanship, and can be installed with the knowledge that it will give utmost service over the years.

Prices

Because of exclusive features which eliminate useless equipment, prices of Energy Equipment will be found consistently moderate. While Energy Dumbwaiters and Elevators are not built on a price basis, they will be found in many buildings where competitive bidding preceded the contract.

How to Specify Energy Dumbwaiters and Elevators

Electric Dumbwaiters and Elevators—

(1) Furnish and install where indicated on plans and in accordance with the manufacturer's drawings and instructions, one Energy Electric Dumbwaiter or Elevator, capacity .... lbs., with Electric Motor.

(2) Leave the dumbwaiter or elevator thoroughly and completely installed and operating to the complete satisfaction of the architect.

(3) The electrical contractor at the building is to furnish and install the necessary wiring and cut-out switch from switchboard to service lugs on the motor.

(4) Contractor at the building is to prepare the necessary shaftway, including service and access doors as shown on the manufacturer's drawings.

(5) Before this dumbwaiter or elevator is shipped, the contractor is to submit to the architect for his approval, details and specifications of equipment together with manufacturer's guarantee for one year against defective materials and workmanship.

Hand-power Dumbwaiters and Elevators—

(1) Furnish and install where indicated on plans and in accordance with the manufacturer's drawings and instructions one Energy Hand-power Dambwaiter or Elevator, Type ...., capacity .... lbs.

(2) Leave the dumbwaiter or elevator thoroughly and completely installed, and in perfect operation to the complete satisfaction of the architect.

(3) Contractor at the building is to prepare the necessary shaftway, including service and access doors, as shown on the manufacturer's drawings.

(4) Before this dumbwaiter or elevator is shipped, contractor is to submit to the architect for his approval, details and specifications of equipment together with manufacturer's guarantee for one year against defective materials and workmanship.

Energy Electric Dumbwaiter, Type R

Capacity—Up to 300 lbs. at any practical speed desired.

This latest development by Energy Engineers is so capable in service and so adaptable to every type of building condition and vertical transit need that it makes available the advantages of electric service at places where it has heretofore been considered impossible or too expensive.

Features—

(1) Quiet operation.
(2) Speed to suit the service.
(3) Maximum safety, because of traction drive.
(4) Machine designed for long life, with all internal working parts and surfaces of bronze or steel.
(5) Motor fully protected against overload, no voltage and phase reversal.
(6) Full call and send pushbutton control.
(7) Control pushbuttons inoperative while car is in motion.

Machine—Of the latest improved direct-connected traction type for either overhead or basement floor mounting. Worm gear is solid bronze and the worm and worm shaft are cut from one blank of hardened steel and coupled directly to the motor. Ball bearing thrusts are located on all shafts and all bearings and heads are bronze. The brake is the solenoid type, self-holding and automatic.

Motor is of ample capacity for duty required, manufactured especially for dumbwaiter service, and guaranteed to comply with the standards of the American Institute of Electrical Engineers. Operates on alternating or direct current, 220-440 volts.

Control—By pushbutton at each landing, to call or send the car from or to any other floor. Effected by a single momentary pressure of the proper button.

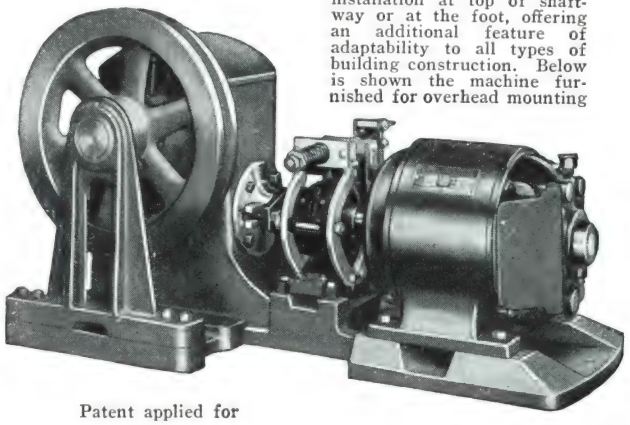
Car—Any size up to 3 ft. square and 4 ft. high, with or without shelves, of material to fit surroundings. Has been furnished in wood and steel for manufacturing plants and general use, and in monel metal for high-class restaurants.

Guides—Either hardwood or planed steel rails, according to service and speed desired. Wood rails are economical for light duty, while steel is better for heavy duty and high speed.

Cables—Special flexible steel construction, of such size and number as to give a high factor of safety.

Variations—Can be adapted to any building condition.

Equipment—Machine with motor and brake for required current; idler wheels, shafts and bearings; automatic pushbutton control units; car (size and type desired); counterweight, cables and connections; guide runs for car and weight.



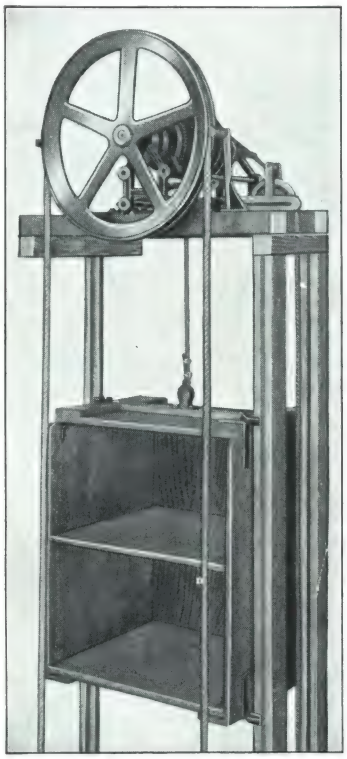
Machine can be built for installation at top of shaftway or at the foot, offering an additional feature of adaptability to all types of building construction. Below is shown the machine furnished for overhead mounting

Patent applied for

Continued on next page

Energy, or Residence Dumbwaiter, Type 632

For residences, apartments, restaurants, etc. The most used type, combining lifting capacity with fair speed.



Type 632

Machine — Automatic, securely sustaining loaded car at any point without brake line. Automatic brake applies only on downward movement of car, up motion being free of all friction. The main shaft is polished turned steel, revolving on roller bearings, and the entire mechanism, including the wheels to deflect the hoist cable, is mounted in one rigid iron frame. All parts are accurately machined and carefully fitted. Adjustable to accommodate cars of various widths.

Car — Well-seasoned hardwood, finished with filler and varnish, braced and bound with irons. One shelf, making two compartments 14 in. and 12 in. high. Adjustable guide shoes of iron.

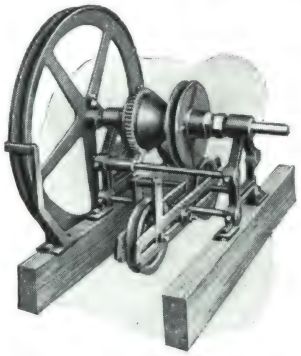
Counterweight—Heavier than car to assist raising load. Sectional and easily accessible to adjust to average load conditions.

Guides—Maple strip on one side and two grooved pine runs opposite, compounded to prevent warping.

Cable—Hoist cable is flexible steel of ample strength with all fittings. Operating rope of first quality hemp, free of splinters.

Variations—Can be furnished open front and back, front and either side, equipped to run on brass tubes; can be any size to maximum (see table) with any number of shelves. Steel car can also be furnished.

Equipment—Machine, car, counterweight, guides for car and weight, hoist cable, hand rope and guards.



Type 632 Dumbwaiter Machine

Double-acting Dumbwaiters

When the dumbwaiter is in constant use, as in restaurants, office buildings, banks, etc., and it is desired to eliminate loss of time waiting for car, we recommend a double-acting type.

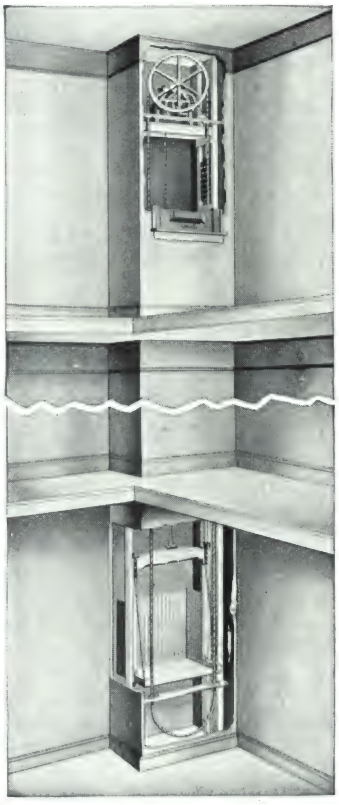
Two cars are provided, to run in a hatchway twice the ordinary width, so that one car is always available from either end without waiting. They operate on one machine with a single traction wheel. The "Energy," "Little Beauty" and electric dumbwaiters are particularly adaptable to this economical method of operation. Write for details and prices for specific installations.

Heavy Duty Dumbwaiter, Type 432

A combination of an extra heavy, iron braced, hardwood cabinet car, and a sturdy automatic-brake machine, with smooth-running gears to give ample lifting power. Used in hospitals, schools, bakeries, shipping rooms, garages for movement of food in quantity, books, boxes, tools, supplies, laundry, etc., offering a safe, dependable, and adequate means of transporting such articles between floors.

Equipment—Machine, car, counterweight, guides for car and weight, hoist cable, hand rope and guards.

Little Giant Dumbwaiter, Type 413



Type 413

For heavier loads in dormitories, hotels, laundries and factories.

Machine—Automatic lock type sustaining loaded car at any point without hand brake. Brake applies on downward motion only, eliminating all friction in raising loads. Geared to raise average load easily with spur gearing, cast from machine-cut patterns, and shafts of polished steel on anti-friction bearings, all contained in an iron frame. All parts accurately machined and carefully fitted.

Car—Platform type of well-seasoned hardwood, finished with filler and varnish, braced with irons and reinforced with steel braces. Enclosed on rear sides and back with yellow pine fencing 18 in. high. Adjustable guide shoes of iron.

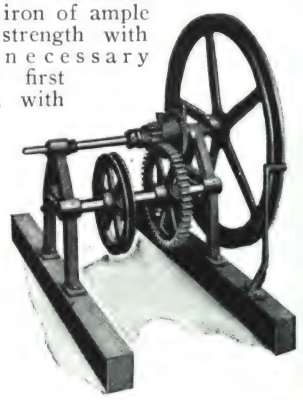
Counterweight—Heavier than car, sectional for adjustment to average load, runs smoothly in closed box.

Guide Runs—Two hard white maple strips fitting guide on car, drilled and countersunk for screws.

Cable—Hoist cable of flexible iron of ample strength with necessary fastenings. Operating rope of first quality hemp, free of splinters, with guards to keep it in proper position.

Variations—Car any size to maximum (see table) with maximum height of 4 ft. to headbeam. Can be fully closed, furnished with shelves, open rear, equipped with special safety device to prevent falling. Steel car can also be furnished.

Equipment—Machine, car, counterweight, guide runs for car, hoist cable, hand rope and guards.



The "Little Giant" Machine

ENERGY HAND-OPERATED DUMBWAITER DATA

For a lifting capacity of, lb.	Energy dumbwaiter	Standard car size (width x depth x height), in.	Maximum car size (width x depth x height), in.	Size of shaft for standard car, width x depth, in.	Shipping weight, lb. (for 10-ft. travel)
25	Little Beauty—Type 362	20x16x30	24x20x30	26 x18	275 (with bottom stand and guard for upper floor, 375)
50	Undercounter—Type 1063	20x16x30	30x24x30	28 x22	120
75	Energy—Type 632	24x20x30	36x24x30	29 x23	300
150–300	Heavy Duty—Type 432	30x24x36	9 sq. ft.	36 x27	450
300	Little Giant—Type 413	30x42x48 to headbeam	9 sq. ft.	38½x45	500

All dumbwaiters and dumbwaiter cars subject to wide variations to fit service needs. See descriptions for full information.

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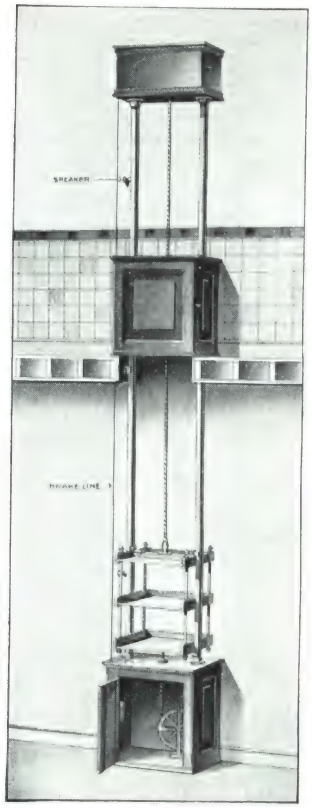
Little Beauty Dumbwaiter, Type 362



For banks, restaurants, offices, light mfg. plants, for quick movement of small objects. Installation stands open—easily accessible.

Operating Gear—Rope passing over iron wheels mounted on iron stands at top and bottom of shaft. Wheels turn on roller bearings and equipped with rope guards. Self-holding brake applied or released by one line, securely sustains car loaded, or empty at any point. Loaded car descends by gravity, speed being controlled by brake line, which prevents burning hands on car rope.

Cabinet Enclosure—Of panelled hardwood for top wheel and brake. Finished golden oak unless otherwise desired.

Car—Hardwood trays finished golden oak unless otherwise desired, spaced with square brass tubes. Fitted with adjustable guide shoes, polished brass connections and rubber bumpers on bottom. One shelf, making two compartments 12 and 14 in. high.

Counterweight—Molded lead in steel jacket. Steel coil spring provided for weight, which runs in one tube.

Guides—Two polished brass tubes with flanges top and bottom and intermediate clamps for each floor line. Mouthpiece in one tube at each floor for speaker.

Rope—Braided cotton fitted with necessary connections for car and weight.

Variations—Car can be furnished any size up to maximum (see table) with one or two compartments, completely enclosed, or in monel metal.

Equipment—Guarded wheels and brake, overhead cabinet with mechanism mounted, car, counterweight, brass tube guides with collars and clamps, operating rope with connections, speakers. If desired, cabinet base and cabinet stand for each floor opening can also be furnished.

Under Counter Dumbwaiter, Type 1063

For quick replenishment of stock in stores, or smooth movement of soiled dishes on lunch counters and restaurants.

Machine—Automatic lock type which securely sustains loaded car at any point without hand brake. No brake friction on upward movement. The main shaft is polished turned steel, revolving on roller bearings, and the entire mechanism is mounted in one rigid iron frame. Hand wheel for easy operation. Winding drum eliminates slipping of cable. Overhead wheel with steel shaft and bearings.

Car—Well-seasoned hardwood, finished with filler and varnish, braced and bound with iron. One shelf, making two compartments 12 and 14 in. high. Legs on each side fitted with guarded roller bearing pickup pulleys.

Guides—Two maple strips, drilled and countersunk.

Hoist Rope—Flexible iron cable with necessary fastenings.

Variations—Car any size to maximum (see table), extra shelves or steel car provided. Any finish desired. Machine can be hung from ceiling to operate with pull rope.

Equipment—Machine, guides, hoist cable, pick-up pulleys, overhead wheel.

Note: Energy Under Counter Dumbwaiters are made to suit all working conditions. Write for information on other types, stating your particular problem.

Electric Invalid Elevator, Type 884

Possesses every possible feature which will add to its usefulness and dependability—maximum safety, facility of operation, artistic simplicity of design, quietness and smoothness of movement.

Machine—Overhead traction type, capacity 500 lb. with high factor of safety at speed of 50 ft. per minute. Standard operating current is alternating current, 2-3 phase, 60 cycles. Single phase or direct current equipment if required.

Control—Operates at touch of button—in car or at any floor—and automatically stops at any floor desired, where it is held securely by electric brake. Starts smoothly and stops without jar.

Car—3 ft. wide by 4 ft. deep, accommodating a wheel chair, patient and attendant. Sides and back of hardwood panel work 4 ft. high, upper parts of bronze painted grille work with oak panel ceiling.

Two Steel Cables—Tested for high factor of safety.

Safety Device—Energy Spring Grip which positively prevents car slipping or falling.

Equipment—Machine for alternating or direct current; hardwood car with safety device; two steel cables and fastenings; counterweights on wrought iron bar; maple guide runs, controller, door contacts, reverse phase relay, limit switches, push buttons.

Shipping Weight—(Standard size) for 10-ft. travel—1800 lb.

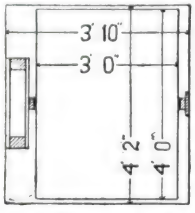
Hand Operated Invalid Elevator, Type 61

Capacity 500 lb.—for residences.

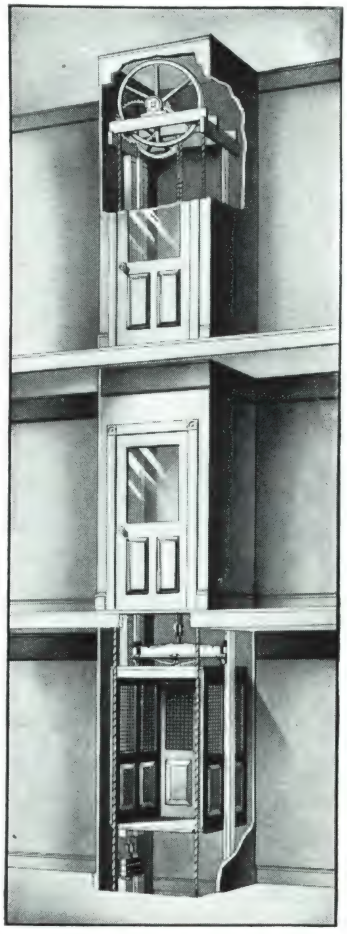
Design and construction represent the best lift where conditions prevent use of the electric lift described above. It is noted for the ease of its hand operation. Surrounded by every safety precaution and built for permanent service.

Hoisting Mechanism—Machine cut gearing with polished shaft on steel antifriction roller bearings, all enclosed in iron frame. Brake acts automatically in either direction, holding car securely at any point in its travel.

Car—Same as car for electric lift, described above.



Plan of Hatch for Hand Operated Invalid Elevators



Energy Hand Operated Invalid Elevator

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Two Steel Hoist Cables—With an ultimate strength of 13,000 lb. provided with equalizing bar. Operating rope of Italian hemp.

Safety Device—Energy Spring Grip prevents any slip or fall.

Counterweight—Sectional and adjustable to require minimum exertion for average load in either direction.

Guide Runs—Hard white maple.

Equipment—Machine, hardwood car (3 ft. wide, 4 ft. deep); counterweights on a wrought iron bar; hand rope, hoist cables and fastenings, car runs.

Shipping Weight—(Standard size) for 10 ft. travel—1600 lb.

Hatch—For standard size, 3 ft. 10 in. wide by 4 ft. 2 in. deep.

Hand-operated Hospital Elevators

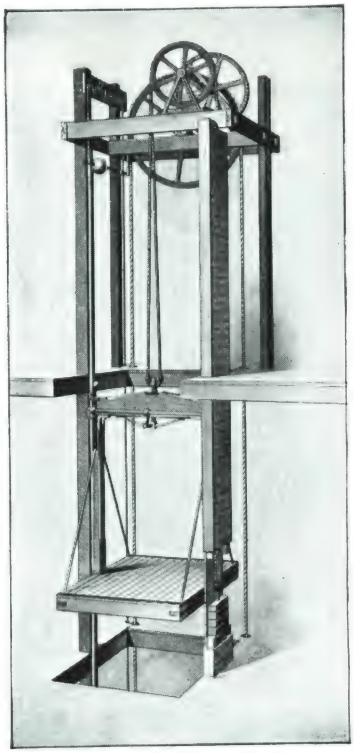
For use in sanatoriums, small hospitals and similar institutions where proper electric power is not available, or where infrequent service does not warrant the expense of an electric passenger elevator, we have developed smooth running hand elevators with cars up to 5x8 ft., and safe capacity up to 1000 lbs. They have been found highly economical and serviceable, requiring very little attention, in the way of upkeep or repairs, yet always dependable when needed.

Energy Hand Elevator, Type 992

Capacity 500, 1000, 1500 and 2000 lbs.

Ideal for warehouses, manufacturing plants and other buildings where economical and dependable lifting service is needed.

Machine—Steel shaft on steel anti-friction roller bearings, to which is keyed the large diameter rope wheel. Spur wheel is cast from machine-cut pattern and, like the cable wheel, is extra strong for durability. Main shaft, also on roller bearings, is turned steel of large diameter to resist torsional strain. Mounted on iron stands to keep gearing perfectly aligned.



Hand Elevator, Type 992

Brake—Double area of self-holding type—a wide steel band compressing outside of pull wheel. Released or applied from any floor and will sustain full load.

Car—First quality hardwood braced with iron and reinforced with angles. Equipped with safety device which instantly locks car to guides should cables break.

Counterweight—Ample to balance, in sections for adjustment at any time.

Steel Cables—Two, which will sustain ten times rated capacity, attached by equalizing bar. Hand rope of best quality Manila.

Guide Runs—First quality hard white maple machined to fit guide shoes on car, bored and countersunk for screws.

Equipment—Machine, car with safety catch, counterweights on a wrought-iron bar, hand rope, two hoist cables and fastenings, check line, car runs.

Note: Guide posts, machine supports, weight box, and bolts for installing elevator are not included in the shipment, as they can be purchased locally, with a considerable saving of freight charges.

SIZES OF HAND ELEVATOR, TYPE 992

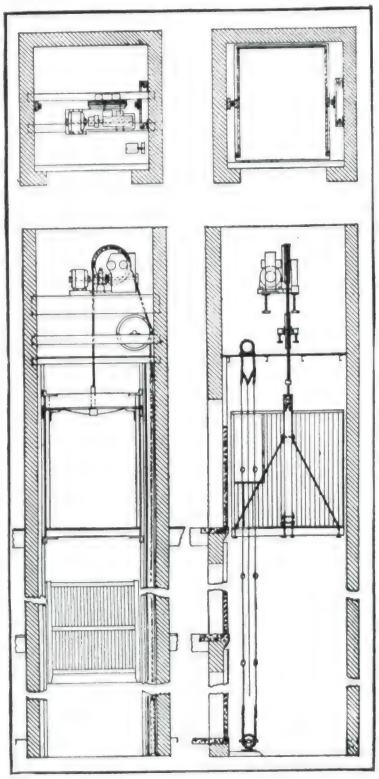
Maximum capacity, lb.	Car size (width and depth), ft.	Shaft size (width and depth), ft. in. ft. in.	Shipping weight, lb.
500	3 x3½	3 11 x 3 8	1100
1000	3½x4	4 5 x 4 2	1400
1500	4 x4½	4 11 x 4 8	1700
2000	4½x5	5 6 x 5 2	2100

Energy Electric Traction Elevator, Type 892

Capacity—2000 lbs.

No more dependable elevator for general, frequent use in raising heavy loads in factories, stores, warehouses, etc., can be had at any price. It has a speed of 40 ft. a minute.

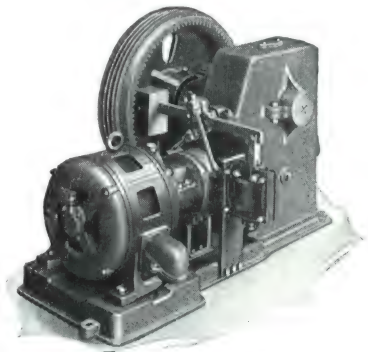
Machine—For either alternating or direct current. Motor and worm shaft are in direct connection, so that it does not require belt. Worm and driving shaft are turned out of one solid piece of special carbon steel. The worm wheel is phosphor bronze and the end thrusts are ball bearings. The pinion driving the internal gear is cut, with its shaft, from one piece of steel. Traction drum is 24 in. in diameter, and the steel shaft on which it turns is $3\frac{7}{16}$ in. in diameter. Machine base is firm and rigid, made in such a way as to catch the oil drip.



Plan and Elevation of Electric Traction Elevator, Type 892

Control—Elevator is controlled by a reversing switch operated by a hand cable inside the hatchway, within easy reach from the car or from any floor. It can also be operated by pushbuttons, located in the car and at each landing.

Car—First quality hardwood, enclosed three sides with yellow pine fencing, wire grille work overhead. Braced with irons and angles, equipped with adjustable guide shoes. Safety catch absolutely prevents falling.



Type 892 Machine

Brake—Electric, automatically applying when current is shut off. Limit switches at top and bottom of hatch prevent overtravel of car.

Cables—Three, of steel, with total strength of 50,000 lbs., attached to equalizing bar.

Counterweights—In cast-iron sections bolted together, balancing car and part of load.

Guides—Hard white maple, machined, bored and countersunk.

Equipment—Machine with motor for alternating current, 2-3 phase, 220 volts, 60 cycles; hardwood car with safety device; three steel hoist cables and connections; maple guide runs; counterweight on wrought-iron bar; control rigging; reversing switch; limit switches; electric call bell; steel bumpers for pit; car lock.

Shipping Weight—For 10-ft. travel, 4700 lbs.

Other Electric Freight and Automobile Elevators

Energy Electric Freight Elevators are also made in belt and chain drive types for a wide variety of uses, including automobile and warehouse work, ranging in capacity from 1000 to 5000 lbs.

Write for our quotations.

Energy Sidewalk Elevators

See descriptive details of hand-operated and electric types on next page.

Continued on next page

Hand-operated Sidewalk Elevator, Type 977

Machine—Illustration shows ideal installation with operating mechanism beside car, permitting direct connection of gearing. Double yoke bearings on steel angles insure positive, permanent alignment of all gears. Operates by large wheel instead of the less effective crank.

Brake—Of self-holding type which also acts to retard car in descent.

Car—Steel framed platform with double flooring. Standard 4x4 ft. area accommodates bulky articles.

Guides—Heavy steel angles on each side guide car steadily and support overhead wheels.

Cables—Of steel with total strength of 30,000 lb.

Variations—Car can be made larger or smaller to fit special needs. Where it is impossible to place operating mechanism beside car (for a hatch outside building line) it is furnished as Type 1004 (see plan). Outstanding in this type is the train of gears developed by Energy Engineers which positively transmits power to hoisting drums, absorbs all shocks and evenly distributes stress of heavy loads.

Sidewalk Elevator, Type 977

Hand-operated Sidewalk Elevator, Type 994

Sidewalk Elevator, Type 994

Similar in construction to Types 977 and 1004, but lighter in design.

Machine — Sufficiently geared to enable one operator to raise capacity load.

For outside hatchway, power is transmitted from machine to hoisting drums by sturdy sprocket chain. Self holding brake controls downward movement or holds car at any position.

Large wheel is motive power instead of the less effective crank.

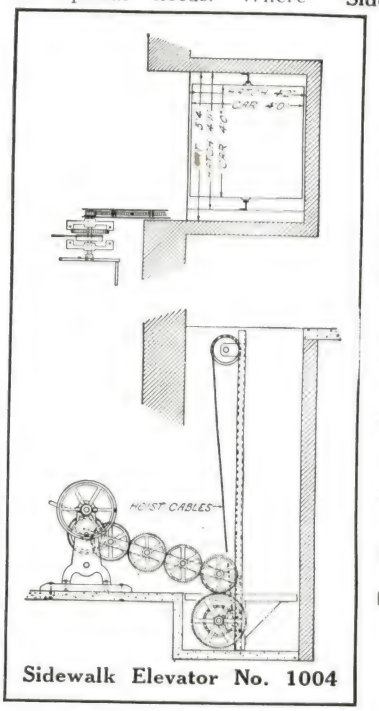
Car—Steel framed, 3x3 ft., with double floor—bottom of pine planks, top of renewal floor of hard maple.

Guides—Rigid steel angles which guide car without binding, and support overhead wheels.

Cables—Steel, of many times needed strength.

Variations — Where there is room in hatchway for mechanism and operation beside car, it is furnished as Type 1002 (see plan).

Energy Hand-operated Sidewalk Elevators are adaptable to all kinds of building conditions—even those which at first thought might seem impossible to overcome.



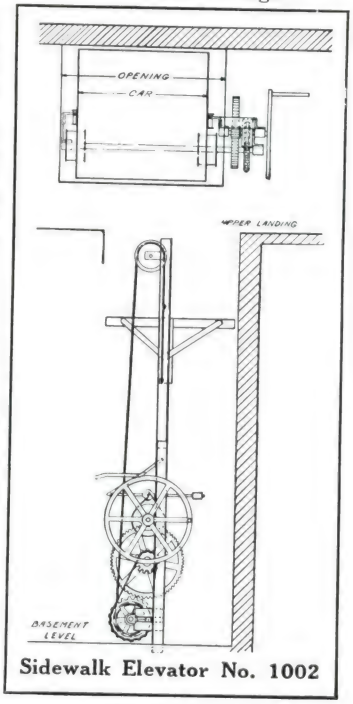
Sidewalk Elevator No. 1004

ENERGY HAND-OPERATED SIDEWALK ELEVATOR DATA

Capacity, lb.	Type	Car size, outside measurements, ft.	Size of door openings required, ft.-in.	Gear ratios	Shipping weight, lb.
1000	977	4 x 4	4-10 x 4-2	70-1	2000
1000	1004	4 x 4	5- 3 x 4-2	35-1	2000
500	1002	3 x 3	4- 0 x 3-2	35-1	1200
500	994	3 x 3	3- 8 x 3-2	35-1	1200

Equipment—Machine, brake, car, guides, top wheels, hoist cables and connections.

We can also furnish sidewalk doors for any of these types, meeting all municipal ordinances.



Sidewalk Elevator No. 1002

Energy Electric Sidewalk Elevator, Type 988

Capacity 1000 lbs.

Machine—Operates on alternating current 2-3 phase, 220-440 volts, 60 cycles, with drum reverse switch. Direct current if desired. Bottom pick-up wheels on car—on principle of tackle block—provide easy movement with economical power consumption. Terminal stops automatically halt car at either end, independently of operator. Under control at all times by pull chain.

Car—Steel frame construction with double floor—bottom of yellow pine planks, renewal floor of hard maple. Steel legs and braces distribute pull evenly. Stops level with street and basement floor. Standard car size is 4 ft. square.

Guides—Heavy steel angles anchored into pit and bolted at top. Bearing stress of overhead wheels is thus carried down to solid foundation.

Cables—Steel, of many times needed strength.

Variations—Car any size up to 24 sq. ft. Motor and operating gear may be placed overhead, if free floor space is desirable. Will meet all building conditions.

Equipment—Machine and motor for alternating current, 2-3 phase, 220 volts, 60 cycles; car, controller rigging, guides, cable and connections, drum reverse switch, steel chain belt. Direct current motor if desired.

Shipping Weight—(Standard size), 10 ft. travel, 2000 lb.

We can furnish sidewalk doors for this type, meeting all municipal ordinances.

Electric Sidewalk Elevator at Van Horn & Son, Phila.
Hatchway outside building line. Energy Electrics meet all municipal ordinances

ESTABLISHED 1889

JOHN W. KIESLING & SON, INC.

INCORPORATED 1923

Manufacturers of Ball Bearing Hand Power Dumbwaiters, Elevators, Hoists and Lifts

1795-1799 Atlantic Avenue
BROOKLYN, N. Y.

TELEPHONE
HADdingway 8070, 8071

REPRESENTED IN

ALBANY, N. Y.
AKRON, OHIO
ATLANTA, GA.
BALTIMORE, MD.
BIRMINGHAM, ALA.
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BOSTON, MASS.
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DAVENPORT, IOWA
DAYTON, OHIO
DENVER, COLO.
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SPRINGFIELD, MASS.
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UTICA, N. Y.
WASHINGTON, D. C.
WICHITA, KAN.

CANADA: PROVINCES OF NOVA SCOTIA, NEW BRUNSWICK AND PRINCE EDWARD ISLAND; PROVINCE OF QUEBEC; VANCOUVER AND VICTORIA, BRITISH COLUMBIA

MEXICO: MONTEREY

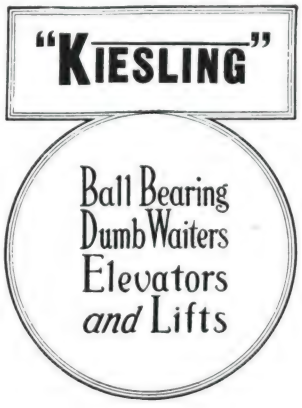
Products

DUMBWAITERS: Ball Bearing, Wood Track or Steel Track—for restaurants, stores, residences, clubs, hospitals, libraries, schools, colleges, Government, State and City institutions, etc.

ELEVATORS or LIFTS: Steel Track—for conveying freight in various form, such as trunks, crates, boxes, barrels, bags of laundry, coin, ashes, etc.

DOORS: Dumbwaiter; Sidewalk Elevator—for use in conjunction with the above mentioned dumbwaiters, elevators or lifts.

GATES: Automatic and Semi-automatic.



Shipments

Through the co-operation of our many representatives and distributors throughout the principal cities of the United States and Canada, we are in position to make prompt shipments, supervise or effect installation of Kiesling products.

Where the purchaser desires to make his own installation, we furnish complete working drawings and written instructions.

Installations

Our unsurpassed record of over 100,000 installations has qualified us to solve the most intricate problems promptly and efficiently.

Kiesling Service

Our experience of over forty-one years in the manufacture and installation of hand power equipment qualifies us to advise authoritatively concerning all problems incident to the installation and use of dumbwaiters and elevators.

Our Service Department or nearest representative will gladly assist architects or prospective users in the selection of the most suitable outfit for the particular requirements.

Doors

Wherever possible we suggest that *Kiesling Ball Bearing Vertical Lifting Sliding Doors (self-closing type)* be included in the dumbwaiter specifications.

Guarantee

We guarantee the *entire* outfit and not the machine alone. It is essential that the tracks, cables, etc., should be covered by a suitable guarantee to assure a product that will prove an economical investment to the purchaser.

Continued on next page

"STEEL-TRACK" AUTOMATIC BRAKE BALL BEARING INVALID OR HOSPITAL ELEVATOR

Designed exclusively for the purpose of conveying persons from one floor to another, with the assurance of safety and ease of operation, eliminating the necessity of arduous climbing of stairs. It is designed for private residences, hospitals and institutions. This elevator can readily be installed in new or old buildings.

Where the installation is to be made by other than our own mechanics, simplicity of erection is effected as each outfit is prepared in accordance with the dimensions of the working drawing, and written instructions are furnished with every shipment.

Principle Features

Steel tracks are securely fastened to brackets which are bolted to steel plates. Four *cold drawn* steel tracks and four *ball bearing* guide shoes guide the car and counterweight, eliminating friction and assuring a quiet and smooth-running car.

The cab is built of selected clear ash, filled and neatly finished with two coats of spar varnish. Sides, back and top are paneled with bronzed grilles in upper half of cab. The cab is inserted in a steel sling which completely envelops it. Two individual flexible steel hoisting cables are securely fastened to the steel sling and to the counterweight. The operating rope is braided cotton cord, guaranteed to be absolutely splinterless.

All cut gearing, sheaves and momentum flywheel are secured, by means of keys and keyways, to *cold drawn* steel shafting which revolves in ball bearings and requires no lubrication. These ball bearings are not to be confused with short pieces of steel rod inserted in a cast iron bearing and termed a "roller" bearing. Our automatic brake, having an unsurpassed locking surface of 18 sq. in. assures perfect safety. As a further safety precaution, this machine is mounted on steel I-beams and securely bolted thereto.

Five Year Guarantee

This "Steel-track" Automatic Brake Ball Bearing Invalid Elevator is guaranteed for *five years* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on the plans and in accordance with the manufacturer's specifications and drawings, "Steel-track" Automatic Brake Ball Bearing Invalid Elevator Size No. ..... as manufactured by JOHN W. KIESLING & SON, INC., Brooklyn, N. Y.

How to Specify Without Using Manufacturer's Name

Steel Tracks (Cold Drawn)—Two individual steel tracks guide the car and two individual steel tracks guide the counterweight.

Guide Shoes—Four ball bearing guide shoes.

Machine—*Automatic brake, cut gears and ball bearing.* Assembled and set as a complete unit within a self-contained iron frame.

Steel Machine Supports—The entire machine is supported on steel I-beams and securely bolted thereto.

Cab—Selected clear ash. Panels in lower half and top, bronze grilles in upper half. Electric lighting fixture provided in cab.

Steel Car Sling—The car, or cab, is inserted in a steel sling and securely bolted thereto.

Cables—Two individual flexible steel cables.

Counterweight—Steel rod, sectional design and adjustable to additional weight.

Operating Rope—Braided cotton cord.

Steel Tracks and Ball Bearing Guide Shoes Assure Ease of Operation

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of cab, in.		Shaft dimensions, in.	
	Width	Depth	Width	Depth
1	30	30	39	33
2	36	30	45	33
3	36	36	45	39
4	42	36	51	39
5	42	42	51	45
6	48	42	57	45
7	48	48	57	51
8	54	54	64	57
9	60	60	70	63
10	48	84	58	87

Note: Intermediate sizes shipped within *four* days.
Blue prints of standard stock sizes furnished on request.

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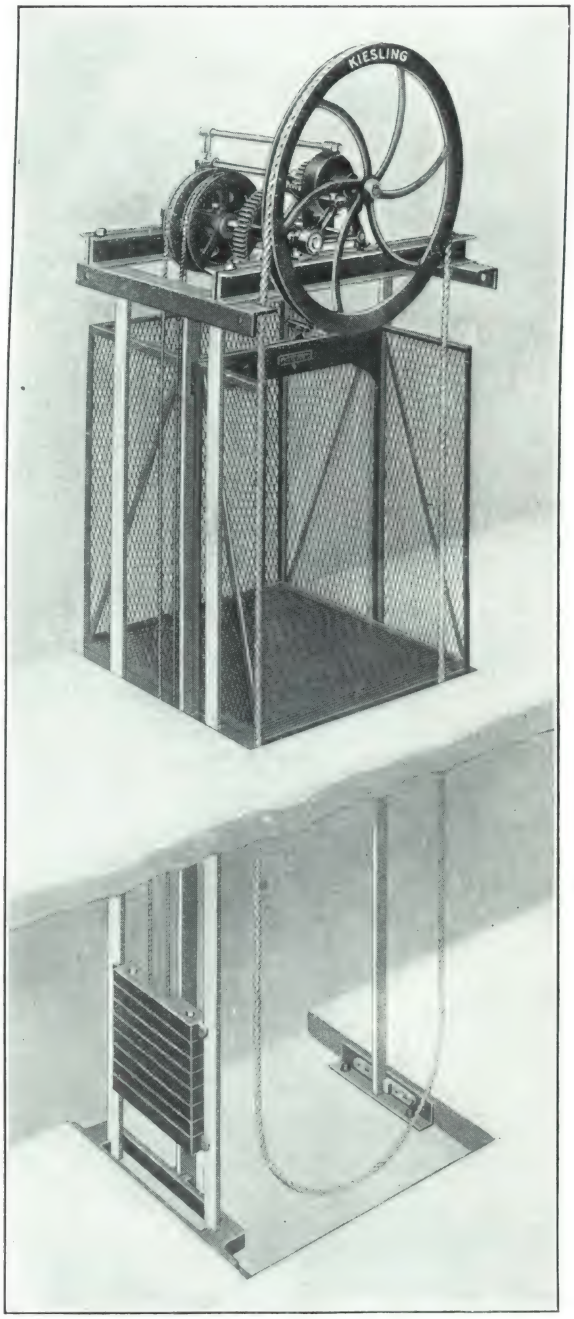
"STEEL-TRACK" BALL BEARING ELEVATOR OR TRUNK LIFT

(Cut Gears and Two Hoist Wheels)



Steel Tracks and Platform Flooring of Diamond Checkered Steel Plate Will Wear Indefinitely

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.		Capacity, lb.
	Width	Depth	Width	Depth	
1	36	36	45	39	600
2	42	36	51	39	750
3	42	42	51	45	750
4	48	42	57	45	1000
5	48	48	57	51	1000
6	54	54	64	57	1200
7	60	60	70	63	1500
8	72	72	82	75	2000

Note: Intermediate sizes shipped within *four* days.
Blue prints of standard stock sizes furnished on request.

Designed for the purpose of conveying freight in various forms, such as furniture, trunks, crates, boxes, barrels, bags of laundry, coin, books, etc., from one floor to other floors.

Local building regulations may necessitate special equipment, such as gates, etc. We are prepared to furnish any special equipment which may be required.

Where the installation is to be made by other than our own mechanics, simplicity of erection is effected as each outfit is prepared in accordance with the dimensions on the working drawing, and written instructions are furnished with every shipment.

Principal Features

Steel tracks are securely fastened to brackets which are bolted to steel plates. Four *cold drawn* steel tracks and four *ball bearing* guide shoes guide the car and counterweight, eliminating friction and assuring a quiet and smooth-running elevator.

The car is of steel construction throughout (no wood whatsoever). The car floor is of diamond checkered steel plate. The car enclosure may be either heavy wire mesh or sheet steel, reinforced with steel angles. The car is inserted in a steel sling which completely envelops it. Two individual flexible steel hoisting cables are securely fastened to the steel sling and to the counterweight. The operating rope is braided cotton cord, guaranteed to be absolutely splinterless.

All cut gearing and sheaves are secured, by means of keys and keyways, to the *cold drawn* steel shafting which revolves in ball bearings and requires no lubrication. These ball bearings are not to be confused with short pieces of steel rod inserted into a cast iron bearing and termed a "roller" bearing. The fibre lined band brake is of the positive toggle locking type, and will sustain a test load four times the amount specified. The machine itself is mounted on and securely bolted to steel I-beams.

Five Year Guarantee

This "Steel-track" Ball Bearing Elevator or Trunk Lift is guaranteed for *five years* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on the plans and in accordance with the manufacturer's specifications and drawings, "Steel-track" Ball Bearing Elevator (or Trunk Lift) Size No. ..... (with gates) as manufactured by JOHN W. KIESLING & SON, INC., Brooklyn, N. Y.

How to Specify Without Using Manufacturer's Name

Steel Tracks (Cold Drawn)—Two individual steel tracks guide the car and two individual steel tracks guide the counterweight.

Machine—*Band brake, cut geared ball bearing.* Assembled and set as a complete unit in a self-contained iron frame.

Steel Machine Supports—The entire machine is supported on steel I-beams and securely bolted thereto.

Steel Car Sling—The car is inserted in a steel sling and securely bolted thereto.

Steel Car—The car is of all-steel construction, diamond checkered steel plate flooring, heavy gauge wire screen enclosure.

Guide Shoes—Four ball bearing guide shoes.

Cables—Two in number and of flexible steel.

Counterweight—Steel rod, sectional design and adjustable to additional weight.

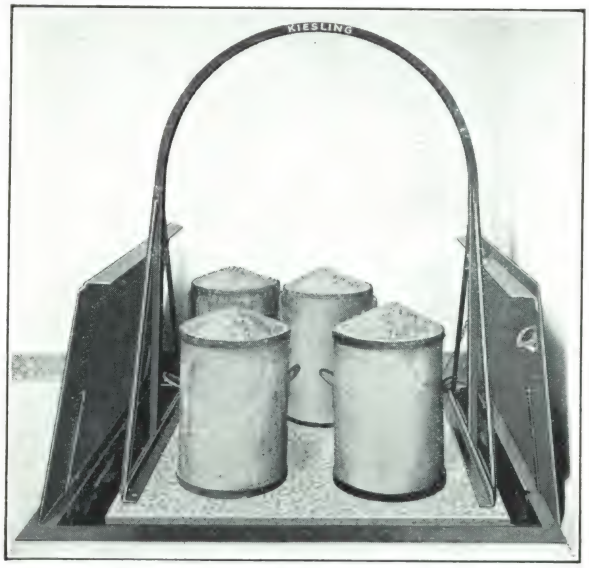
Operating Rope—Braided cotton cord.

Continued on next page

"ALL-STEEL" BALL BEARING SIDEWALK ELEVATOR OR ASH LIFT

These elevators are designed for the purpose of conveying freight in various forms—barrels of ashes, boxes, crates, books, laundry, etc.—from the basement to sidewalk level. Empty cellars may readily be converted into valuable storerooms through the installation of an inexpensive elevator of this type.

Where the installation is to be made by other than our own mechanics, simplicity of erection is effected as each outfit is prepared in accordance with the dimensions shown on the working drawing, and written instructions are furnished with every shipment.

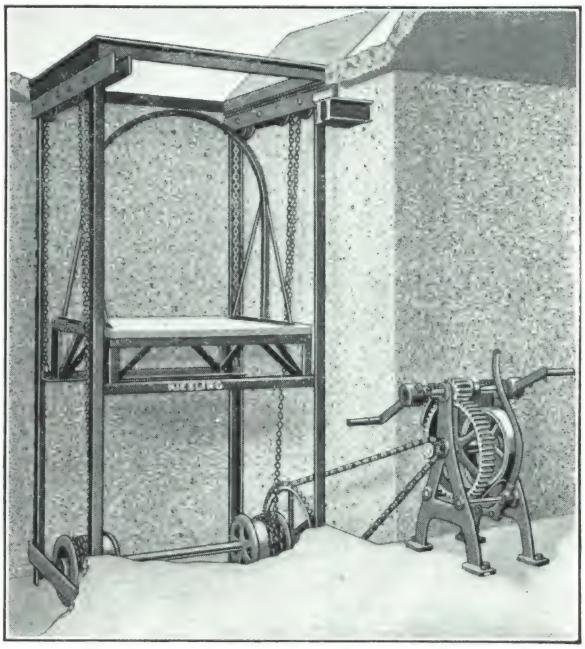


Kiesling Platform Ash Hoist or Sidewalk Elevator
Flooring of platform is diamond checkered steel plate

Principal Features

This is a *full ball bearing* sidewalk elevator, i.e., not only is the machine full ball bearing, but the cold rolled steel shafting to which the drums are secured also revolves in ball bearings, which require no lubrication. The objectionable and dangerous practice of crawling into the pit to oil the drum shaft babbit bearings, customarily used with other types, is entirely eliminated. The winding machine can be placed wherever desired. The fibre lined band brake is of the positive toggle locking type and will sustain a test load four times the amount specified.

Four *cold drawn* steel tracks (not angle irons) are used to guide the car. The platform is of *all-steel* construction, the flooring of same is diamond checkered steel plate. Each platform, or car, is equipped with an "arch" or "bow" which automatically opens the sidewalk doors as the elevator rises, and closes them as the elevator descends. Winding wheels, instead of crank handles, can be furnished at no additional cost. B.B.B. quality chain, electrically welded, carries the car and load.



Kiesling Ball Bearing Sidewalk Elevator
The machine can be placed in practically any position relative to the platform. Cold drawn steel guide rails have replaced the old wrought iron tracks. Ball bearings for the drum shaft and entire machine unit make it a full ball bearing outfit. Made in 5 standard stock sizes but any special size made to order without unnecessary delay

Five Year Guarantee

This "All-steel" Ball Bearing Sidewalk Elevator or Ash Lift is guaranteed for *five years* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on plans and in accordance with the manufacturer's specifications and drawings, "All-steel" Ball Bearing Sidewalk Elevator (or Ash Lift) Size No. ..... (with sidewalk doors) as manufactured by JOHN W. KIESLING & SON, INC., Brooklyn, N. Y.

How to Specify Without Using Manufacturer's Name

Machine—*Ball bearing, band brake.* The machine is assembled and set as a complete unit in a self-contained iron frame.

Steel Tracks (Cold Drawn)—Four *cold drawn* steel tracks guide the car.

Platform—All-steel, diamond checkered steel plate flooring.

Steel Trusses—Used to support the overhead sheaves.

Drums—Drums are made of cast iron. Drum shafting revolves in ball bearings.

Steel Arch—The arch is securely bolted to the steel platform.

Steel Chain—B.B.B. quality; breaking strain 2.5 tons each.

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.		Capacity, lb.
	Width	Depth	Width	Depth	
1	36	36	48	38	500 to 1000
2	42	42	54	44	500 to 1500
3	48	48	60	50	500 to 1500
4	54	54	66	56	500 to 2000
5	60	60	72	62	500 to 2000

Note: Intermediate sizes shipped within *four* days.
Blue prints of standard stock sizes furnished on request.

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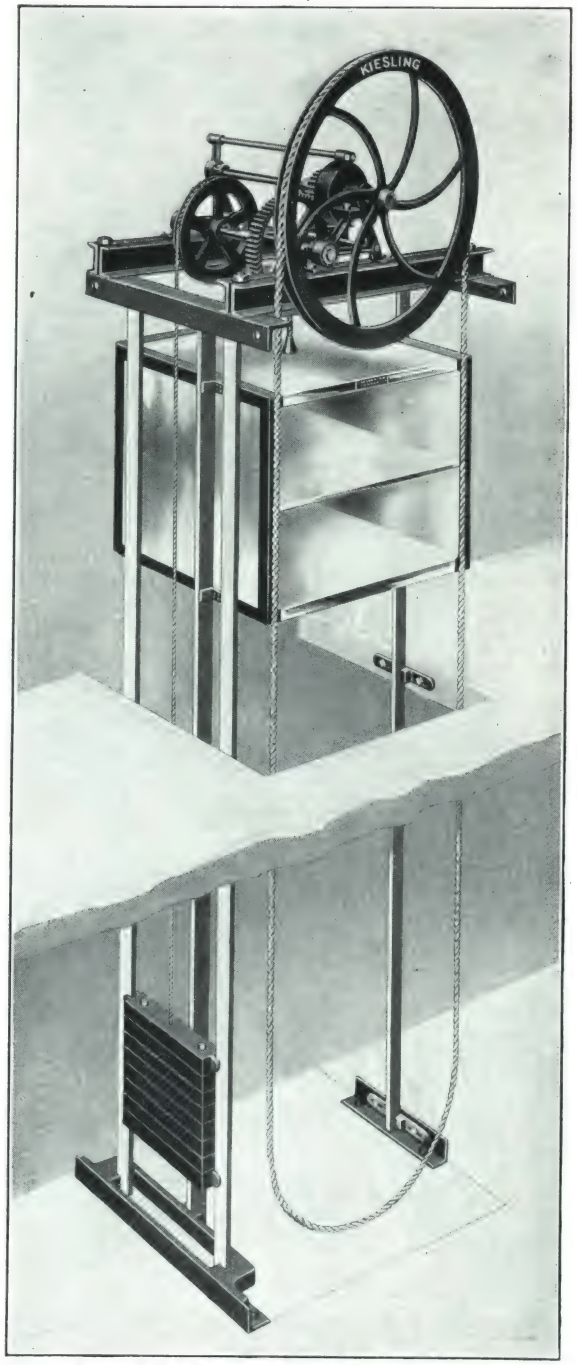
"STEEL-TRACK" AUTOMATIC BRAKE BALL BEARING DUMBWAITER

(Full Diameter Hoist Wheel and Cut Gears)



Steel Tracks and Ball Bearing Guide Shoes Assure a Silent, Easy Operating Dumbwaiter

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions in.		Outside dimensions of car, in.		Shaft dimensions, in.		Car height, in.
	Width	Depth	Width	Depth	Width	Depth	Width	Depth	
	Single Face				Double Face				
1	18	16	24	19	18	16	24	20	36
2	20	16	26	19	20	16	26	20	36
3	20	20	26	23	20	20	26	24	36
4	24	20	30	23	24	20	30	24	40
5	24	24	30	27	24	24	30	28	40
6	28	24	34	27	28	24	34	28	40
7	28	28	34	31	28	28	34	32	40
8	32	28	38	31	32	28	38	32	48
9	36	36	43	39	36	36	43	40	48

Note: Intermediate sizes shipped within *two* days.
Blue prints of standard stock sizes furnished on request.

Designed for use in restaurants, hospitals, residences, clubs, libraries, schools, colleges, apartments, Government, State and City institutions, etc., and wherever the *highest* grade dumbwaiter is required.

Where the installation is to be made by other than our own mechanics, simplicity of erection is effected as each outfit is prepared in accordance with the dimensions on the working drawing and written instructions are furnished with every shipment.

We recommend that Kiesling Ball Bearing Vertical Lift Doors (described on page 10) be included with dumbwaiter as the dimensions of these two items are governed by each other.

Principal Features

Four *cold drawn* steel tracks and four ball bearing guide shoes guide the car and counterweight. These two features eliminate friction and assure a quiet, smooth-running car.

The car is constructed of monel metal, reinforced with a steel angle frame. It is a strong, sanitary and fireproof dumbwaiter.

Cut gears and full diameter hoist wheels of our automatic brake machine are secured, by means of keys and keyways, to the *cold drawn* steel shafting, which revolves in ball bearings and requires no lubrication. The ball bearings used in our machines are encased in a case-hardened housing which is dustproof and should not be confused with small pieces of steel rod inserted in a cast iron bearing and termed a "roller bearing." Our automatic brake having an unsurpassed locking surface of 18 sq. in. enables us to gear this machine for a working capacity of 500 lb. without the necessity of using compound gears—the less gears the less friction.

As a safety precaution, and to diminish machine space, the machine is bolted to steel I-beams. Braided cotton cord, ¾ in. in diameter, is used exclusively as the hand operating rope and is guaranteed to be absolutely splinterless. Flexible steel hoisting cable carries the car and counterweight, or we can furnish a hand-forged chain to carry the car and counterweight at a slight additional cost.

Five Year Guarantee

This "Steel-track" outfit is guaranteed for *five years,* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on plans and in accordance with the manufacturer's specifications and drawings, "Steel-track" Automatic Brake Ball Bearing Dumbwaiter, Size No. ..... (with Kiesling Doors) as manufactured by JOHN W. KIESLING & SON, INC., Brooklyn, N. Y.

How to Specify Without Using Manufacturer's Name

Steel Tracks (Cold Drawn)—Two individual steel tracks guide the car and two individual steel tracks guide the counterweight.

Car—Monel metal, of proper gauge, according to size; reinforced with steel angles. One or more shelves as desired.

Guide Shoes—Four ball bearing guide shoes.

Machine—*Automatic brake, cut gears, ball bearing, full diameter hoist wheel.* The machine is assembled and set as a complete unit in a self-contained iron frame.

Steel Machine Supports—The entire machine is supported on steel I-beams, securely bolted thereto.

Cable—Best quality flexible steel hoisting cable.

Operating Rope—Braided cotton cord.

Counterweight—Sectional design steel rod counterweight, adjustable to additional weight.

Continued on next page

TYPE "A-1-A" AUTOMATIC BRAKE BALL BEARING DUMBWAITER
(Full Diameter Hoist Wheel and Cut Gears)

Designed for use in restaurants, hospitals, residences, clubs, libraries, schools, colleges, apartments, Government, State and City institutions, or wherever the *highest* grade wood dumbwaiter is required. Regularly furnished with wood tracks but can be furnished with *steel tracks* (*) at slight additional cost.

Where the installation is to be made by other than our own mechanics, simplicity of erection is effected as each outfit is prepared in accordance with the dimensions on the working drawing, and written instructions are furnished with every shipment.

We recommend that Kiesling Ball Bearing Vertical Lift Doors (described on page 10) be included with dumbwaiter as the dimensions of these two items are governed by each other.

Principal Features

This outfit is equipped with the same machine as our "Steel-track" Dumbwaiter. The cut gears and full diameter hoist wheel are secured, by means of keys and keyways, to the *cold-drawn* steel shafting which revolves in ball bearings and requires no lubrication. Our automatic brake, having an unsurpassed locking surface of 18 sq. in., enables us to gear this machine for a working capacity of 500 lb. without the necessity of using compound gears—the less gears the less friction.

The ball bearings used in our machine are encased in a case-hardened housing which is dustproof and should not be confused with small pieces of steel rod inserted in a cast iron bearing and termed a "roller" bearing.

The car is constructed of hardwood—selected clear ash, oak or chestnut—filled, varnished and neatly finished. It can be lined with monel metal, aluminum, galvanized, rust-resisting metal, etc., at slight additional cost. A flexible steel cable (152 strands) carries the car and counterweight, and the hand operating rope is of Russia, India or hemp, free from all fibres.

Guarantee

Type "A-1-A" Dumbwaiter outfit is guaranteed for *five years,* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on plans and in accordance with the manufacturer's specifications and drawings, Type "A-1-A" Automatic Brake Ball Bearing Dumbwaiter, Size No. ..... (with steel tracks) (with Kiesling Doors) as manufactured by John W. Kiesling & Son, Inc., Brooklyn, N. Y.

How to Specify Without Using Manufacturer's Name

Machine—*Cut geared, automatic brake, ball bearing, full diameter hoist wheel.* Assembled and set as a complete unit in a self-contained iron frame.

Platform—The machine is mounted on steel I-beams at top of shaft and securely anchored to the sidewalls.

Car—Made of hardwood, properly seasoned, filled and varnished. It is especially designed for heavy dumbwaiter service—shelves as required.

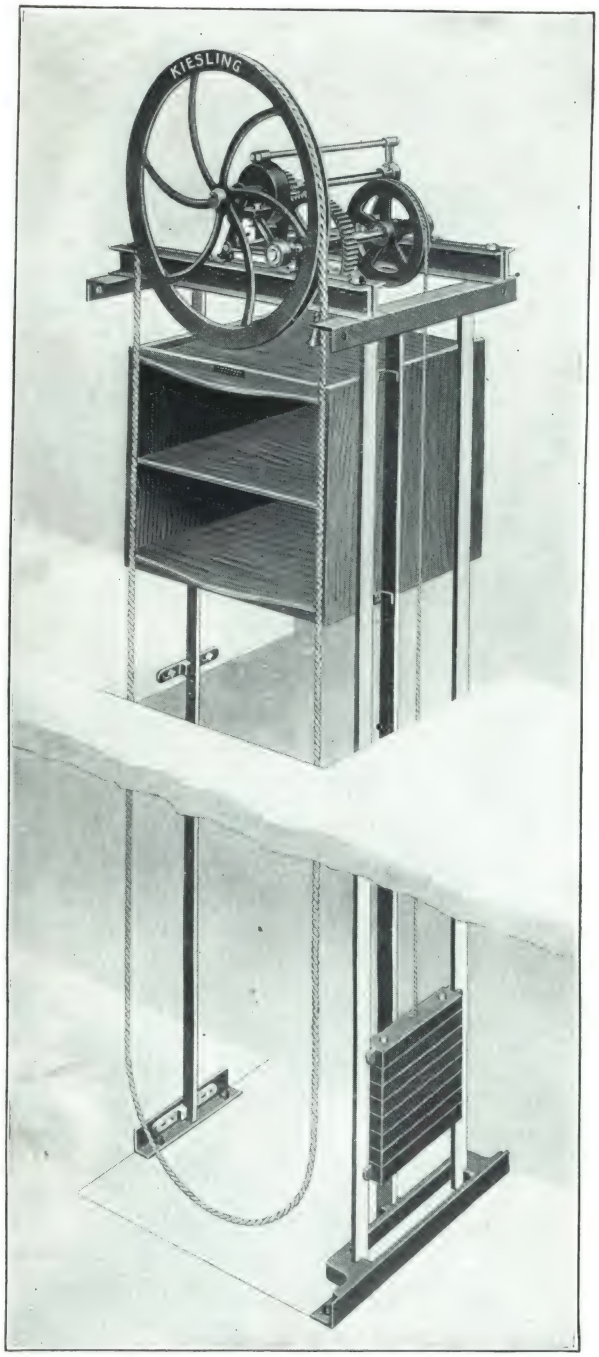
Wood Tracks—Georgia pine or maple, properly milled out so that the counterweight travels between same without taking additional space in the shaft. Guide runs are secured to the sidewalls, or backing strips, by means of wood screws.

***Steel Tracks (Cold Drawn)**—Two individual steel tracks guide the car and two individual steel tracks guide the counterweight.

Cable—Best quality flexible steel hoisting cable.

Counterweight—Properly designed to overbalance the car and of sectional type permitting of simple adjustment.

Operating Rope—Russia or India hemp, free from rough fibres.



Wood Tracks or Steel Tracks Are Standard Equipment

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.		Outside dimensions of car, in.		Shaft dimensions, in.		Car height, in.
	Width	Depth	Width	Depth	Width	Depth	Width	Depth	
	Single Face				Double Face				
1	16	16	21	19	16	16	21	20	36
2	20	16	25	19	20	16	25	20	36
3	20	20	25	23	20	20	25	24	36
4	24	20	29	23	24	20	29	24	40
5	24	24	29	27	24	24	29	28	40
6	28	24	33	27	28	24	33	28	40
7	28	28	33	31	28	28	33	32	40
8	32	28	37	31	32	28	37	32	48
9	36	36	43	39	36	36	43	40	48

Note: Intermediate sizes shipped within *two* days.
Blue prints of standard stock sizes furnished on request.

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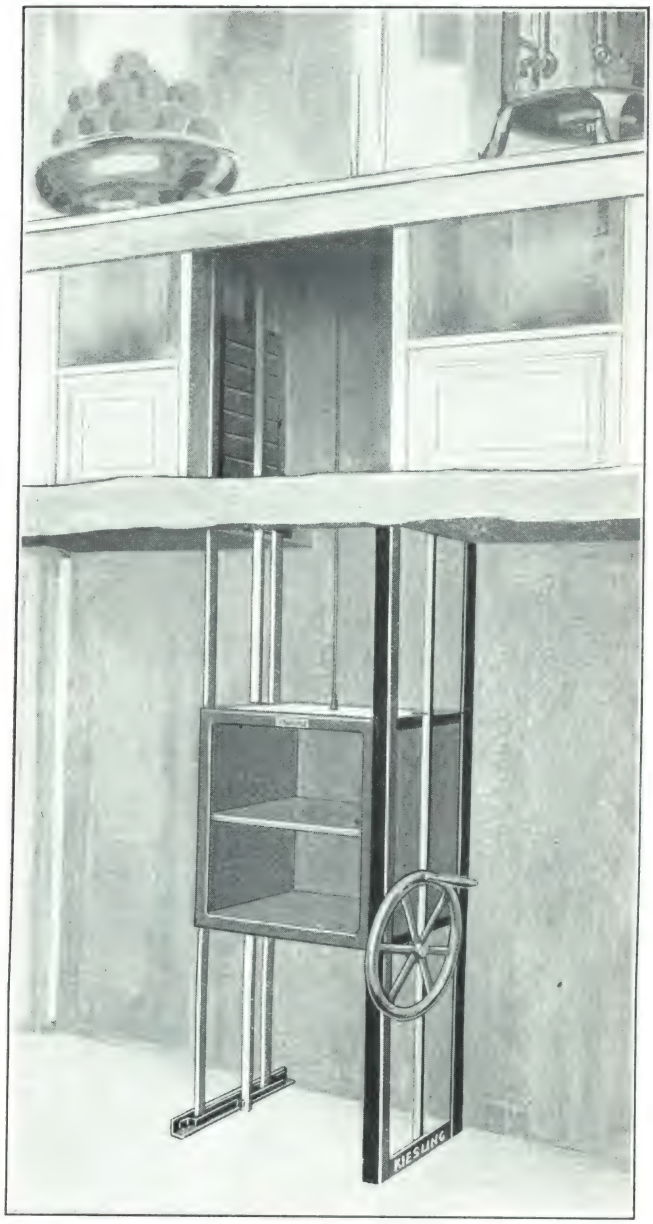
"STEEL-TRACK" AUTOMATIC BRAKE BALL BEARING UNDERCOUNTER DUMBWAITER



This Outfit Can Be Equipped with Ball Bearing Automatic Vertical Sliding Doors

STANDARD STOCK SIZES—SINGLE FACE (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.	
	Width	Depth	Width	Depth
1	16	12	22	13
2	20	12	26	13
3	20	16	26	17
4	24	16	30	17
5	24	20	30	21
6	28	16	34	17
7	32	16	38	17

Note: Intermediate sizes shipped within *two* days.
Blue prints of standard stock sizes furnished on request.

Designed for use in restaurants, stores, residences, banks, etc., particularly where there is no room overhead for the machine.

This type of outfit is phrased as an "undercounter" dumbwaiter because of its general use in conveying merchandise such as food, soda, dishes, etc. from the basement to the underside of the counter in the store above.

The outfit can be equipped with Kiesling Vertical Sliding Doors (described on page 10) which are automatically controlled by the car. When the car is at the underside of the counter opening, the door descends below the door sill and when the car is lowered, the door at the counter automatically closes and the lower door automatically opens and vice versa.

Principal Features

Four *cold drawn* steel tracks and four ball bearing guide shoes guide the car and counterweight. We particularly recommend the use of *steel* tracks for an Undercounter Dumbwaiter as they will neither warp, shrink nor splinter like wood tracks when subjected to the usual amount of dampness found in the average basement. Not alone is the machine full ball bearing, but the sheaves that carry the car are ball bearing as this assures a quiet running dumbwaiter and ease of operation. The machine is of the automatic brake type having an unsurpassed locking surface of 18 sq. in. The car is constructed of clear hardwood, filled, varnished and neatly finished, or we can furnish a sheet steel car at no additional cost; or a monel metal car.

Five Year Guarantee

This "Steel-track" Undercounter Dumbwaiter outfit is guaranteed for *five years* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on plans and in accordance with the manufacturer's specifications and drawings, "Steel-track" Automatic Brake Ball Bearing Undercounter Dumbwaiter, Size No. .... (with Kiesling Doors) as manufactured by JOHN W. KIESLING & SON, INC., Brooklyn, N. Y.

How to Specify Without Using Manufacturers Name

Steel Tracks (Cold Drawn)—Two individual steel tracks guide the car; two individual steel tracks guide the counterweight.

Car—Hardwood, neatly filled and varnished; or sheet steel with two coats of enamel.

Cable—Flexible steel hoisting cable, 3/8 in. in diameter.

Machine—Automatic brake, ball bearing.

Counterweight—Sectional design.

Continued on next page

"KIE-SON" AUTOMATIC BRAKE BALL BEARING DUMBWAITER

(Formerly known as Model "D")

This dumbwaiter meets the demand for an inexpensive, yet efficient dumbwaiter where the loads are light in comparison to the various sizes of cars. Regularly equipped with wood tracks but can be furnished with *steel tracks* (*) at a slight additional cost.

Where the installation is to be made by other than our own mechanics, simplicity of erection is effected as each outfit is prepared in accordance with the dimensions shown on the working drawing, and written instructions are furnished with every shipment.

Principal Features

"Kie-Son" Dumbwaiter is equipped with the same automatic brake as our "A-1-A" Dumbwaiter (page 6). This brake, on account of its unsurpassed locking surface of 18 sq. in. enables us to furnish this machine with a working capacity up to 100 lb.

The *cold drawn* steel shafting revolves in ball bearings which require no lubrication. The ball bearings are encased in a dustproof case-hardened cage and should not be confused with small pieces of steel rod inserted in a cast iron bearing and termed a "roller" bearing. The car is constructed of hardwood—selected clear ash, oak or chestnut—filled, varnished and neatly finished. It can be lined with monel metal, aluminum, galvanized, rust-resisting metal, etc., at slight additional cost.

A flexible steel cable of 152 strands carries the car and counterweight. Plymouth Brand No. 1 pure manila, free of rough fibre, is used for the hand operating rope. The counterweight is of sectional design and adjustable to additional weight.

Guarantee

We particularly call to your attention that this "Kie-Son" Dumbwaiter outfit is guaranteed for *three years,* irrespective of the machine which is guaranteed for *five years,* against defective material and workmanship.

How to Specify

Furnish (and install) where indicated on plans and in accordance with the manufacturer's specifications and drawings, "Kie-Son" Automatic Brake Ball Bearing Dumbwaiter, Size No. ..... (with steel tracks) (with Kiesling Doors) as manufactured by JOHN W. KIESLING & SON, INC., Brooklyn, N. Y.

How to Specify Without Using Manufacturer's Name

Machine—*Automatic brake, full ball bearing*—Assembled and set as a complete unit in a self-contained iron frame.

Car—Of selected hardwood, filled and varnished and especially designed for light dumbwaiter service. Shelves furnished as required. Fitted with cast iron guide shoes and proper rope connections.

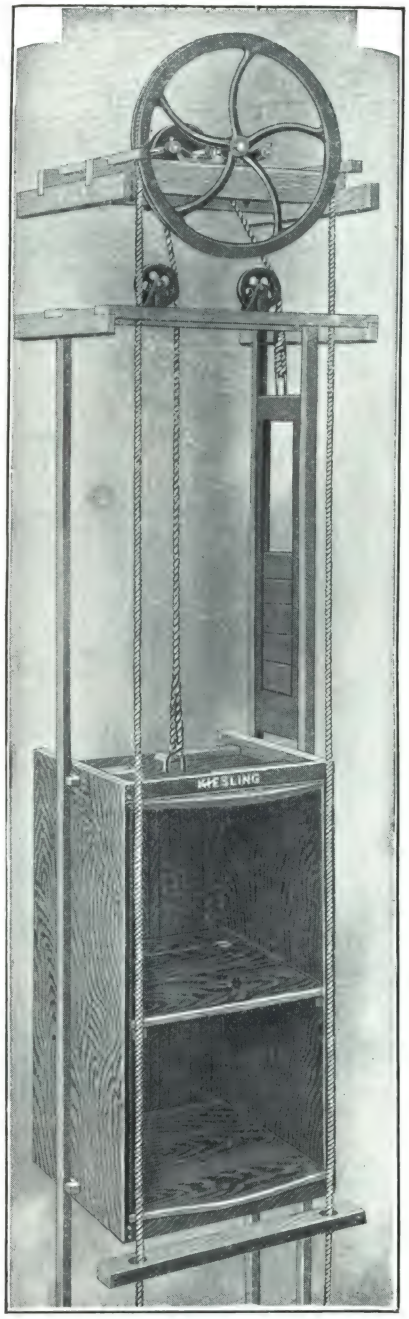
Wood Tracks—Georgia pine or maple properly milled out so that the counterweight travels between same without taking additional space in the shaft. Guide runs are secured to the sidewalls or backing strips by means of wood screws.

***Steel Tracks (Cold Drawn)**—Two individual steel tracks guide the car and two individual steel tracks guide the counterweight.

Cable—Best quality flexible steel hoisting cable.

Counterweight—Properly designed to overbalance the car and of improved sectional pattern type permitting of simple adjustment.

Operating Rope—Finest No. 1 quality Plymouth brand, pure manila; Russia or India hemp, free from rough fibres.



Wood Tracks or Steel Tracks Are Standard Equipment

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

Size No.	Outside dimensions of car, in.		Shaft dimensions, in.		Outside dimensions of car, in.		Shaft dimensions, in.		Car height, in.
	Width	Depth	Width	Depth	Width	Depth	Width	Depth	
	Single Face				Double Face				
1	16	16	21	19	16	16	21	20	36
2	20	16	25	19	20	16	25	20	36
3	20	20	25	23	20	20	25	24	36
4	24	20	29	23	24	20	29	24	40
5	24	24	29	27	24	24	29	28	40
6	28	24	33	27	28	24	33	28	40
7	28	28	33	31	28	28	33	32	40

Note: Intermediate sizes shipped within *two* days.
Blue prints of standard stock sizes furnished on request.

Continued on next page

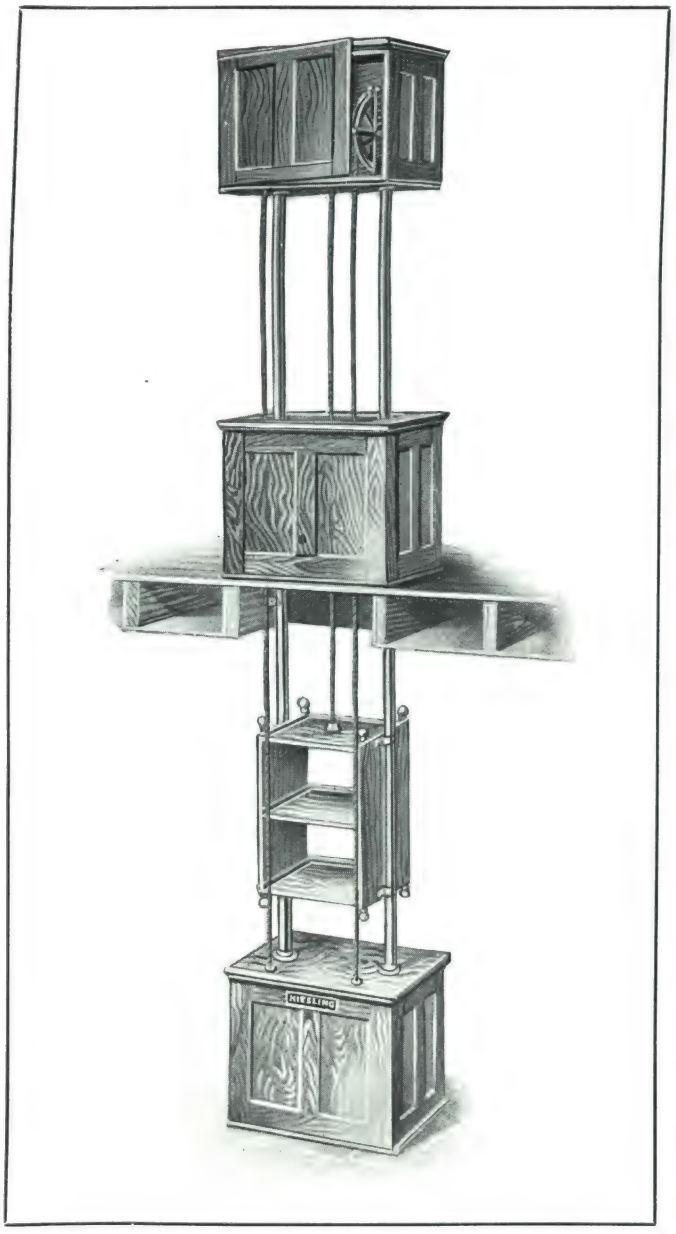
BRASS TUBE DUMBWAITER

(Ball Bearing and Automatic Brake)

For the conveyance of food, dishes and supplies in restaurants; merchandise in stores; books and records in banks and offices; or wherever it is either undesirable or impractical to erect a shaft.

As brass tube dumbwaiters do not require a shaft, the outfit is not enclosed and is very attractive in appearance. Surrounding panel work can be stained to harmonize with the general decorative scheme.

Guide rails are polished brass tubing. The operating rope is purple braided cotton cord and the car may be hardwood, monel metal, brass or wire grille.



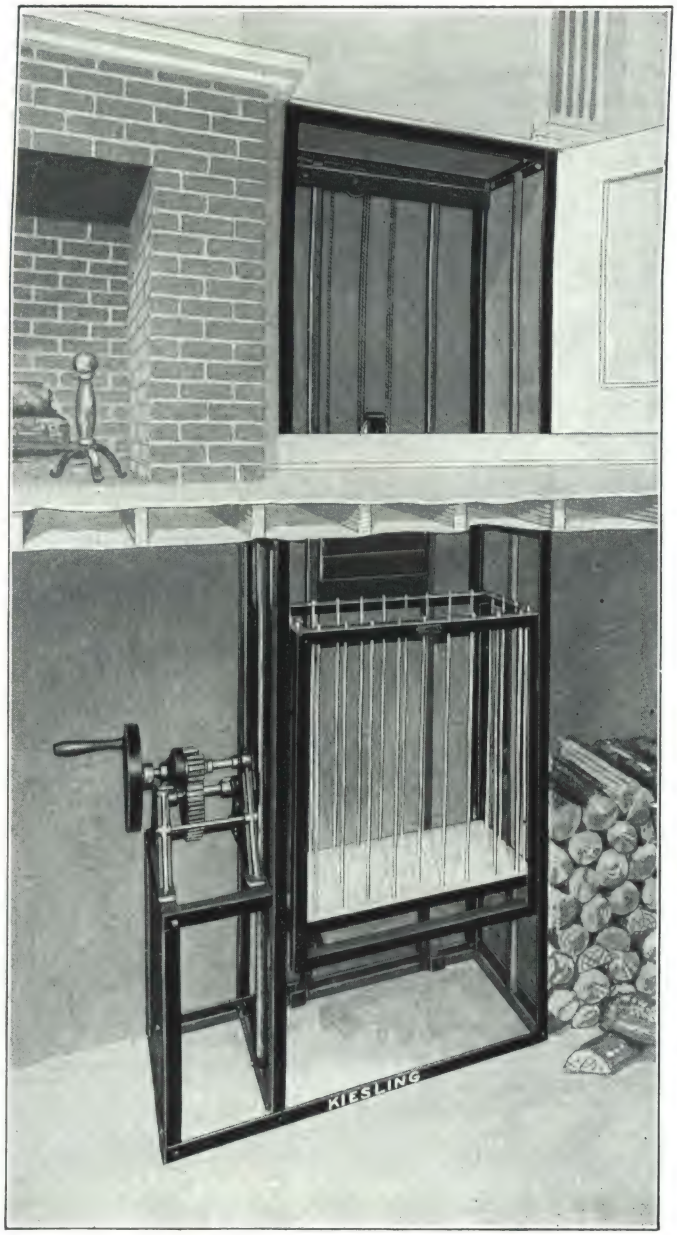
Brass Tube Dumbwaiters Are Furnished with or without Wood Panel Enclosures

"STEEL-TRACK" FUEL LIFT

(Automatic Brake, Ball Bearing and Cut Gears)

This outfit provides a practical solution of the problem of conveying fuel for log fires in private residences. A fuel lift obviates the necessity of carrying logs up the stairs and across hardwood floors and rugs. Built into the wall with a panel door, they do not disturb the decorative harmony of any interior.

The unit is complete with *all-steel* construction throughout. All shafts and sheaves are ball bearing equipped. Operation is smooth, silent and easy running. Kiesling Fuel Lifts are made in standard sizes but special sizes can be had without unnecessary delay.



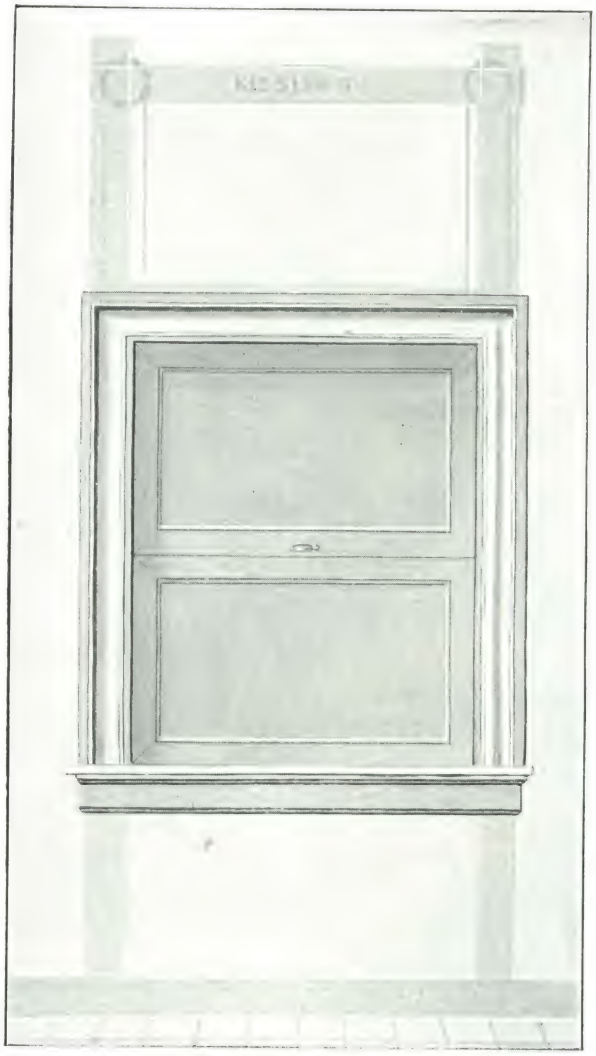
Outfit Can Be Equipped with Ball Bearing, Automatic, Vertical Sliding Doors

Continued on next page

VERTICAL SLIDING DOOR
(Counterbalanced, Ball Bearing)

The chief advantage of a *vertical sliding* door over the hinged type is that the door does not open *into* the room, but opens the full height and width of the doorway by the upper half rising above and the lower half descending below the door jamb, quietly and smoothly.

Kiesling Doors are neat in appearance, easily operated by means of ball bearings and steel tracks. Standard doors can be furnished covered with aluminum, monel metal, all-steel, rust-resisting metal, etc. Furnished with or without trim. The doors are constructed to conform with our standard stock sizes of various dumbwaiters and also in intermediate sizes.



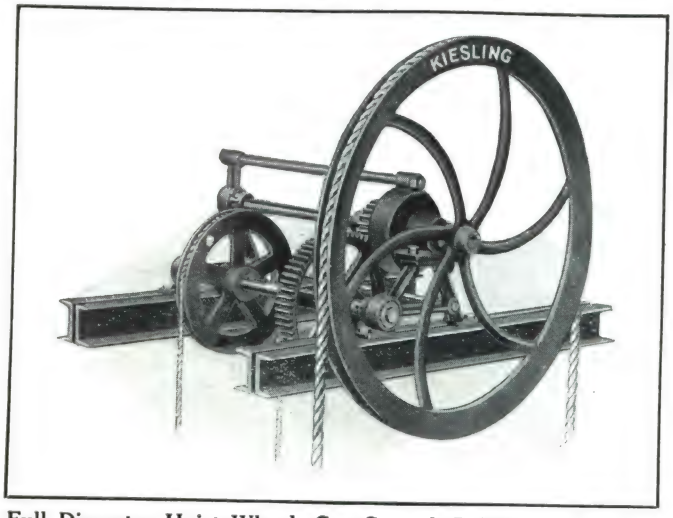
Phantom View

STANDARD STOCK SIZES (IMMEDIATE SHIPMENT)

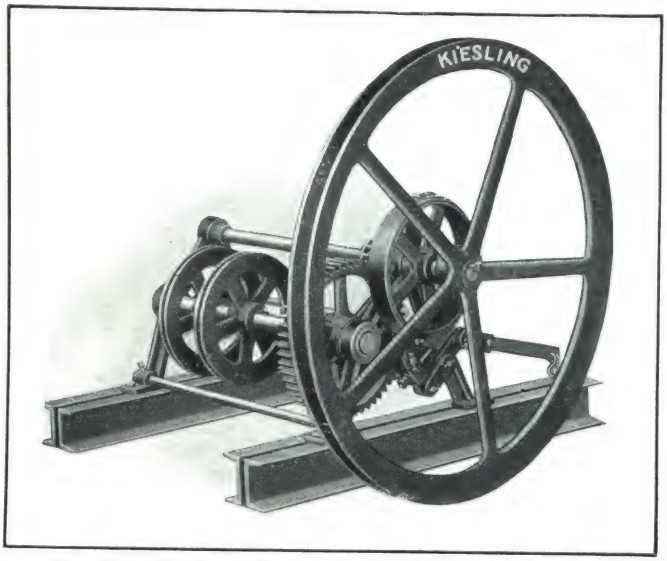
Door No.	Door opening, in.		Shaft opening, in.		
	Width	Height	Width	Height	Depth
1	17	36	19	38	2
2	21	36	23	38	2
3	21	36	23	38	2
4	25	40	27	42	2
5	25	40	27	42	2
6	29	40	31	42	2
7	29	40	31	42	2
8	33	48	35	50	2
9	37	48	39	50	2

Note: Intermediate sizes shipped within *four* days.
Blue prints of standard stock sizes furnished on request.

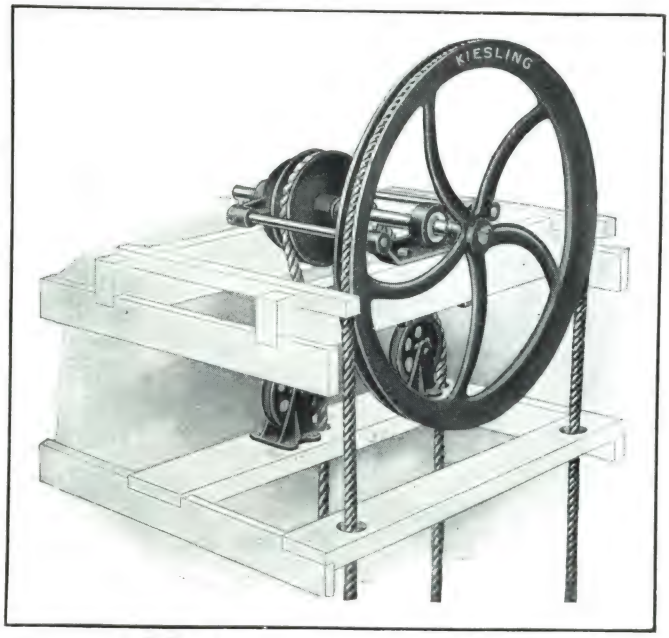
BALL BEARING MACHINES



Full Diameter Hoist Wheel, Cut Geared, Ball Bearing, Automatic Brake Machine



Cut Geared, Band Brake, Positive Locking Machine



Ball Bearing, Automatic Brake Machine

D. A. MATOT

Manufacturers of Hand Power Dumb Waiters and Elevators

TELEPHONE
LINCOLN 0002, 0003, 0004
1538-1546 Montana Street, CHICAGO, ILL.

Products

All types of HAND POWER DUMB WAITERS for private houses, apartment houses, hospitals, restaurants, hotels, clubs, etc., made in Automatic Brake, Band Brake and Geared Types; also Brass Tube and High Speed.

UNDER COUNTER DUMB WAITERS.

Also Hand Power Elevators, all types: Hospital, Invalid, Domestic and Freight; Lifts for Library Books, Fuel and Trunks; Iceless Refrigerators.

Service

In order to assist architects in selecting the dumb waiter and elevator outfits which will be best suited to the requirements of each installation, this company maintains a service or consultation department. By availing themselves of the services of this department the trade may obtain the benefit of our specialized experience of over forty years in this field.

Shipping Facilities

A sufficient stock of regular size dumb waiters and elevators is always carried on hand to guarantee prompt shipment of all orders—regular sizes shipped the same day order is received. Special sizes furnished within two or three days.

Guarantee

All Matot Dumb Waiter and Elevator Machines are guaranteed for five years. They will be repaired free of charge any time within that period if parts are returned to us, charges prepaid.

Installation

Complete instructions for erecting, including blue prints, are furnished with each Matot Dumb Waiter or Elevator Outfit. This enables them to be satisfactorily installed by local labor. Where desired, we will install same. Although we sell machines only, and complete outfits, we strongly recommend that the complete outfit be specified. This will give the best results and insure complete satisfaction.

Dumb Waiter Cars

Matot Dumb Waiter Cars are made of selected, kiln dried, ash lumber, carefully machined and assembled by first class workmen. This deliberate care is responsible for the extra long service given by Matot Dumb Waiter Cars. The cars are varnished two coats, presenting an exceptionally neat appearance.

We carry in stock all regular catalogue sizes of dumb waiter cars, equipped with one hinged or removable shelf. The No. 1 size cars are 2 ft. 6 in. high inside, and the Nos. 2, 3, 4 and 5 sizes are 3 ft. 0 in. high inside. The outside height of dumb waiter cars is 6 in. higher than the inside measurements.

Door openings in hatchway should always be at least 6 in. higher and 2 in. wider than dumb waiter cars, wherever possible, so as to secure a full swing on the hand rope, and also to allow leeway for placing the car in the hatchway. We build to order any special size dumb waiter cars, and also furnish them of galvanized steel construction at a small additional charge.

Matot Types and Their Capacities

(See Specification Data)

Capacity up to 75 Lbs.

Automatic Brake Type—This equipment is full automatic, both up and down. The load is automatically held by the machine itself, without any check or brake lines, and is so arranged when operator releases pull on hand rope the car stops automatically, traveling up or down, loaded or empty.

Band Brake Type—Best adapted for use in high hatchways, such as are found in factories, etc., where a harder service is encountered. This type is more practical for lowering loads, as it does not require the operation of the hand rope. The speed and positive stops are regulated by the brake cord.

Economy Type—A low priced outfit having a spring catch on the hand rope to hold the load. Best adapted where a moderate cost dumb waiter is wanted for light use and will receive reasonable care.

High Speed Type—These are small rapid running outfits best adapted for light loads such as copy work, invoices, letters, messages, etc., as are passed from one department to another.

Brass Tube Type—Designed for light service but somewhat heavier in construction than the high speed type, having brass tubes for guides where an enclosure is not wanted.

Undercounter Type—Designed so as to eliminate space for overhead machine and adapted to such places where lack of space does not permit the machinery to be placed overhead.

Fuel Lift Type—A most convenient arrangement for hoisting wood from basement to fireplace upstairs.

Capacities up to 300 Lbs.

Machines arranged with full diameter hoist wheels. These types are designed for use where the service would be too severe for the lighter types as described above. They are made in two types, each having the same qualifications as in the lighter outfits, in addition to which, however, they are more substantially constructed and geared for heavier loads. They are known as follows: geared automatic brake H. C. type and geared band brake H. C. type.

H. C. Type Geared Automatic Brake Dumb Waiter

Capacities up to 500 Lbs.

Depending upon size of car, arranged with leading sheave.

Substantially constructed and geared for heavy loads. Made in two types: geared automatic brake L. S. type and geared band brake L. S. type.

Capacity from 250 to 500 Lbs.

Arranged with compound gears. Made with compound gears having 2 cable hoisting sheaves and heavier construction than above geared outfits. Also made in two-speed two-capacity type which is arranged with two sets of gears for different speed and capacity. They are: compound geared automatic brake type, compound geared band brake type and two-speed two-capacity type.

Invalid Lifts, Capacity up to 500 Lbs.

Designed for use of disabled people who cannot walk stairs.

Freight Elevators, Capacity from 500 to 2000 Lbs.

Designed for severe service and easy operation. The smaller sizes are suitable for private residences as trunk lifts, and the larger sizes for all around use in industrial buildings, warehouses, etc. *Also made in two-speed two-capacity type.*

Sidewalk Elevators, Capacity up to 2000 Lbs.

Best adapted where operating machine is on lower floor. Mostly used for loads traveling from sidewalk to basement.

Continued on next page

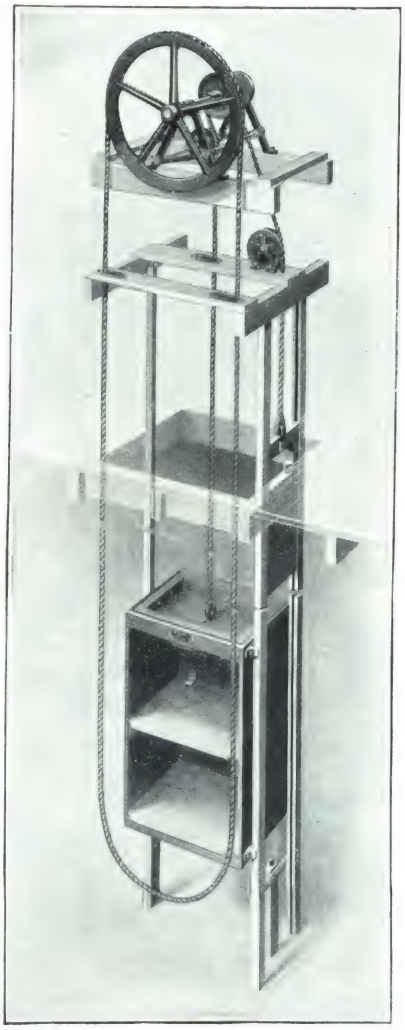
Matot Automatic Brake, Band Brake and Economy Dumb Waiters

Capacities up to 70 lb., depending on size of car.
Special sizes made to order.
Any of the outfits listed in the following table is strong enough to lift a much greater load, but to do so will require more energy.

STOCK SIZES

No.	*Capacity, lb.	Car outside, in.			Space required, in.				Hand wheel dia., in.	Hand rope ratio	Feet pull on hand rope to raise car one foot ft. in.	Machine space, ft. in.	Headroom ft. in.	Approx. shipping weight, lbs.
					Single face		Double face or right angle							
		Wid.	Dep.	Height	Wid.	Dep.	Wid.	Dep.						
With 6-in. Lift Sheave														
1	48	20	16	36	25	19	25	20	16	2.17	2 8	1 10	8 2	250
2	60	24	20	42	29	23	29	24	20	3.33	3 3	2 0	8 6	300
3	70	28	24	42	33	27	33	28	24	3.9	3 11	2 3	8 10	350
With 8-in. Lift Sheave														
1	38	20	16	36	25	19	25	20	16	2.16	2 2	1 10	8 2	250
2	48	24	20	42	29	23	29	24	20	2.68	2 8	2 0	8 6	300
3	56	28	24	42	33	27	33	28	24	3.12	3 1	2 3	8 10	350
4	68	32	28	42	37	31	37	32	30	3.8	3 9	2 6	9 4	450
With 9-in. Lift Sheave														
1	31	20	16	36	25	19	25	20	16	1.74	1 9	1 10	8 2	250
2	38	24	20	42	29	23	29	24	20	2.16	2 2	2 0	8 6	300
3	45	28	24	42	33	27	33	28	24	2.51	2 6	2 3	8 10	350
4	55	32	28	42	37	31	37	32	30	3.06	3 0	2 6	9 4	450

*Based on normal pull of 18 lb. on hand rope.



Matot Automatic Brake Dumb Waiter Erected
Enclosure removed to show mechanism

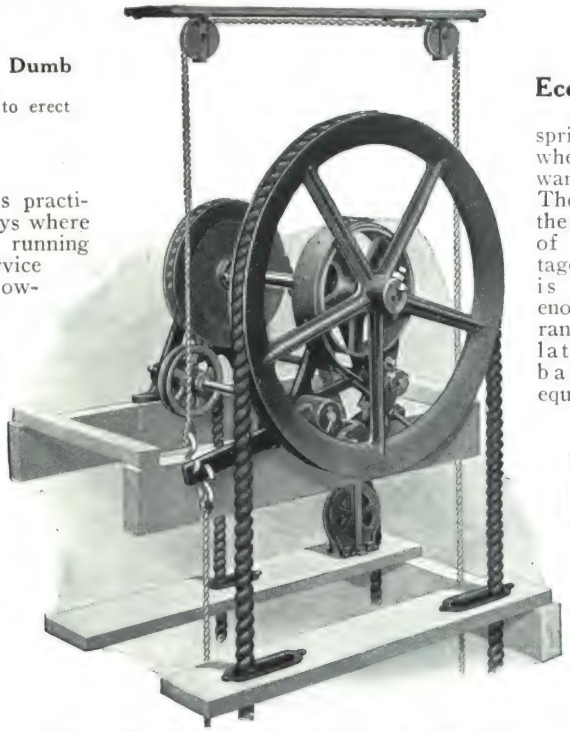
Matot Automatic Brake Dumb Waiter Machine
Mounted on platform ready to erect

Automatic Brake Type

Full automatic, both up and down. The load is automatically held by the machine itself, without any check or brake lines, and is so arranged that when operator releases the pull on hand rope the car stops automatically, whether traveling up or down, loaded or empty. The brake does not lock fast, but is applied and regulated by the load, holding the car securely at any point. The heavier the load, the more positive the brake. Roller bearings are used throughout to assure a smooth, easy running, long life equipment. An automatic brake mechanism, having no adjustments of any kind; guaranteed for five years and will last a lifetime.

Band Brake Type

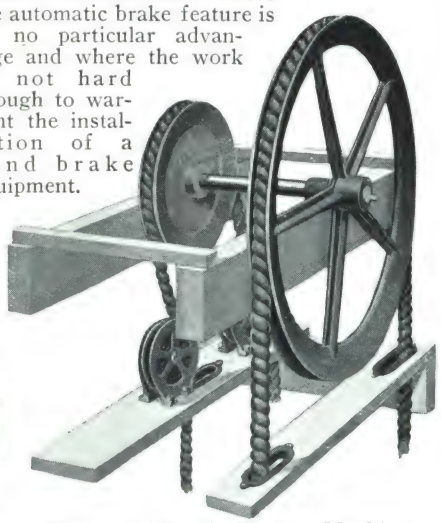
This type equipment is practical for use in high hatchways where a strong, reliable, rapid running dumb waiter for hard service is required. The speed in lowering, or the positive stops, is regulated by a partial application or a final pull on the brake cord. The brake band is lined with vulcanized fiber to withstand hard usage. This equipment is practical for lowering loads as it does not require the operation of the hand rope, the speed being regulated by the brake cord. The machine is carefully assembled, and is fitted throughout with roller bearings.



Matot Band Brake Dumb Waiter Machine
Mounted on platform ready to erect

Economy Type

An inexpensive dumb waiter having a spring check on the hand rope. Adaptable where a moderate cost dumb waiter is wanted and will receive reasonable care. These outfits are used where the automatic brake feature is of no particular advantage and where the work is not hard enough to warrant the installation of a band brake equipment.



Economy Dumb Waiter Machine
Mounted on platform ready to erect

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Matot Geared Automatic Brake and Geared Band Brake Dumb Waiters

Full Diameter Lift Wheel, Hobbed Cut Gears H. C. Type

Geared Automatic Brake H. C. Type

Capacities up to 250 lb. geared according to capacity to give greatest speed, plus ease of operation. Any outfit listed in the following table is strong enough to lift a much greater load, but to do so will require more energy. Special sizes made to order. Fitted with roller bearings throughout.

Geared Automatic Brake H. C. Type

This is a practical equipment combining an Automatic Brake feature with large lifting capacity. Smooth in action; positive in brake; requires no adjustments of any kind. The Automatic Brake does not lock fast, but is applied and regulated by the load, holding the car securely at any point. The heavier the load, the more positive the brake, which is designed to quickly, smoothly and automatically release when operating the hand rope. Full automatic in both up and down direction, loaded or empty.

Geared Band Brake Type

Practical for use in high hatchways where a strong, reliable, rapid running dumb waiter for hard service is required. The speed in lowering, or the positive stops, is regulated by a partial application or a final pull on the brake cord. Most practical for lowering loads, as it does not require the operation of the hand rope, the speed being regulated by the brake cord.

Geared Band Brake H. C. Type

Capacity	No.	Car outside, in.			Space required, in. Single face		Space required, in. Double face or right angle		Hand wheel dia., in.	Hand rope ratio	Gear ratio	Feet pull on hand rope to raise car 1 ft. ft.	Feet pull on hand rope to raise car 1 ft. in.	*Pull, lb.	Machine space, ft.	Machine space, in.	Headroom, ft.	Headroom, in.	Approx. shipping wt., lbs.
		Wid.	Dep.	Ht.	Wid.	Dep.	Wid.	Dep.											
100 lb.	1	20	16	36	25	19	25	20	16	5.46	3.19	5	5	19	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	5.70	2.83	5	5	19	2	0	8	6	400
	3	28	24	42	33	27	33	28	24	5.67	3.42	5	6	18	2	3	8	10	450
	4	32	28	42	37	31	37	32	30	5.33	2.64	5	4	19	2	9	9	4	500
	5	36	36	42	41	39	41	40	30	5.55	3.13	5	6	19	2	9	9	4	650
150 lb.	1	20	16	36	25	19	25	20	16	6.22	3.63	6	2	25	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	6.40	3.19	6	4	25	2	0	8	6	400
	3	28	24	42	33	27	33	28	24	6.24	3.76	6	3	25	2	3	8	10	450
	4	32	28	42	37	31	37	32	30	6.32	3.13	6	3	24	2	9	9	4	500
	5	36	36	42	41	39	41	40	30	6.07	3.42	6	0	25	2	9	9	4	650
200 lb.	1	20	16	36	25	19	25	20	16	7.14	4.17	7	2	28	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	7.40	3.88	7	4	28	2	0	8	6	400
	3	28	24	42	33	27	33	28	24	7.68	4.63	7	7	26	2	3	8	10	450
	4	32	28	42	37	31	37	32	30	7.60	2.76	7	6	27	2	9	9	4	500
	5	36	36	42	41	39	41	40	30	7.38	4.16	7	4	28	2	9	9	4	650
250 lb.	1	20	16	36	25	19	25	20	16	7.7	4.5	7	8	33	1	10	8	2	350
	2	24	20	42	29	23	29	24	20	8.0	4.5	8	0	32	2	0	8	6	400
	†3	28	24	42	33	27	33	28	24	8.62	5.2	8	7	30	2	3	8	10	450
	‡4	32	28	42	37	31	37	32	30	8.4	4.16	8	4	30	2	9	9	4	500
	§5	36	36	42	41	39	41	40	30	8.2	4.63	8	2	31	2	9	9	4	650

*Pounds pull on hand rope to lift capacity.
†3 Capacity can be had up to 350 lb. ‡4 Capacity can be had up to 400 lb. §5 Capacity can be had up to 400 lb.

Compound Geared Automatic Brake and Compound Geared Band Brake Dumb Waiter

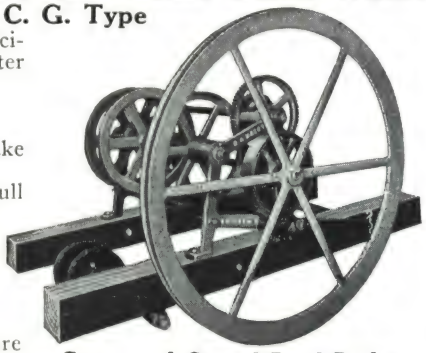
Full Diameter Lift Wheel, Hobbed Cut Gears C. G. Type

Can be had in any capacity between 250 and 500 lb. Prices the same on all capacities. Any outfit listed in the following table is strong enough to lift a much greater load, but to do so will require more energy.

Compound Geared Automatic Brake Type

A most practical equipment for heavy loads combining the Automatic Brake feature with a large lifting capacity easy to operate.

Full automatic, both up and down, loaded or empty; when operator releases pull on hand rope the car stops automatically. Requires no adjustments. The automatic brake does not lock fast, but is applied and regulated by the load, holding car securely at any point. The heavier the load the more positive the brake. Roller bearings are used throughout.



Compound Geared Band Brake C. G. Type

Compound Geared Band Brake Type

A most practical equipment for heavy loads combining the Band Brake feature with a large lifting capacity easy to operate.

This type equipment is practical for use in high hatchways where a strong, reliable, rapid running dumb waiter for hard service is required. The speed in lowering or the positive stops are regulated by a partial application or a final pull on the brake cord. This equipment is practical for lowering loads as it does not require the operation of the hand rope, the speed being regulated by the brake cord.

Compound Geared Automatic Brake C. G. Type

No.	Car outside, in.			Space required, in. Single face		Space required, in. Double face or right angle		Hand wheel dia., in.	Hand rope ratio	Gear ratio	Feet pull on hand rope to raise car 1 ft. ft.	Feet pull on hand rope to raise car 1 ft. in.	*Pull, lb.	Machine space, ft.	Machine space, in.	Headroom, ft.	Headroom, in.	Approx. shipping wt., lbs.
	Wid.	Dep.	Ht.	Wid.	Dep.	Wid.	Dep.											
1	20	16	36	25	19	25	20	16	14.11	8.25	14	1	35	1	10	8	2	400
2	24	20	42	29	23	29	24	20	13.98	7.2	14	0	36	2	0	8	6	475
3	28	24	42	33	27	33	28	24	14.91	8.99	14	9	34	2	3	8	10	550
4	32	28	42	37	31	37	32	30	14.17	7.98	14	0	36	2	9	9	4	675
5	36	36	42	41	39	41	40	36	14.94	7.15	15	0	33	3	0	9	7	850

*Pounds pull required on hand rope to raise 500 lb.

Continued on next page

Matot Two-speed Two-capacity Hand Power Dumb Waiters

Compound Geared Automatic Brake and Geared Band Brake Types

General—Made in any combination of light and heavy loads from 50 to 500 lb.

Constructed in two types—geared automatic brake, and geared band brake.

A great time and labor saver where both light and heavy loads are handled, and overcomes difficulties due to a slow traveling car that has machine geared for heavy loads, when in most cases light loads are used.

When a heavy load is handled on slow gear, the empty car can be brought back to loading point on the high gear, saving time.

A simple easy pull on the shifting rope changes capacity and speed, and it is so arranged that load cannot drop while shifting.

Two-speed Two-capacity Compound Geared Automatic Brake Type

Full automatic, both up and down, loaded or empty, and so arranged that when operator releases pull on hand rope the car stops automatically. This feature is guaranteed for five years against defects, and requires no adjustments of any kind. The automatic brake does not lock fast, but is applied and regulated by the load, holding the car securely at any point. The heavier the load, the more positive the brake. Hobbed cut gears assure smooth and noiseless operation.

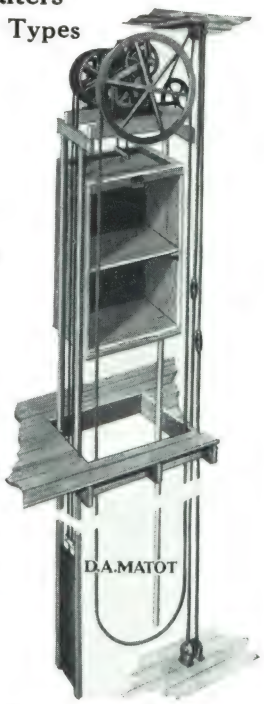
Two-speed Two-capacity Compound Geared Band Brake Type

This type equipment is most practical for use in high hatchways. The brake band is lined with vulcanized fibre to withstand hard usage. The speed in lowering, or the positive stops, is regulated by a partial application or a final pull on the brake cord. Most practical for lowering loads, as it does not require the operation of the hand rope, the speed being regulated by the brake cord. Roller bearings are used throughout.

STOCK SIZES

No.	Car outside, in.			Space required, in.				Hand wheel dia., in.	Machine space ft. in.	Head room ft. in.	Approx. shipping weight, lbs.
				Single face		Double face or right angle					
	Width	Depth	Height	Width	Depth	Width	Depth				
3	28	24	42	34	27	34	28	24	2 6	9 0	735
4	32	28	42	38	31	38	32	30	2 9	9 4	785
5	36	36	42	42	39	42	40	36	3 0	9 7	835

Special sizes made to order.



Two-speed, Two-capacity Geared Automatic Brake Type

Matot Brass Tube Dumb Waiter

Matot High Speed and Brass Tube Dumb Waiters

Matot High Speed Dumb Waiters

A small, quick acting, rapid running outfit with wire guides. Adapted for light loads, such as copy work, messages and small articles usually passed from one department to another.

Regularly furnished with cars 1 ft. 6 in. high outside.

Special sizes made to order.

STOCK SIZES

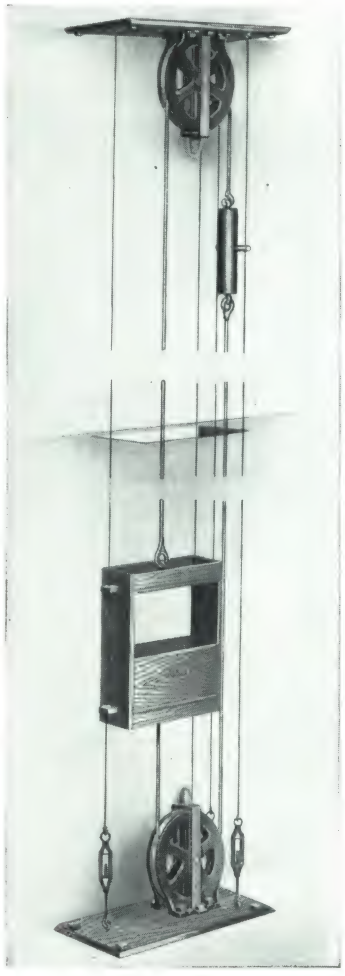
No.	Car outside, in.		Space required, in.	
	Width	Depth	Width	Depth
1	10	6	18	8½
2	12	8	20	10½
3	14	10	22	12½

Matot Brass Tube Dumb Waiters

Designed for use where equipment is to be placed in the open, having no enclosure, as in a store or office, and where an exceptionally neat appearing outfit is desired.

These outfits are also made in the regular Matot Automatic Brake, Band Brake and Economy Dumb Waiter styles, with regular stock size cars, but in place of wood guides, as regularly used, brass tubes are substituted. Can also be made in the geared types.

Cars are furnished in wood, highly polished, and can be trimmed with brass fittings. Brass or steel cars furnished as desired.



High Speed Type

Continued on next page

Matot Under Counter Dumb Waiters

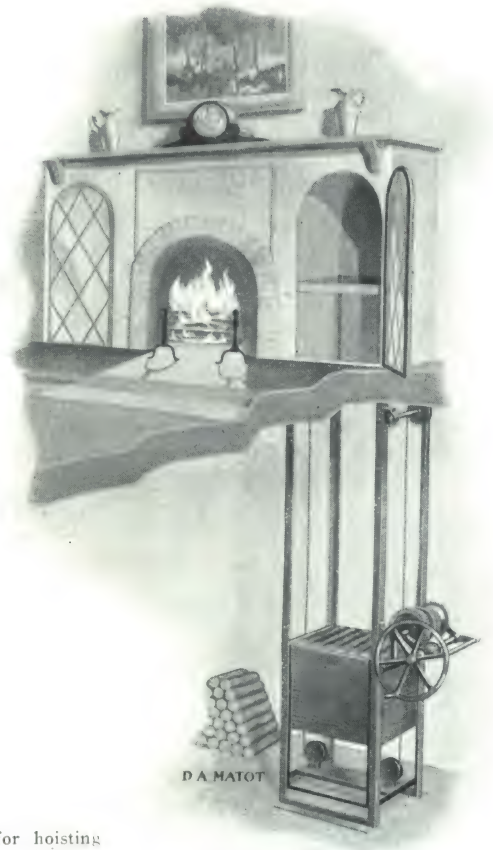
These under counter dumb waiters are designed to fit where lack of space precludes the placing of overhead machinery, which condition is sometimes encountered where space does not allow the highest part of equipment or dumb waiter car to come higher than 3 ft. 0 in. over the top floor, or in some cases counter height.

The automatic brake type is 25 lb. capacity and the automatic brake geared type is 50 lb. capacity and up. Type No. 6 is used where overhead space is limited or car is open on top, and can also be furnished with machine overhead. Special sizes made to order.

STOCK SIZES

No.	Car outside, in.			*Wheel dia., in.	†Ratio	Space required, in.		Space between posts, in.	Overhead sheave space, in.	Car headroom, in.	Approx. shipping weight, lbs.
	Width	Depth	Height			Width	Depth				
Automatic Brake, 25-lb. Capacity, Types Nos. 1 and 2											
1	20	16	27	22	2.68	32	18	24	6	35	250
2	24	20	27	22	2.68	36	22	28	6	35	300
3	28	24	27	22	2.68	40	26	32	6	35	350
Geared Automatic Brake, 50-lb. Capacity, Types Nos. 3, 4 and 6											
1	20	16	27	22	4.17	32	18	24	6	35	350
2	24	20	27	22	4.17	36	22	28	6	35	400
3	28	24	27	22	4.17	40	26	32	6	35	450

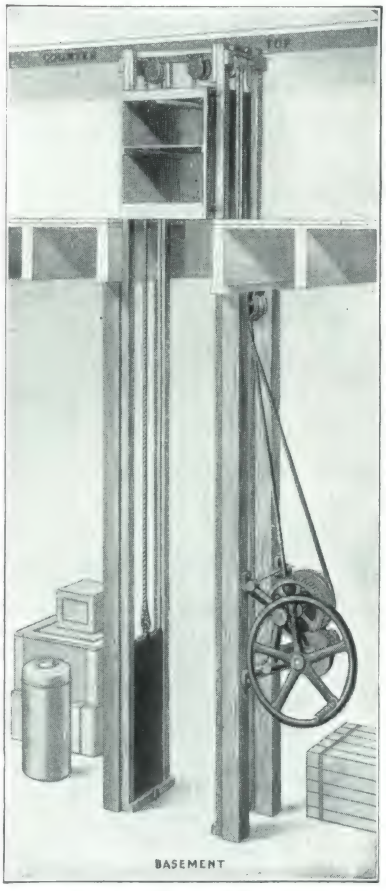
*Crank wheel or hand wheel diameter.
†Crank wheel or hand wheel rope ratio.



Right:

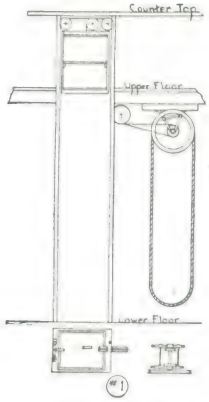
Fuel Lift

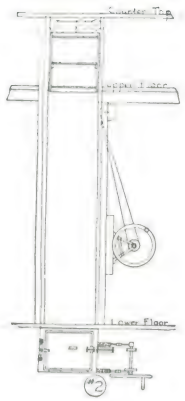
A most convenient arrangement for hoisting wood from basement to fireplace upstairs.

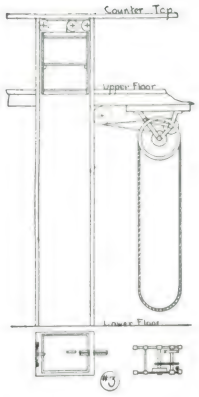


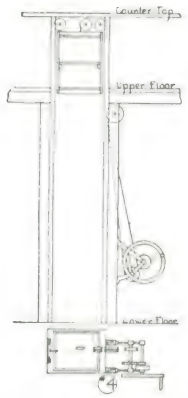
Matot Under Counter Dumb Waiter

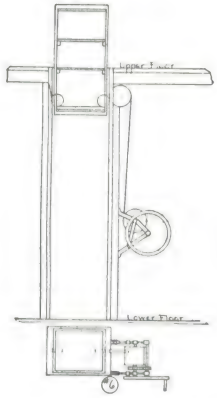
Types of Layouts of Undercounter Dumb Waiters











Continued on next page

Matot Hand Power Elevators

Capacities up to 2000 lb. geared according to capacity to give greatest speed plus ease of operation.

Matot elevators are also made in the two-speed two-capacity type in any combination of light and heavy loads as illustrated.

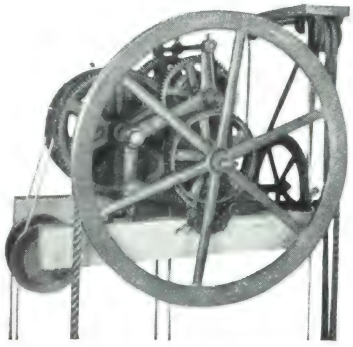
The smaller sizes are suitable for private residences as trunk lifts, larger sizes for all around use in industrial buildings, warehouses, etc.

Stock cars are regularly 6 ft. 3 in. high under beam. Can be made any special size required.

Cars are made of hardwood well braced with iron and will withstand hard usage. Can be equipped with safety catches.

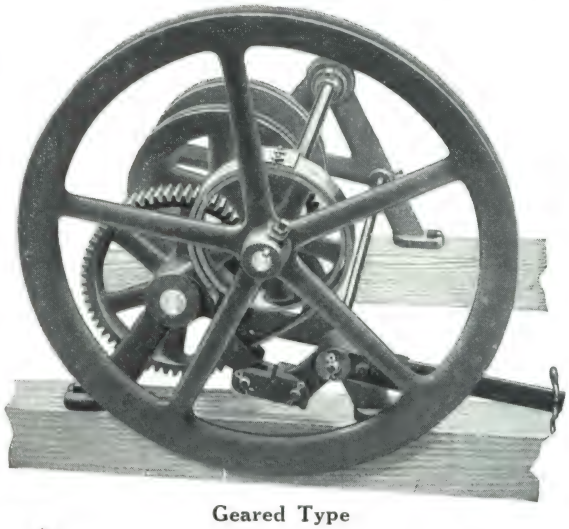
Machinery is fitted throughout with roller bearings, and as the gears are hobbed cut, they have teeth uniform in size and operate most quietly. The brake band is lined with vulcanized fibre and the speed in lowering, also the positive stop, is regulated by a partial application or a final pull on the brake cord. Machine is guaranteed for five years and will last a lifetime.

Blue prints on any elevator outfit submitted on request.

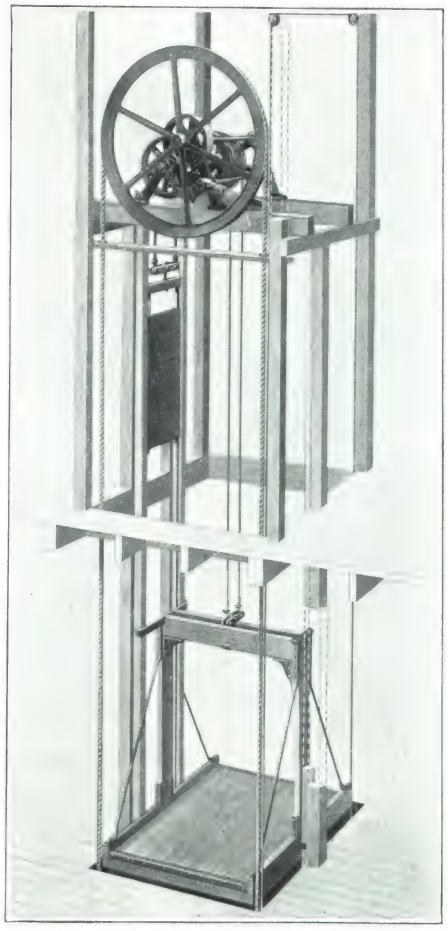


Two-speed Two-capacity Type

Compound Geared Type



Geared Type



STOCK SIZES

No.	Car outside Width ft.	in.	Car outside Depth ft.	in.	Space required Width ft.	in.	Space required Depth ft.	in.	Hand wheel diameter, in.	Machine space ft.	in.	Head room ft.	in.	Approx. shipping weight, lbs.
1	3	0	3	0	3	8¾	3	5	36	3	9	10	9	1200
2	3	0	4	0	3	8¾	4	5	36	3	9	10	9	1220
3	4	0	4	0	4	8¾	4	5	42	4	7	11	7	1240
4	4	0	4	6	4	8¾	4	11	42	4	7	11	7	1250
5	4	0	5	0	4	8¾	5	5	42	4	7	11	7	1340
6	5	0	6	0	5	8¾	6	5	48	5	1	12	1	1550

If outfits are installed in brick or tile hatchways the space required is 2⅜ in. more in width.

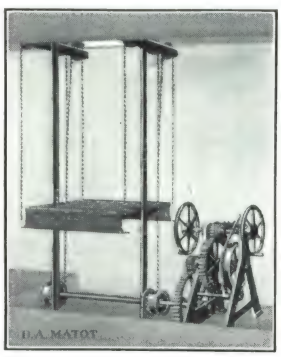
Matot Sidewalk Elevators

Mostly used for loads traveling from sidewalk to basement.

All types are substantially constructed and easy running, and are equipped with Matot Vulcanized Fibre Self-locking Band Brake.

When lowering loads, the crank shaft is thrown out of gear so it does not revolve, and a slight pressure on the brake lever controls the speed. For a positive stop at any point desired, a full application of the lever locks the brake and holds the car.

Made in capacities from 500 to 2000 lb.



STANDARD SIZES

No.	Capacity lbs.	Car size ft.	in.	ft.	in.	Shipping weight, lbs.
1	500	3	0 x	3	0	900
2	1000	3	6 x	3	6	1100
3	1500	4	0 x	4	0	1400
4	2000	5	0 x	5	0	1600
5	2500	5	0 x	5	0	1600

Special sizes made to order. Gearing can be brought forward if required.

Detail blue prints showing different layouts sent on request.

Continued on next page

Matot Invalid Elevators

This equipment is designed to convey invalids from one floor to another and is exceptionally easy to operate, in fact a child can handle same, due to our system of compounding the gears.

The automatic brake feature is so arranged when operator releases pull on hand rope, the car automatically stops itself, loaded or empty, traveling up or down.

Besides the automatic brake feature mentioned above, additional safety devices are incorporated in the manufacture of this equipment to provide a most practical outfit for the purpose intended.

STANDARD SIZES

No.	Car outside						Space required				Approx. shipping weight, lbs.
	Wid.		Dep.		Hgt.		Wid.		Dep.		
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	
1	3	0	3	0	7	0	3	6	3	3	1000
2	3	6	3	6	7	0	4	0	3	9	1050
3	4	0	4	0	7	0	4	6	4	3	1100
4	4	6	4	6	7	0	5	0	4	9	1150
5	5	0	5	0	7	0	5	6	5	3	1200

Detail blue prints gladly submitted.

Specification Data

The preceding pages cover the regular types and sizes of Matot Dumb Waiters and Elevators. Complete information, including drawings and estimates on these or other regular or special sizes, will gladly be sent on request.

The many designs that have been developed during more than forty years of dumb waiter experience cover a vast number of special installations.

To Specify

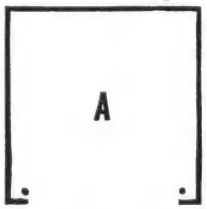
(1) State type of hatchway, whether A, B, C, D or E (as illustrated below).

(2) Type of equipment, or whether for use in residence, hospital, factory, etc.; weight to be handled; also whether weight travels mostly up or down, or both ways.

(3) Size of car, and whether inside or outside dimensions; or give us the inside measurements of hatchway in the clear, and the width, depth and height. In stating the height give us the measurements from lower floor to ceiling of upper floor or highest point of hatchway in the clear.

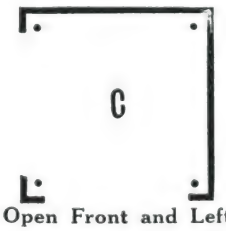
(4) How many shelves in car?

Types of Hatchway

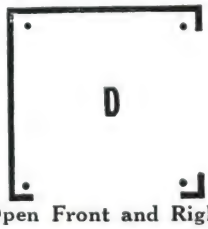


Open at Front on All Floors. Single Face Type

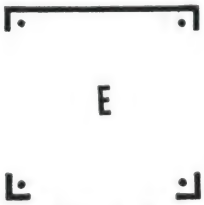
Open at Front and Back, Requiring Double Face Outfit to Operate from Both Fronts



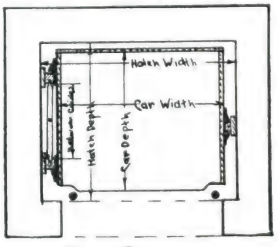
Open Front and Left



Open Front and Right

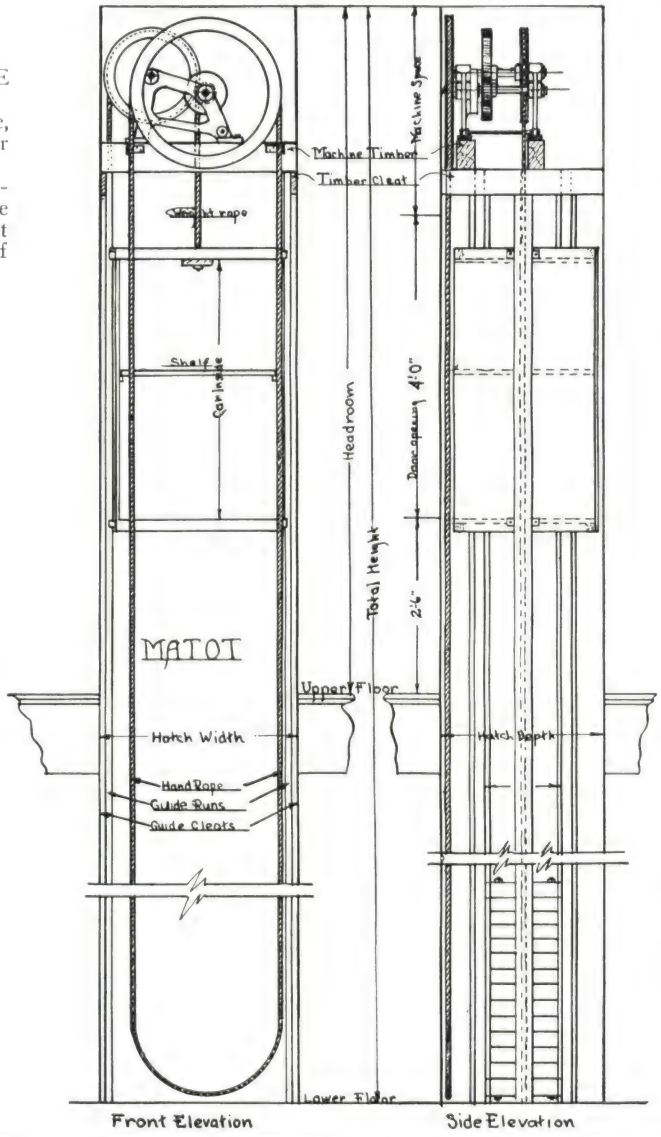


Open Front, Right and Left



Complete Outfit—Includes the machine mounted on platform, car, guides, counterweight, ropes, rope guides and bumpers.

Machine Only—Includes the machine, leading sheaves for types requiring same, and hand wheel.



STORM MANUFACTURING COMPANY

Hand and Electric Dumbwaiters and Elevators

291 South Orange Avenue, NEWARK, N. J.

Products

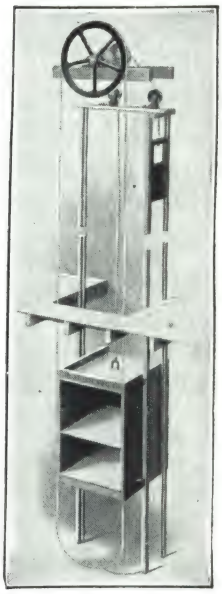
HAND and ELECTRIC DUMBWAITERS and ELEVATORS, including Invalid and Trunk Lifts; Automobile, Carriage and Warehouse Elevators; Basement and Sidewalk Elevators; Brass Tube Dumbwaiters; Apartment House Dumbwaiters, etc.

Engineering Service

Our engineers will be glad to confer with you regarding your vertical transportation problems. Their recommendations are based on wide experience and they will recommend the type of equipment best suited to your requirements. *We carry no stock sizes.* Storm machines are *always* built to fit the space.

"MACHINES THAT ARE BUILT TO FIT YOUR PLACE"

Paragon Automatic Dumbwaiter



Paragon Automatic Dumbwaiter

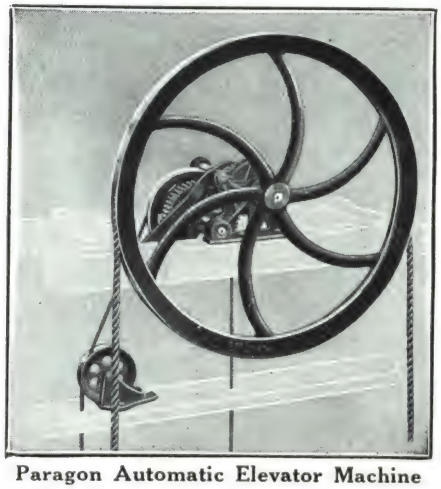
Designed and constructed so that the car will remain stationary at any point of travel without the use of brake or rope clamp. Ease of operation is combined with perfect safety. The outfit shown at the left is ready for erection with counterweight at the right. Counterweight may be placed at the left if desired. Equipped with ball bearings.

Capacities—Range from 50 to 150 lb.

Paragon Automatic Hand Elevator

Similar in construction to the Paragon Automatic Dumbwaiter but geared to lift heavier loads. Counterweight can be arranged to come on either right or left of shaft. This machine is furnished with frame as shown below. Wire hoisting cable is used for lifting. The outfit may be double or single face.

Capacities—225 to 500 lb.



Paragon Automatic Elevator Machine

Paragon Invalid Lift

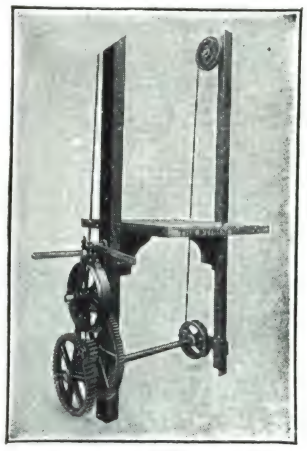
Equipped with the Paragon Elevator Machine, with *double automatic brake.* The outfit is perfectly balanced to assure easy operation and the double automatic brake provides positive control.

Cars are built of hardwood, handsomely paneled and finished with brass grille work. We furnish directions for erection or will quote prices erected in any part of the country.

Humphrey Hand Elevator

For use where a heavier machine than the Paragon is desired. While intended for stores, factory uses, hospitals and public buildings, trunk and invalid lifts, this outfit is so simple and low priced it can be used in many places instead of a dumbwaiter. Made in three sizes, 500, 750 and 1000 lb.

Suitable for wells from 2½ to 5½ ft. square, any height. Counterweight can run on either side, or when beveled gears are used, at the back. Shaft bearings are babbitt metal, frictionless and noiseless. The machinery is properly made, and warranted in all particulars. Hand rope is 1 or 1⅛-in. manila; brake rope, ½-in. manila; lifting cable ½ or ⅝-in. wire. This machine is also built in heavier capacities up to and including 5000 lb.



Basement Elevator

Humphrey Hand Elevator

Basement or Sidewalk Elevators

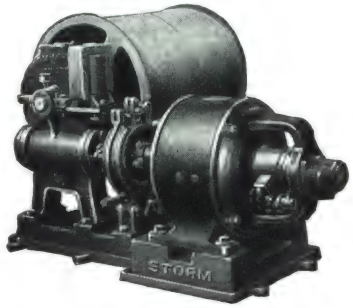
Made in capacities ranging up to 2000 lb. The outfit illustrated is designed for light work and has a capacity of 800 lb. Our heavier machines (1000 to 2000 lb. capacity) are equipped with one or two cranks as desired and so arranged that cranks do not revolve when lowering the machine, being entirely controlled by the brake which is positive in operation.

Also Electric Sidewalk Elevators of all capacities.

Electric Dumbwaiters

Storm Electric Dumbwaiter Machines are of the standard worm gear and drum or traction type. Built in capacities from 100 to 500 lb., speeds 75 to 300 ft. per minute, direct or alternating current, any phase.

All parts easily accessible and only the highest quality material is used throughout. Furnished with various types of control—depending upon requirements of service.



Electric Dumbwaiter Machine

ESTABLISHED 1643

SEDGWICK MACHINE WORKS

Manufacturers of Hand Power Dumb Waiters and Elevators

TELEPHONE
WATkins 9-9416, 9-4034

152 West 15th Street
NEW YORK, N. Y.

FACTORY
POUGHKEEPSIE, N. Y.

REPRESENTATIVES

BALTIMORE, MD., Walter S. Brauns, 509 North Charles Street
Telephone, Vernon 6003
BOSTON, MASS., Geo. T. McLauthlin Co., 120 Fulton Street
Telephone, Richmond 3760
CHICAGO, ILL., Standard Equipment Co., 400 West Madison Street
Telephone Franklin 7905
CLEVELAND, OHIO, Charles E. Lewis, 1737 East 18th Street
Telephone, Prospect 1795
DETROIT, MICH., The Rayl Company, 1233 Griswold Street
Telephone, Randolph 4300
LOS ANGELES, CALIF., C. P. Helpman, 722 Story Building
Telephone, VanDike 0572
SEATTLE, WASH., S. W. R. Dally, 332 Pioneer Building
Telephone, Main 8678
WASHINGTON, D. C., Barber & Ross, 11th and G Streets, N. W.
Telephone, Main 8206

The above will go anywhere within reasonable distance to study your problems. Information promptly furnished to any other part of country.

Products

Hand Power Dumb Waiters and Elevators of all types for every purpose; Gravity Drops.

Residence Dumb Waiters; Apartment Dumb Waiters; Hotel and Restaurant Dumb Waiters; Hospital Dumb Waiters and Elevators; Book Lifts; Fuel Lifts; Tube Dumb Waiters; High Speed, Automatic Brake, Band Brake, and Geared Dumb Waiters; Compound Geared Dumb Waiters; Outdoor Dumb Waiters; Under Counter Dumb Waiters; Trunk Lifts; Invalid Elevators; Freight Elevators; Sidewalk Elevators; Automobile Elevators; Ash Hoists; Mortuary Lifts; Hatchway Hoists; Iceless Refrigerators, etc.

SEDGWICK
Dumb Waiters - Elevators
FOR ALL PURPOSES

"Sedgwick"

The name "Sedgwick," in hand power dumb waiters and elevators, stands for an engineering organization properly equipped for planning, constructing and installing. Backed by wide experience in the field and by substantial resources, Sedgwick Service and Sedgwick Outfits may be relied upon.

When architects place complete conditions and requirements before us, we guarantee results.

Doors, Cabinets, Enclosures

Believing that doors, cabinets, enclosures and other items required in connection with dumb waiter and elevator installations can be, under usual conditions, supplied to best advantage by concerns specializing in door building, cabinet work, carpentry and masonry, we do not regularly include such work in our contracts.

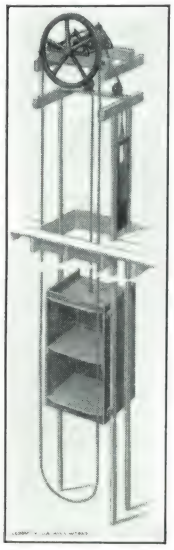
However, in special cases, we will furnish this work and are in position to give materials and workmanship of highest standard.

Sedgwick Service

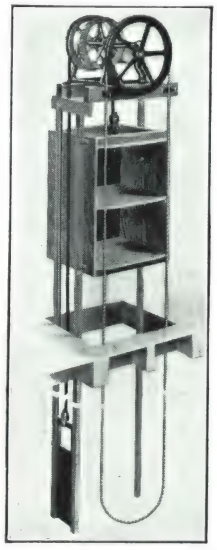
The Sedgwick Service Department will work with architects in deciding upon the proper equipment to give best results under specific conditions.

Installation—Blue prints and full directions for installing are furnished with each outfit, from which local labor may install. Or, experienced mechanics will be sent by us to install, on request.

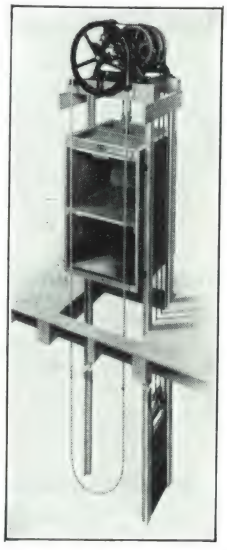
Guarantee—Sedgwick Dumb Waiter Machines are guaranteed for 5 years against defects in workmanship and material.



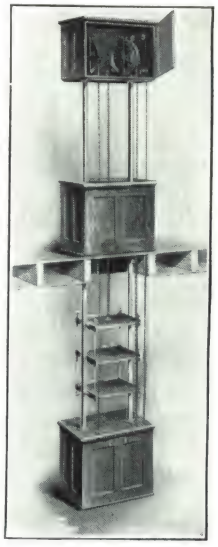
Automatic Brake Dumb Waiter



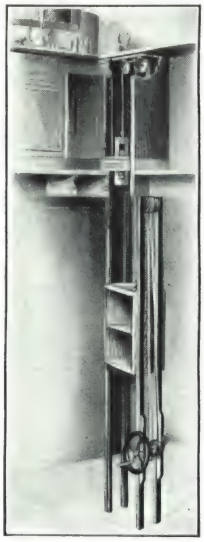
Type "FDCG" Dumb Waiter



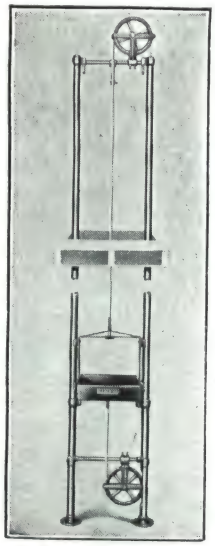
"Sedg-Versal" Dumb Waiter



Tube Dumb Waiter



Under Counter Dumb Waiter



High Speed Tube Dumb Waiter

BRIEF CHART OF TYPE, USES AND APPLICATIONS OF SEDGWICK DUMB WAITERS

Type	Loads		Convenient size		Type of building	Cost
	Average	Capacity	Car Width Depth	Shaft Width Depth		
Automatic Brake	Up to 25 lb.	75 lb.	24″ x 20″	29″ x 23″	Residence, apartment, etc.	Prices and blue prints on request
Type "FDCG"	Up to 75 lb.	200 lb.	28″ x 24″	33″ x 27″	Restaurant, hotel, hospitals, etc.	
"Sedg-Versal"	Up to 150 lb.	400 lb.	36″ x 36″	42½″ x 39″	Bank, hotel, bakery, etc.	
Tube	Up to 75 lb.	150 lb.	24″ x 20″	31″ x 23″	Restaurant, bank, store, etc.	
Under Counter	Up to 75 lb.	200 lb.	28″ x 16″	33″ x 18″	Soda fountain, lunchrooms, etc.	
High Speed Tube	Up to 5 lb.	10 lb.	12″ x 10″	18″ x 12″	Office, bank, etc.	

Continued on next page

Sedgwick Dumb Waiters—General Information

In selecting dumb waiter equipment, careful attention and study should be given to the requirements and conditions of service if satisfactory and economical results are to be obtained.

A brief chart of suggested type, application and uses is shown on preceding page, but in order to assure selection of the type most suitable we recommend that answers to the following questions be sent to our Architectural Service Department for complete data, specifications and blue prints. (This service incurs no obligation whatsoever.)

Answers to the following questions will ordinarily enable us to make recommendations intelligently:

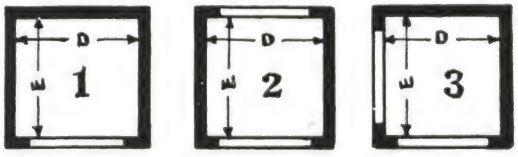
(1) What is the outfit to be used for?
(2) How large a car is desired?
(3) How far does the car travel?
(4) Have you a place prepared for the outfit?
(5) What will be the weight of average loads?
(6) What will be the weight of heaviest loads?
(7) Are loads all up, all down, or both up and down?
(8) Who will operate; men, women, boys, or girls?
(9) Are all doors located in same front?

Standard Sizes and Dimensions—The dimensions tabulated below and referring to the typical layout at right of this page are for standard sizes of the Sedgwick "FDCG" Geared Automatic Brake Dumb Waiter. These sizes with very slight variation apply to all types of dumb waiters.

STANDARD DUMB WAITER SIZES

Dimension See Fig. G	No. 1 Car Size: outside dimensions Width Depth 20″ x 16″	No. 2 Car Size: outside dimensions Width Depth 24″ x 20″	No. 3 Car Size: outside dimensions Width Depth 28″ x 24″	No. 4a Car Size: outside dimensions Width Depth 32″ x 28″	No. 5a Car Size: outside dimensions Width Depth 36″ x 36″
A	20″	24″	28″	32″	36″
B	16″	20″	24″	28″	36″
C	30″	36″	36″	36″	48″
D	25″	29″	33″	37″	42½″
E	19″	23″	27″	31″	39″
F	As required	As required	As required	As required	As required
G	7″	9″	11″	13″	16″
P	30″*	30″*	30″*	33″*	36″*
AA	9′0″*	9′0″*	9′0″*	9′3″*	9′6″*

*Secure if possible.



Location of Doors—1—Single face hoistway, as shown in the layout and in "1" above, with all doors located in same front, is always advisable.

2—Double face hoistway ("2" above) with openings located in opposite fronts. For standard sizes, dimensions "E" in above table must be increased by 1 in. to allow for additional hand rope.

3—Corner post hoistway ("3" above). The least desirable arrangement. Should be avoided when possible. When writing us, locate and identify each door and specify door chiefly used.

Door Openings—Door openings should be fully as wide as car.

Height should be 4 ft. with sill located 30 in. above floor.

Cleating—The cleating (or grounds) behind guide runs shown in the drawing on this page is necessary where hoistway is of fireproof material, or is already plastered without provision for securing of guide runs.

In a wood-ceiled hoistway where guide runs may be screwed directly to the sidewalls, cleating is unnecessary and dimension "D" in above table may be reduced by 2 in.

Hoistway Construction—Before constructing hoistway send for our detailed instruction sheet.

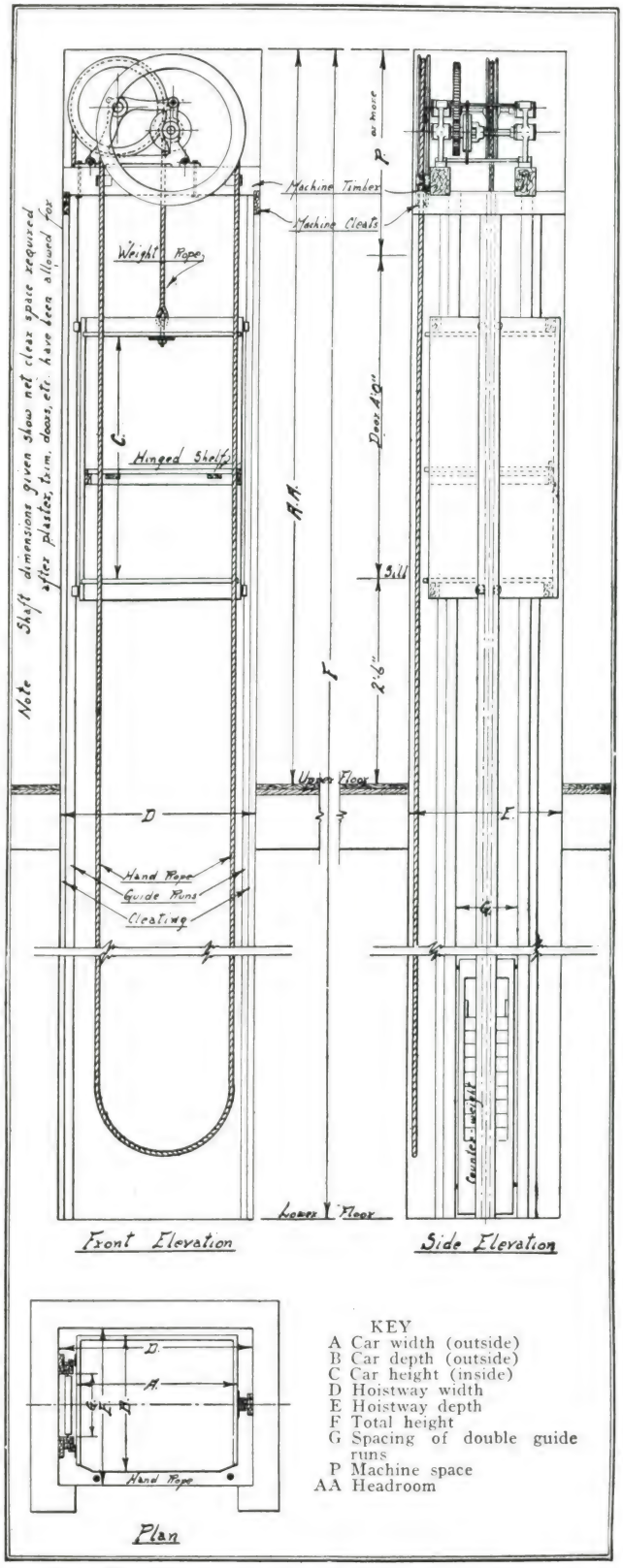


Fig. G. Typical Dumb Waiter Layout
Dimensions tabulated in preceding column

Continued on next page

Sedgwick Automatic Brake Dumb Waiters

(For Average Loads up to 25 Pounds and Capacity Loads of 75 Pounds)

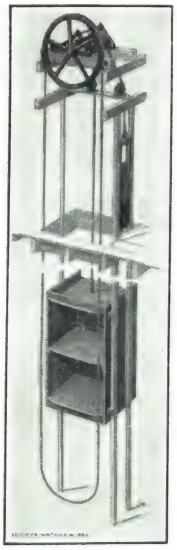


Fig J

Sedgwick Light Automatic Brake Dumb Waiters give easy, dependable, smooth and quiet service. Equipped with automatic brake of latest improved design, automatic in both directions with all brake surfaces accurately ground and adjustable for wear, anti-friction steel roller bearings, steel shafting and other refinements in keeping with the class of residences in which these dumb waiters are installed.

By means of the Sedgwick Automatic Brake, car is held stationary at any point as soon as operator ceases pulling on hand rope.

Standard sizes Nos. 1, 2 and 3 as shown in chart on preceding page can be shipped at once.

Specification and blue prints on request.

"Sedg-Versal" Compound Geared Dumb Waiters

(For Average Loads up to 150 Pounds and Capacity Loads of 400 Pounds)

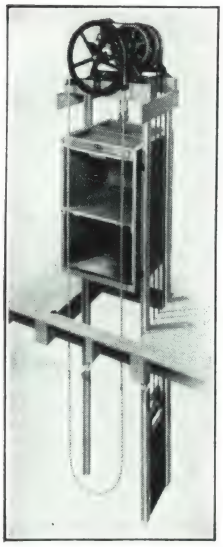


Fig. P

This dumb waiter is especially designed for heavy loads, or where the requirements cannot be determined in advance. Machine is provided with two sets of machine cut spur gears, two full diameter hoist wheels, anti-friction steel roller bearings and either band brake or automatic brake as conditions demand, all contained in substantial iron frames as a complete unit. By rearrangement of gears and mechanism it is adaptable to universal conditions, embodying capacity features of five types of dumb waiters.

Standard sizes Nos. 1, 2, 3, 4a and 5a as shown in chart on preceding page can be shipped at once. Specifications and blue prints on request.

Sedgwick Tube Dumb Waiters

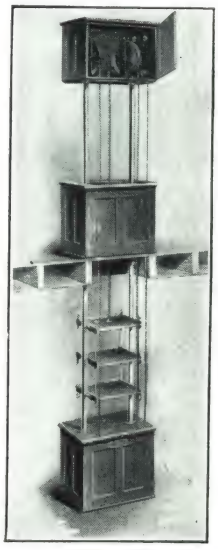


Fig. T

Where enclosures are not desired or required and appearance is important, one of the types and arrangements of steel, brass or monel tube dumb waiters is usually selected. Outfits can be equipped with machines of any capacity desired and fitted with cars of wood, wire, steel, brass, or monel metal as preferred. A special folder illustrating other arrangements will gladly be sent with blue prints and specifications.

Type "FDCG" Geared Automatic Brake Dumb Waiter

(For Average Loads up to 75 Pounds and Capacity Loads of 200 Pounds)

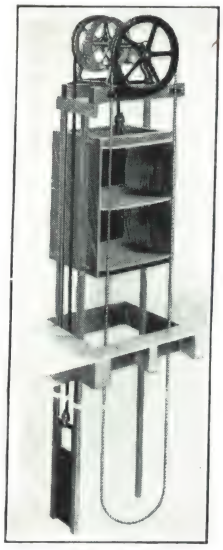


Fig. F

This dumb waiter represents a marked development in equipment of this type. The use of full diameter hoist wheel in overhead mechanism permits car cable to drop directly to the car and counterweight eliminating the use of intermediate or deflecting sheaves and increasing ease of operation and life of cable. Machine cut spur gears, accurately shaped in our own plant, contribute further to smooth performance and the elimination of friction. The automatic brake is positive in action, adjustable for wear and self-regulating to load carried.

Standard sizes Nos. 1, 2, 3, 4a and 5a as shown in chart on preceding page can be shipped at once. Specification and blue prints on request.

Under Counter Dumb Waiters

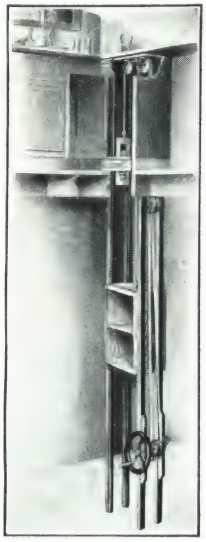


Fig. R

Designed for use where there is insufficient headroom above upper floor level to permit the use of overhead machine. These outfits can be fitted with machine of any capacity desired. Four standard sizes are furnished in six standard arrangements.

Sedgwick Under Counter Dumb Waiters are being used extensively in restaurants, cafeterias, soda fountains, stores and similar establishments where every inch of available room is utilized. We have hundreds of drawings showing special arrangements and recommend consultation when equipment of this type is required.

Special descriptive circular will be sent on request.

High Speed Tube Dumb Waiters

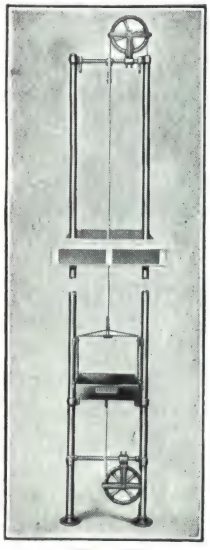


Fig. T

Especially designed for rapid service where orders, letters, prints and similar light loads must be sent from one floor to another. Equipped with steel tubes finished in mahogany bronze and metal car to match, this outfit is attractive in appearance and requires no enclosure. Car is held at upper terminal by an automatic lock and self-releasing catch.

Blue prints and specifications on request.

Specifications

To avoid the confusion which might be caused by attempting to submit in this catalogue complete specifications covering the many types and arrangements of Sedgwick Dumb Waiters and Elevators, we recommend that where specification is required immediately, without opportunity to consult us, the following be used:

Furnish (and install) where shown on plans (one) Sedgwick (name type of equipment) Dumb Waiter (or Elevator) in accordance with the manufacturer's blue prints and specifications which shall be submitted to the architect for approval.

Continued on next page

Fuel or Wood Lifts (Fig. Q) and Log Lifts

The fireplace, an attraction in every home, can be made an even greater feature by the installation of a Sedgwick Fuel Lift.

Homes so equipped are more livable and salable because of the ease of conveying fuel from basement to fireplace without the untidiness of carrying wood up the cellar stairs and across clean floors and rugs.

Fuel lifts can be utilized in the same convenient manner for removing ashes from the fireplace.

The Sedgwick Fuel Lift consists of a container traveling in vertical guides, raised and lowered by means of a crank operated, geared automatic brake machine.

The entire equipment is in the basement, and so located that the container, at the top of its lift, rests inside a fixed fuel box beside the fireplace, or in a convenient window seat, or in the bottom of a nearby closet or book-case.

These latter details can be arranged to suit the convenience of the home owner.

The fuel lift is built in any size, of wood or metal, or both. The machine parts are of the usual superior Sedgwick design, fitted with anti-friction roller bearings and with every feature making for quiet, easy operation.

Large living rooms and libraries call for large fireplaces in which logs 3 or 4 ft. (or longer) can be used.

The problem of serving such a fireplace is solved by the Sedgwick Log Lift which brings several logs at a time within easy reach and without laborious effort.

Sedgwick Log Lifts are built in various arrangements and sizes to meet individual conditions and requirements.

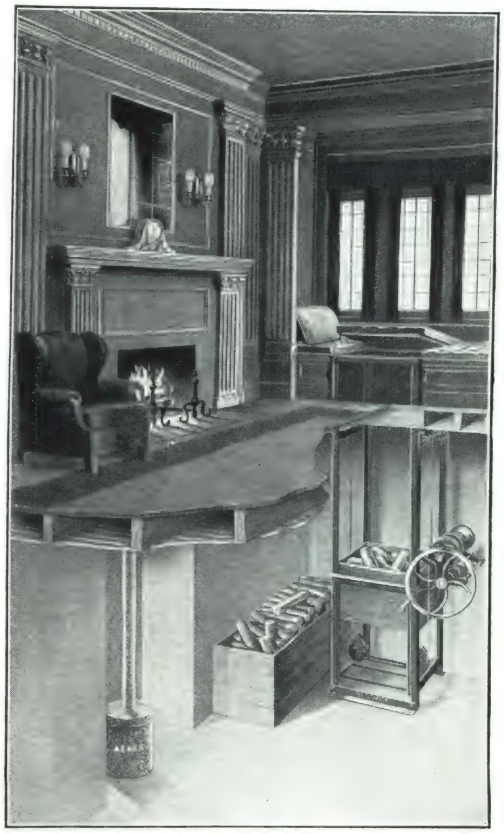


Fig. Q. Sedgwick Fuel Lift

These Sedgwick outfits can be installed to serve basement and first floors, or as many floors above as desired.

Invalid Elevators (Fig. E)

The Sedgwick Automatic Brake Hand Power Invalid Elevator is a most practical outfit for the purpose intended.

The essential features of such an outfit are ease of operation, absolute safety, and simplicity of design, so that no interruption of service need be anticipated. These essentials are embodied in the Sedgwick outfits.

While the weakness which prevents the invalid climbing stairs would probably make it inadvisable for him to operate the elevator himself, the amount of power required is so small that even a child can safely operate the elevator either up or down with full load.

Over a thousand Sedgwick Invalid Elevators in satisfactory service testify to their convenience and advantages. Widespread installation makes it possible to inspect outfits in use in almost every part of the country.

Outfits are built in five standard sizes, listed below, which can be shipped immediately.

Special sizes are built to meet any requirements.

Car 3 ft. square is large enough to accommodate two persons standing, while car 4 ft. square is usually sufficient to provide for invalid in wheel chair and an attendant.

***STANDARD INVALID ELEVATOR SIZES**

Car size	Hoistway size	Car size	Hoistway size
3′0″ x 3′0″	3′7 ″ x 3′3″	4′6″ x 4′6″	5′2″ x 4′9″
3′6″ x 3′6″	4′1¼″ x 3′9″	5′0″ x 5′0″	5′8″ x 5′3″
4′0″ x 4′0″	4′7¼″ x 4′3″		

*Ready to ship. Special sizes built to order.

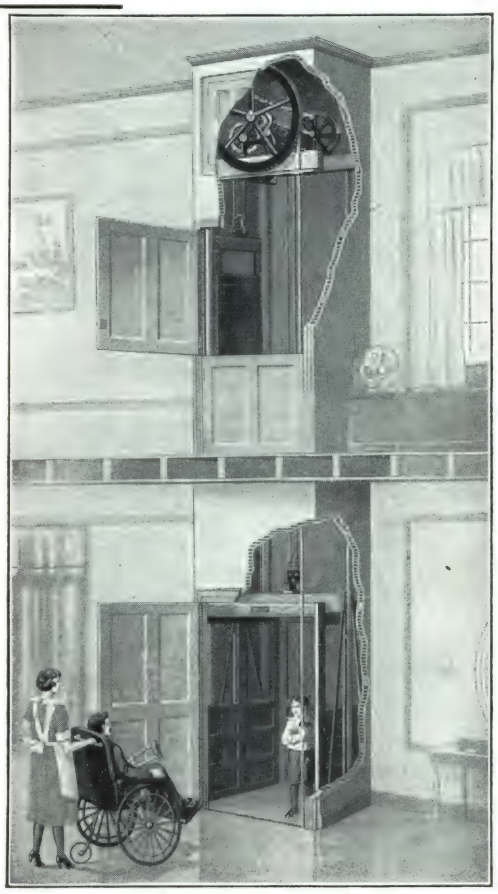


Fig. E. Sedgwick Invalid Elevator
"A child can run it"

Continued on next page

Sedgwick Freight Elevators

Sedgwick Improved Hand Power Freight Elevators are built for economical and dependable service and are extensively used in commercial, institutional and industrial buildings.

The outfit is equipped with self-contained, rigidly braced iron frame machine, having anti-friction steel roller bearings, smooth running spur gears, steel shafting, traction sheaves or drum, and the improved Sedgwick Self-locking Fibre Lined Band Brake (by means of which loads may be safely and easily lowered by gravity). Counterweight is of the improved sectional type permitting easy and accurate adjustment. Car and counterweight are carried by two independently attached steel cables. See following page for extra attachments required in accordance with code regulations and, in all instances, we recommend consultation before final decision.

STANDARD DIMENSIONS (DRAWING H) FOR ELEVATORS OF CAPACITY AS GIVEN

Dimensions in feet and inches

See Drawing H	500 lb.	750 lb.	1000 lb.	1200 lb.	1500 lb.	2000 lb.	2500 lb.
A	3-0	3-6	4-0	4-6	5-0	6-0	6-0
B	3-0	3-6	4-0	4-6	5-0	6-0	6-0
C	6-3	6-3	6-3	6-3	6-3	6-3	6-3
D	3-8½	4-3¼	4-9¼	5-3¼	5-10½	6-11½	6-11½
E	3-4	3-10	4-4	4-10	5-4	6-4	6-4
U	0-4½	0-5	0-5	0-5	0-5⅝	0-6⅝	0-6⅝
V	0-4	0-4¼	0-4¼	0-4¼	0-4⅞	0-4⅞	0-4⅞
Y*	0-6	0-6	0-6	0-6	0-6	0-6	0-6
AA	11-0	11-4	11-8	12-6	13-0	13-6	14-6

*Minimum.

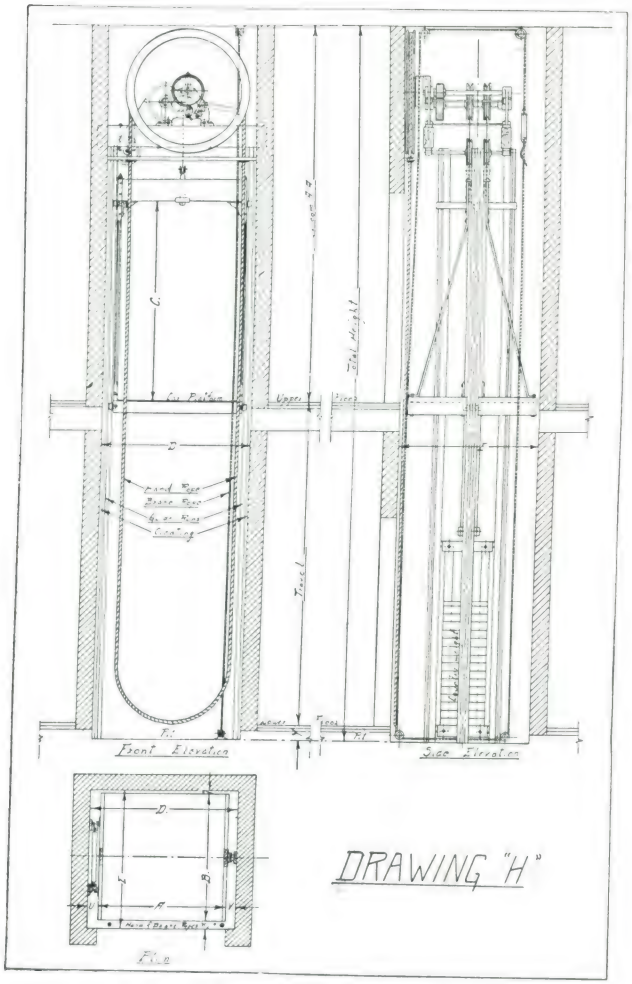


Fig. H. Sedgwick Freight Elevator
See dimension table

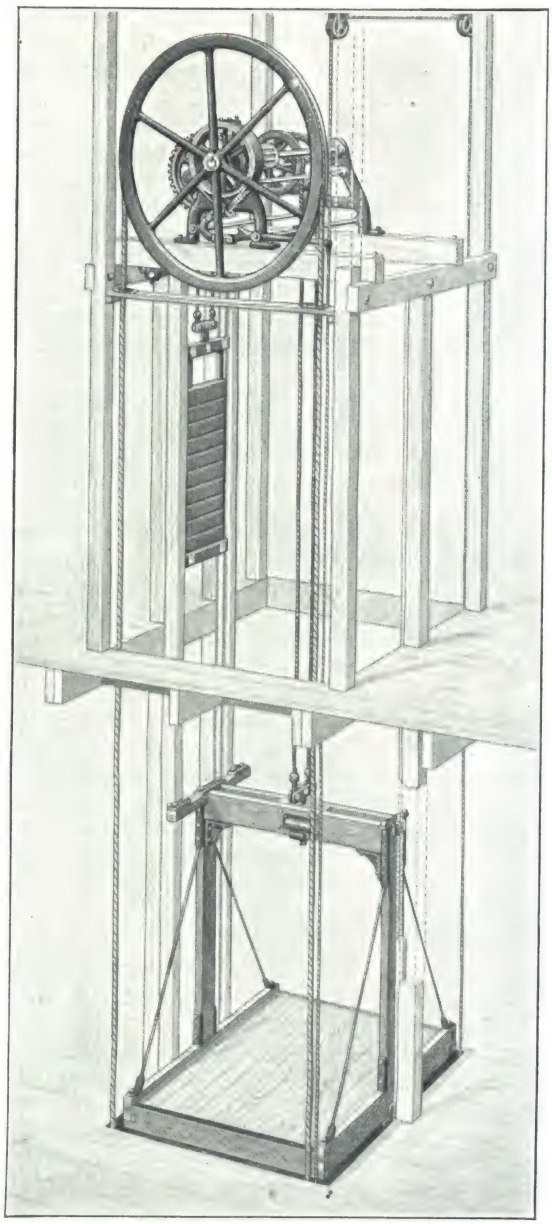


Fig. D. Sedgwick Freight Elevator
See Drawing II and dimension table

Sedgwick Trunk Lifts

Sedgwick Freight Elevators are extensively used as *trunk lifts* in residence service, conveying luggage, furniture and other bulky loads, thereby eliminating damage to stairways, walls and woodwork of house. Car is usually 4 ft. square with slatwork on sides and back. Blue print and specifications sent on request.

Gravity Drops

This term is used to distinguish outfits designed for use where the loads are uniformly down. In many modern plants, the arrangement is to use power elevators to carry the heavy materials to the top of the building, and as the work progresses, the materials are lowered from floor to floor in the different departments by Sedgwick Gravity Drops at marked economies of both time and money. The Sedgwick Machine Works have installed such outfits for the National Biscuit Co., American Sugar Refining Co., Tiffin Products Co., and many other firms. Sedgwick Gravity Drops, owing to their durability, ease of operation and low maintenance costs, have always been found to be a profitable investment in manufacturing plants.

Continued on next page

Freight Elevators to Meet Code Requirements

Building and elevator codes in effect in many places sometimes require certain safety devices and equipment.

Sedgwick Outfits are built to meet any regulations.

The drawing below includes the following:

Safety Catch—Instantaneous type, prevents platform from falling should both cables be allowed to wear out and break.

Enclosed Platform—Hardwood slatwork enclosure on sides and back; wire screen canopy top.

Gates—Self-closing type.

Grating—Under overhead machine.

STANDARD DATA

Capacity, lb.	Standard car size	Clear hoistway required		Headroom above upper floor	Weights to be carried by walls, lb.		
		Width	Depth		Machine	Car	Counterweight
500	3′ 0″ x 3′ 0″	3′ 11¼″	x 3′ 7″	12′ 6″	180	310	385
750	3′ 6″ x 3′ 6″	4′ 7¾″	x 4′ 1″	13′ 0″	301	380	455
1000	4′ 0″ x 4′ 0″	5′ 1¾″	x 4′ 7″	13′ 4″	349	422	497
1200	4′ 6″ x 4′ 6″	5′ 7¾″	x 5′ 1″	14′ 2″	580	543	618
1500	5′ 0″ x 5′ 0″	6′ 1¾″	x 5′ 7″	14′ 8″	670	585	660
2000	6′ 0″ x 6′ 0″	7′ 1¾″	x 6′ 7″	15′ 4″	865	743	818
2500	6′ 0″ x 6′ 0″	7′ 2½″	x 6′ 7″	16′ 3″	1090	753	828

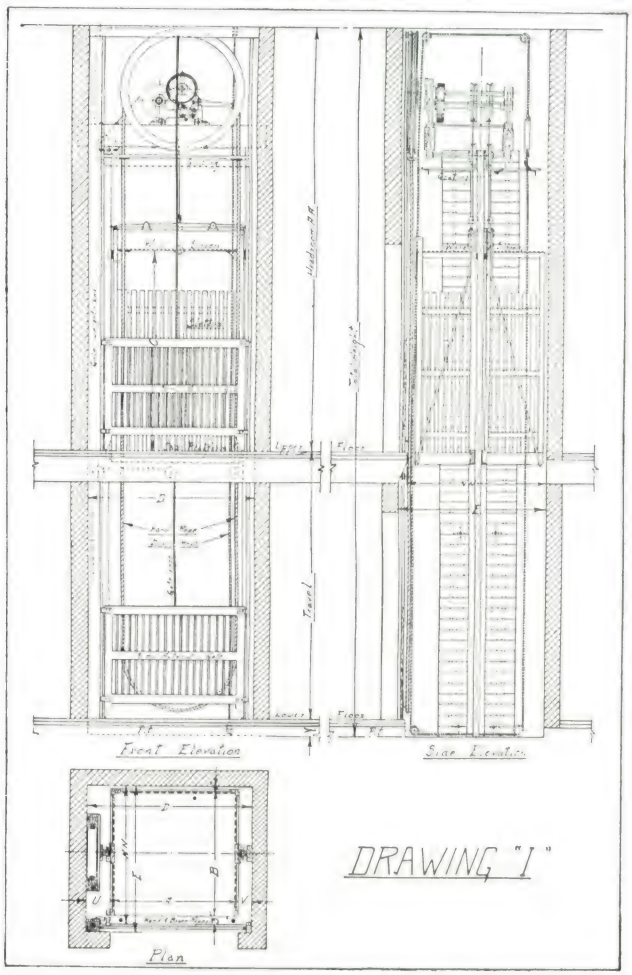


Fig. I. Sedgwick Freight Elevator

STANDARD DIMENSIONS (DRAWING I) FOR ELEVATORS OF CAPACITY AS GIVEN

Dimensions in feet and inches

See Draw. I	500 lb.	750 lb.	1000 lb.	1200 lb.	1500 lb.	2000 lb.	2500 lb.
A	3-0	3-6	4-0	4-6	5-0	6-0	6-0
B	3-0	3-6	4-0	4-6	5-0	6-0	6-0
C	6-3	6-3	6-3	6-3	6-3	6-3	6-3
D	3-11¼	4-7¾	5-1¾	5-7¾	6-1¾	7-1¾	7-2½
E	3-7	4-1	4-7	5-1	5-7	6-7	6-7
U	0-7 1/16	0-8¾	0-8¾	0-8¾	0-8¾	0-8¾	0-9¼
V	0-4 5/16	0-5	0-5	0-5	0-5	0-5	0-5¼
Y*	0-6	0-6	0-6	0-6	0-6	0-6	0-6
AA	12-6	13-0	13-4	14-2	14-8	15-4	16-3
NN	3-4	3-10	4-4	4-10	5-4	6-4	6-4

*Minimum.

Advisory Service in Connection with Elevator Requirements

In some localities certain attachments and extra equipment are required by State and municipal regulations and we recommend consultation for most satisfactory and economical results.

Our Service Department will gladly investigate and advise regarding individual requirements.

The illustration at right shows a typical Sedgwick Freight Elevator equipped to meet code regulations.

Complete blue prints and specifications will be furnished on request.

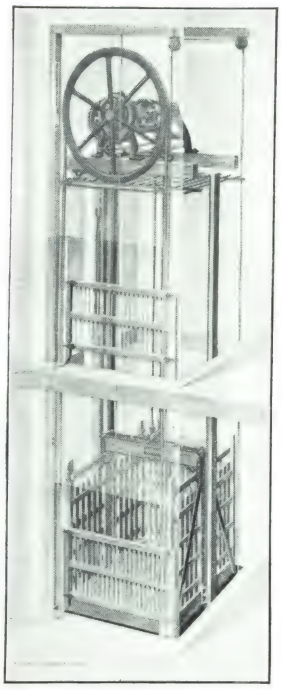


Fig. "O." Equipped to Meet Code Requirements

Sedgwick Hospital Elevators

In many hospitals, sanitariums, infirmaries, clinics and similar institutions Sedgwick Hospital Elevators are well suited to service requirements and give satisfactory, dependable, and economical performance.

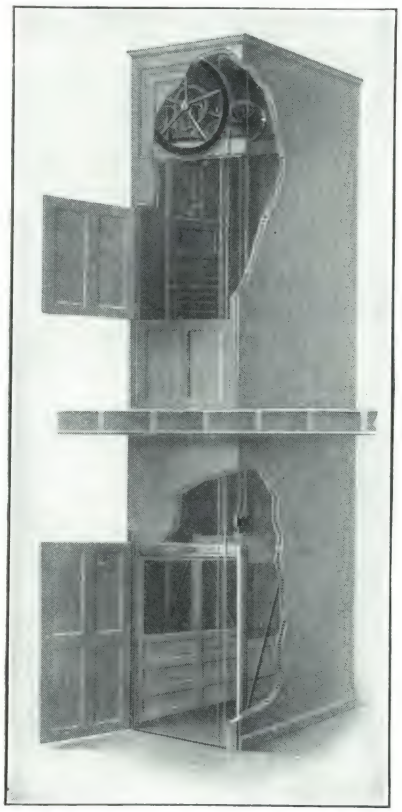


Fig. "V." Hand Power Hospital Elevator

We have made a special study of the problem involved in the design, manufacture and installation of this type equipment and welcome the opportunity to submit complete recommendations, specifications and blue prints for further consideration.

Continued on next page

Sidewalk Elevators (Drawings K, L and M)

Many improvements make the Sedgwick the simplest, strongest, safest, most durable, most easily operated sidewalk elevator that an architect can specify.

It is designed for heavy duty and stands up under the work.

Three of the many possible arrangements are illustrated in the drawings.

In most cases the outfit shown in Drawing K should be installed.

For light capacities or where space alongside of platform is limited, the arrangement as per Drawing L, following page, will secure satisfactory results.

When there is no space directly alongside of the platform, the machine must be brought inside the building line as shown in Drawing M, following page.

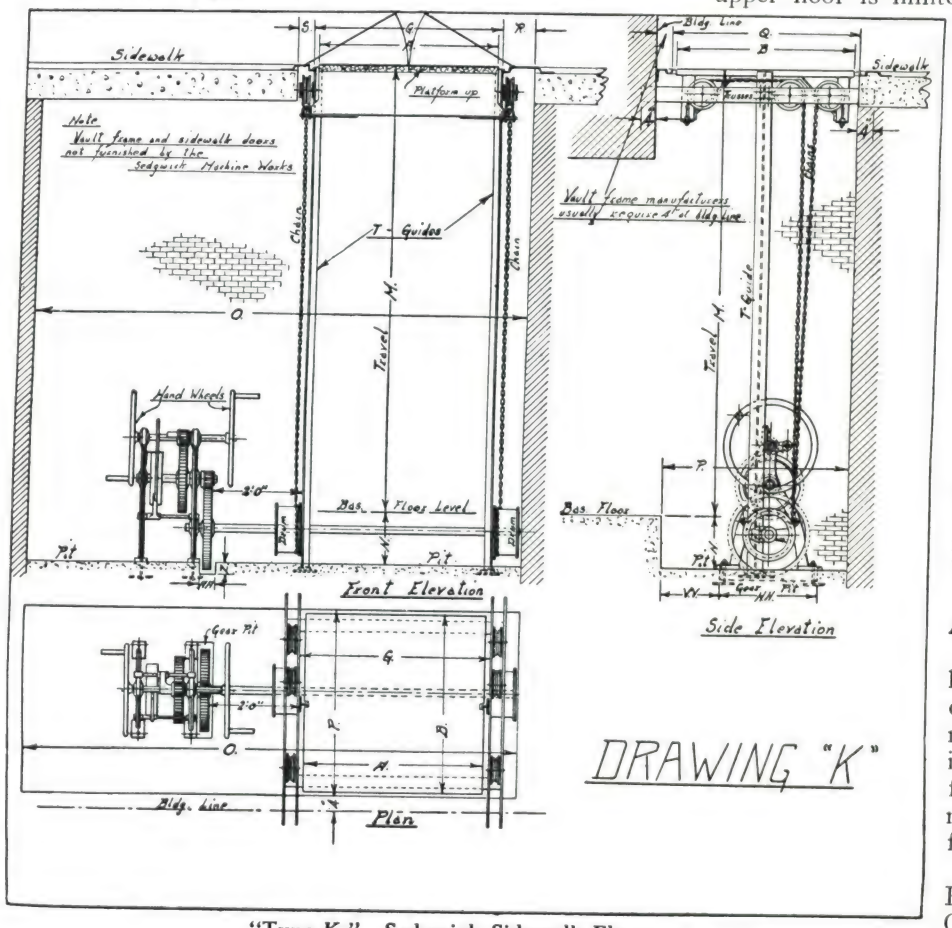
Sidewalk elevators serve a variety of purposes, perhaps one of the most common being for removal of ashes. For this use Sedgwick Sidewalk Elevators are doubly serviceable in schools, banks, and many other buildings, as they may be used also for carrying all kinds of freight supplies, furniture, trunks, etc.

STANDARD DIMENSIONS (DRAWING K) FOR ELEVATORS OF CAPACITY AS GIVEN

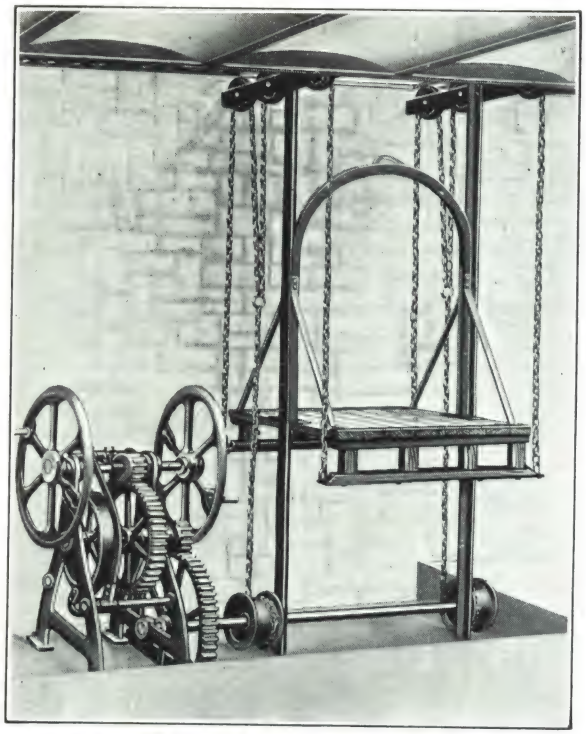
Dimensions in feet and inches

See Drawing "K"	1500 lb.	2000 lb.	2500 lb.
A	4′-0″	5′-0″	5′-0″
B	4′-0″	5′-0″	5′-0″
G	4′-2″	5′-2″	5′-2″
M	Travel—Basement to sidewalk		
N	1′-2″	1′-2″	1′-2″
O	11′-0″	12′-0″	12′-0″
P	4′-2″	5′-2″	5′-2″
Q	4′-2″	5′-2″	5′-2″
R*	0′-8″	0′-8″	0′-8″
S	0′-4½″	0′-4½″	0′-5″
Z	0′-3″	0′-7″	1′-0″
AA	0′-4″	0′-5″	0′-6″
HH	2′-2″	2′-8″	3′-4″
VV	1′-3″	1′-6½″	1′-2½″

*8 in. for 10 ft. or less of travel; for each extra 3 ft. or less of travel, increase R 1½ in.



"Type K." Sedgwick Sidewalk Elevator
See dimension table



"Type K." Sedgwick Sidewalk Elevator
See Drawing K and dimension table. Arch on platform is optional

Such installations are of advantage when space at upper floor is limited and, of course, where operation from lower floor only is satisfactory.

The opening through floor is usually protected by trapdoors and railings, if necessary.

Sedgwick Sidewalk Elevators can be arranged to suit practically any requirements.

We have on file thousands of drawings showing special outfits designed to meet unusual conditions.

Code Requirements—Special study should be made of the local regulations regarding the installation of Sidewalk Elevators as these vary in different localities.

Our Service Department will gladly make a thorough investigation of your requirements and submit complete recommendations, blue prints and specifications.

Automobile Elevators

Hand power elevators for handling automobiles are frequently desirable where there is not sufficient work to warrant the installation of power elevators, as for example: the repair department, paint shop or showroom, or for dead storage.

The Sedgwick Automobile Elevator, like all the Sedgwick Outfits, is strong, simple and dependable.

Continued on next page

Sidewalk Elevator Arrangements

Many different arrangements to suit requirements.

It is wise for architects to send for blue prints so that surrounding walls, pit, sidewalk opening, etc., may be arranged that the outfit when installed shall give best results.

The Sedgwick Sidewalk Elevators shown in Drawings L and M are suited to conditions where there is little or no space for locating the machines directly alongside of platforms.

Complete specifications in convenient form for copying will be gladly forwarded on request.

STANDARD DIMENSIONS (DRAWING L) FOR ELEVATORS OF CAPACITY AS GIVEN

Dimensions in feet and inches

See Draw. L	500 lb.	1000 lb.	1500 lb.	2000 lb.	2500 lb.
A	3'-0"	3'-6"	4' 0"	5'-0"	5'-0"
B	3'-0"	3'-6"	4'-0"	5'-0"	5'-0"
D*	4'-2"	4'-9½"	5'-3½"	6'-3½"	6'-4"
G	3'-3"	3'-9"	4'-3"	5'-3"	5'-3"
M	Travel—basement to sidewalk				
N	1'-2"	1'-2"	1'-2"	1'-2"	1'-2"
O**	4'-11"	5'-5"	6'-11½"	7'-11½"	7'-3"
P	3'-2"	3'-8"	4'-2"	5'-2"	5'-2"
Q	3'-2"	3'-8"	4'-2"	5'-2"	5'-2"
R*	0-8"	0-8"	0-8"	0-8"	0-8"
S	0-3"	0-4½"	0-4½"	0-4½"	0-5"
Z	0-0	0-0	0-7"	0-7"	1'-0"
AA	0-0	0-0	0-7"	0-7"	0-8"
HH	0-0	0-0	2'-2"	2'-8"	3'-4"
VV	0-0	0-0	0-9"	0-11½"	0-7½"

*For travel of 10 ft. or less—for each 3 ft. or less increase, add 1½ in.

**For travel of 10 ft. or less—for each 3 ft. or less increase, add 3 in.

STANDARD DIMENSIONS (DRAWING M) FOR ELEVATORS OF CAPACITY AS GIVEN

Dimensions in feet and inches

See Draw. M	500 lb.	1000 lb.	1500 lb.	2000 lb.	2500 lb.
A	3'-0"	3'-6"	4'-0"	5'-0"	5'-0"
B	3'-0"	3'-6"	4'-0"	5'-0"	5 -0"
G	3'-2"	3'-8"	4'-2"	5'-2"	5'-2"
I	Vault wall to inner wall of building				
M	Travel—basement to sidewalk				
N	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"
O	4'-1"	4'-7"	5'-2"	6'-2"	6'-2"
P	3'-2"	3'-8"	4'-2"	5'-2"	5'-2"
Q	3'-2"	3'-8"	4'-2"	5'-2"	5'-2"
R	0-7"	0-7"	0-7½"	0-7½"	0-7½"
S	0-4"	0-4"	0-4½"	0-4½"	0-4½"
Z	0-6"	0-6"	0-6"	0-9"	0-9"
AA	0-4"	0-4"	0-4"	0-4"	0-4"

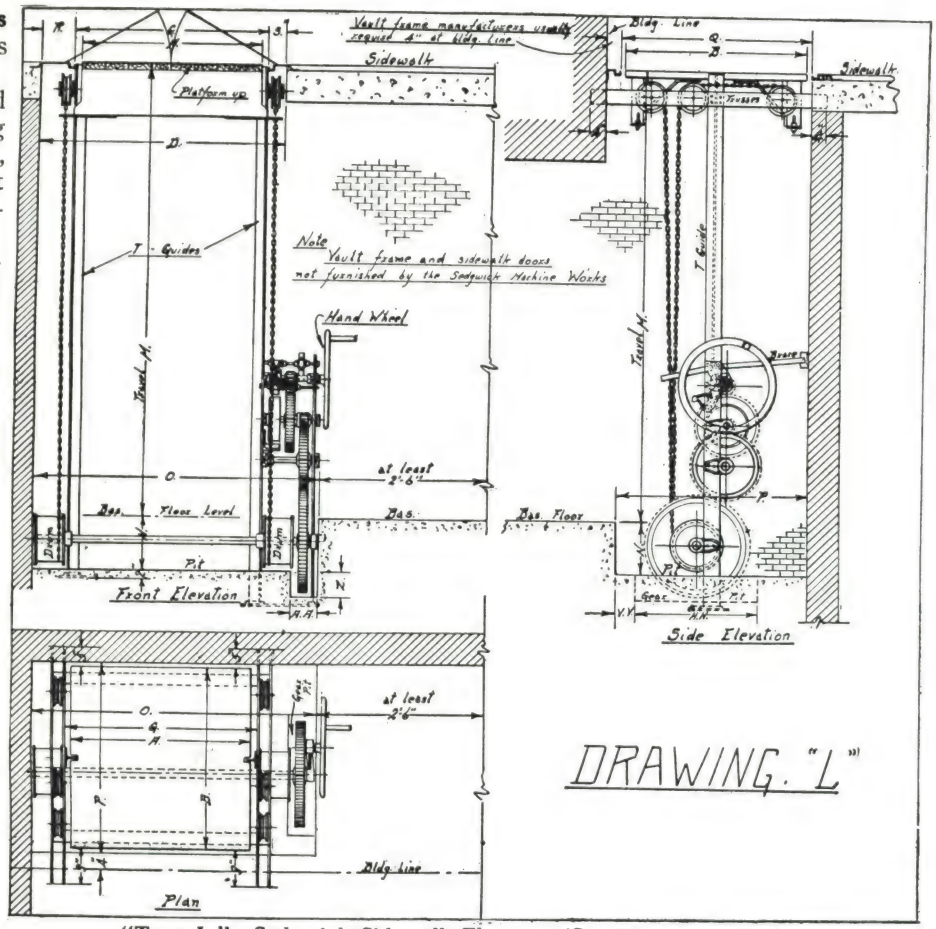
Ash Hoists

Sedgwick Ash Cranes consisting of crane, brackets, self-retaining block and fall, and bail for can are used where service does not necessitate a Sedgwick Sidewalk Elevator.

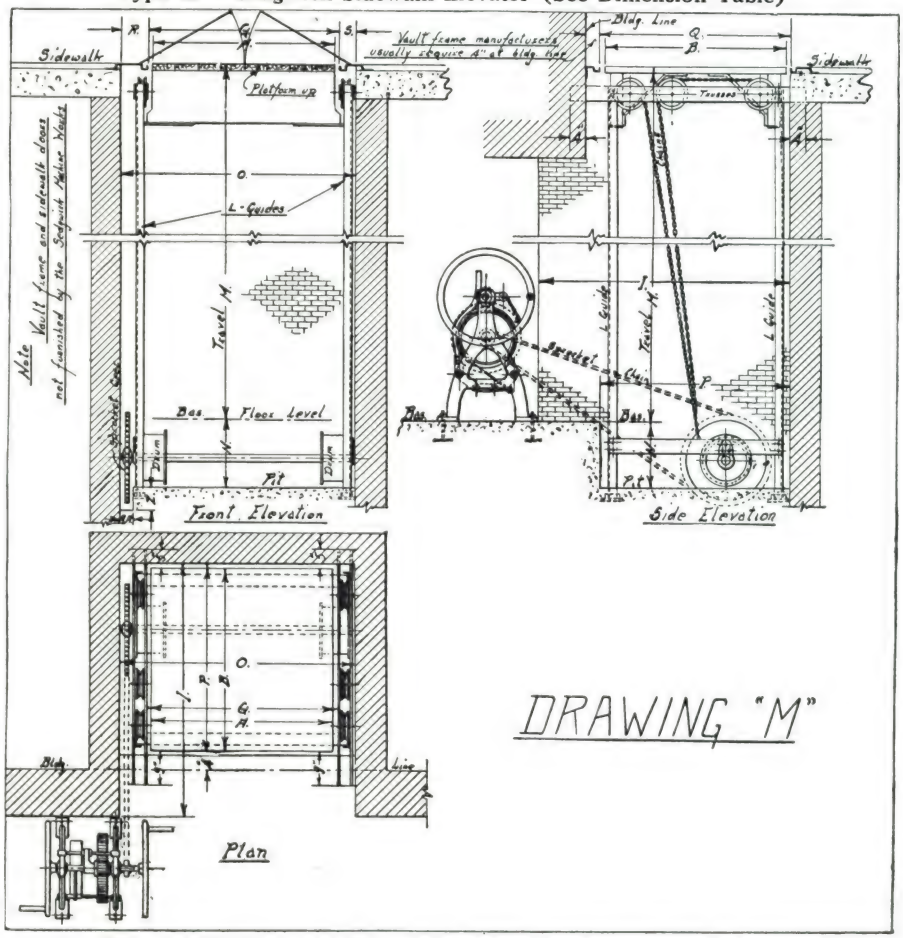
The Policy of the Sedgwick Machine Works

Since 1643, the policy of Sedgwick has been that of honest service.

Sedgwick Outfits are products of an engineering organization properly equipped to handle the many problems of planning, constructing and installing. Backed by wide experience and substantial resources, Sedgwick Service and Equipment justify the confidence placed in them.



"Type L." Sedgwick Sidewalk Elevator (See Dimension Table)



"Type M." Sedgwick Sidewalk Elevator (See Dimension Table)

ESTABLISHED 1889

BECKWITH ELEVATOR CO., INC.

INCORPORATED 1917

TELEPHONE
LIBERTY 8333

113 Albany Street, BOSTON, MASS.

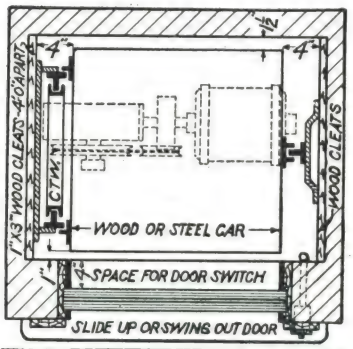
CHICAGO, ILL., L. G. TINGWALL CO., 349 West Randolph Street
PHILADELPHIA, PA., SECURITY ELEVATOR CO., 901 Callowhill Street
SAN FRANCISCO, CALIF., PRICE BUILDING SPECIALTIES CO., 683 Howard Street

Products

We specialize in the manufacture and installation of DUMBWAITERS, SMALL PASSENGER and FREIGHT ELEVATORS, INVALID ELEVATORS, etc.; electric, hydraulic or hand power types.

Material is sold f.o.b. or installed. Send for catalogues with prices and data.

For our pages on Ash Hoists, see Manufacturer's Index.



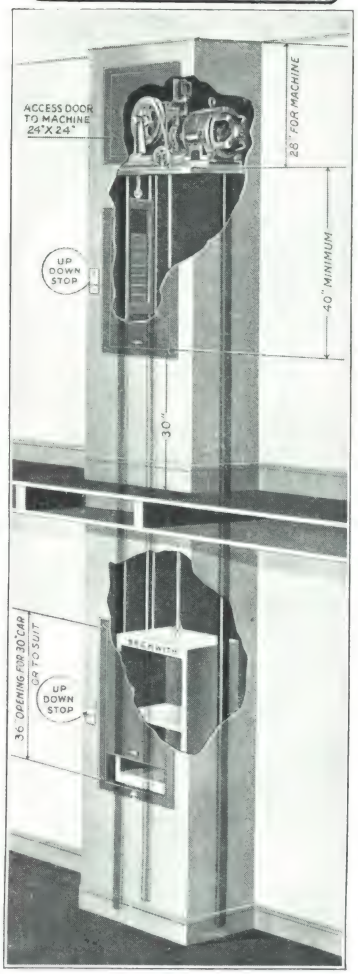


Fig. B. Traction Type Electric Dumbwaiter Installation with Machine Overhead

For two or more landings, push button control. Car stops automatically at top and bottom. Counterweight is used to overbalance car. Can be used for any number of floors, any speed or capacity

Electric Dumbwaiters

Automatic push button operated. Any capacities up to 500 lb. at speeds of 50 to 200 ft. per minute. Standard equipment furnished for 110-220 volts d-c., or single phase 60 cycle a-c. and 220-440-550 volts, 2 or 3-phase 60 cycle a-c.

General Specifications—Machine-traction (or drum) type consists of bronze gear, steel worm with ball bearing thrusts, well lubricated, fully enclosed and mounted on machined bed plate. Simple electric brake, spring-actuated to stop motor immediately the power is shut off. Reversible motor is high grade especially arranged for dumbwaiter service. All very simple and compact. Controller of latest approved design, mounted on slate panel, with ample size carbon-to-copper contacts. Push buttons, door and limit switches of neat, reliable design. Cars made any size of wood or metal. Guide rails and hoist rope of steel. Electric switches on doors arranged to make machine and car inoperative while landing doors are open, thus avoiding accidents. Mechanical locks to keep doors from being opened unless car is at landing. Note 4-in. recess or sill space for door switches and locks.

Standard Push Button Control Systems—

No. 1—Full automatic for two landings. Buttons marked *Up-Down*. Momentary pressure on button sends or calls car as desired. Inoperative when door is open. *Stop* button optional.

No. 2—Semi-selective for three or more landings. Buttons marked *Up-Down-Stop*. Momentary pressure on button sends car as desired. It will continue to either terminal unless *Stop* button is pressed at intermediate landing.

No. 2A—Constant pressure. Buttons marked *Up-Down*. Pressing button starts car—stopped by releasing button.

Systems No. 2 and 2A require vision panels for landing doors. Car stops automatically top and bottom.

No. 3—Full automatic selective for three or more landings. Button bank at each landing giving complete control of car from any landing. Inoperative when doors are open.

No. 4—Bank of buttons on car. "Call" button at landings. Momentary press of proper button in car and closing door sends car to desired landing.

No. 5—Bank of buttons at one floor only. "Send" button at other floors to return car to controlling station. Call buttons if wanted.

In all cases control buttons are inoperative while car is in motion. Other combinations furnished where required.

Installation Data—

Provide fireproof shaftway with landing doors. Allow one opening of sufficient size to admit assembled car and an opening for access to machine, wherever it may be located. Provide wood cleats, about 1x3 in., set flush in sidewalls of shaftway, 4 ft. apart, for fastening guide rails.

Use 2 or 3-phase current for motors where possible. If higher voltage than 220 is to be used, the cost will be greater to cover a transformer, changing push buttons and secondary circuit to lower voltage for safety feature. Electric current, with suitable cut-out switch, should be provided in machine room or close to motor.

STANDARD CAPACITIES AND SPEEDS

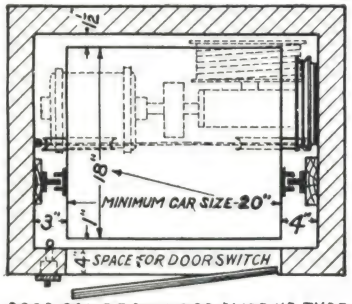
Capacity, lb.	Speed, ft. per min.	Motor hp.
100	60-75-100	¾
150	75	¾
200	60	¾
200	75	1
250	60	1
300	75	1½
400	75	2
500	75	2½

INSIDE DIMENSIONS OF STANDARD SIZE CARS

(Wood or Steel-Box Type—With One Removable Shelf)

Width, in.	Depth, in.	Height, in.
20	18	30
24	20	30
30	24	30
36	30	36
36	36	36

Note: Wood cars have ¾-in. ash sides, top and bottom and shelf with ½-in. 5-ply back. Steel cars have angle framework with sheet steel sides, back, top and bottom, and shelf. All reinforced and braced. Cast iron guide shoes



DOOR CAN BE SWING OR SLIDE UP TYPE

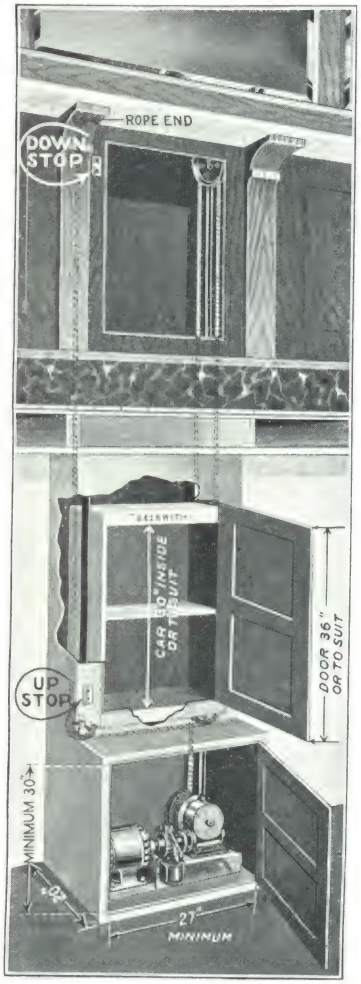


Fig. D. Counter Type Electric Dumbwaiter Installation with Drum Type Machine Located at Bottom of Shaft

Machine can be placed at side or back, push button control, car stops automatically by limit switch geared to machine. No counterweight needed except for loads over 200 lb.

Continued on next page

Hand Power Dumbwaiters and Elevators

Dumbwaiters may be had in capacities up to 500 lb. with car having platform area up to 9 sq. ft. Larger cars and with greater capacity are classed as hand elevators and should be equipped with safety devices to hold car in case of rope breakage. Machines are the band brake types in any capacities or the automatic, self-sustaining type in capacities up to 200 lb.

Hydraulic Dumbwaiters, 100 to 500 lb.

Where there is a maintained water pressure of at least 40 lb., and the rise does not exceed 15 ft., the hydraulic dumbwaiter is the most economical of the power types to install and maintain. Silent and very reliable, it is still preferred by many for a power proposition. A slight pull on the operating rope or handle starts the car. It stops automatically at the top and bottom.

The piston type, with the cylinder directly under the car, is most commonly used. Where this is not possible, we set a special hydraulic machine at the side or back of the shaft above the floor. The operation is the same.

For both kinds, a suitable supply and waste pipe must be provided.

Invalid Lifts or Small Passenger Elevators

Especial care is taken to make these machines simple, quiet, easy running and absolutely safe.

Electric—Automatic push button (Fig. 8) or shipper rope control. Interlocks and electric contacts can be installed on shaft doors to prevent operation of car unless all doors are closed and to prevent the opening of any door unless car is at that door. Electric brake, worm geared machines of best type are used. We include safety devices on car, hatch switches, etc., as required for safety features.

Hydraulic—Fig. 6 hand rope control. Car stops automatically top or bottom. Exceptionally safe and quiet, very low installation and maintenance cost. Car cannot drop as it is pushed up from beneath by piston. Collapsible gate at front of car is used. Recommended for one-story rise and especially for invalid lifts. Electric lock on operating cable makes car inoperative while doors or car gate are open. Landing door cannot be opened except when car is at the landing.

Hand Power—Operates by pulling hand rope. Speed of descent is controlled by separate brake rope. Car has safety devices to hold it in case of rope breakage. Standard size for invalid lift is 3 ft. square by 6 ft. 6 in. high. Size for wheel chairs is 3 ft. wide by 4 ft. 4 in. deep, by 6 ft. 6 in. high (Fig. 7).

Freight Elevators

For use in factories, commercial buildings, etc.

Electric—Operated by cable, lever or push button. Capacities up to 4000 lb. Speeds to 100 ft. per min. Rise up to 60 ft.

Hydraulic—Operated by cable or lever. Capacities up to 6000 lb. Rise up to 20 ft.

Hand Power—Operated by hand rope. Capacities up to 1500 lb. Rise of 20 ft.

Information Required for Estimating

General for All Types—Inside size and type of car; number and location of openings in car (if dumbwaiter); number of shelves wanted in car; clear inside dimensions of shaftway; total height and height at top landing from floor to ceiling; travel of car; live load capacity; number of landings served; total number of door openings and whether located at front only, front and back, or front and side of shaftway.

For Electric Type—Besides general information, state voltage, phase and cycle of electric current available; speed of car in feet per minute, and type of control.

For Hydraulic Type—Besides general information, state water pressure and size of supply pipe.

For Hand Power Type—Besides general information, state type of machine desired, band brake, automatic brake or balanced type.

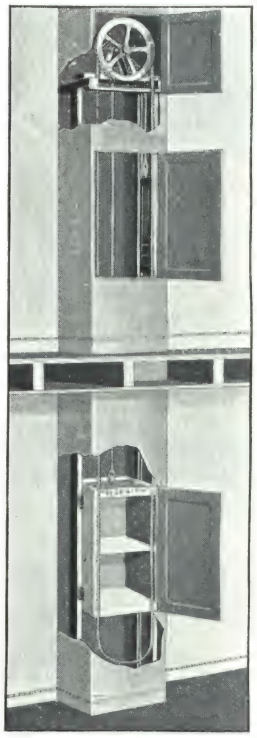


Fig. 5. Hand Power Automatic Brake Dumbwaiter

Suitable for loads up to 200 lb. Rise, 20 ft. or less. For larger capacities or longer travel, band brake type is recommended. Clear inside sizes of shaftways should be 5 in. wider and 3 in. larger, front to back, than the outside sizes of car desired. A 16-page booklet, with 41 illustrations and diagrams, mailed on request

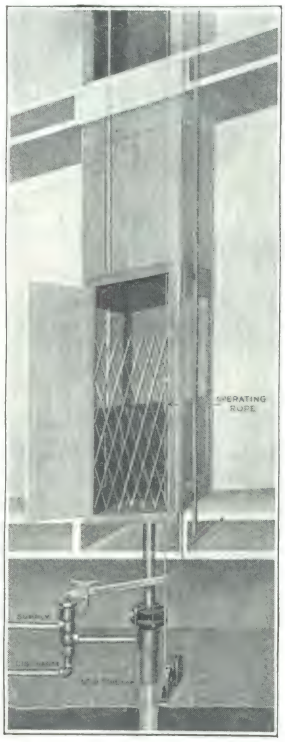


Fig. 6. Hydraulic Invalid Lift, Plunger Type

Exceptionally quiet and safe with low installation and maintenance costs. Recommended for rise up to 20 ft., any capacities to suit. Water pressure should be 40 lb. or over with 1 in. or larger supply pipe according to capacity and speed desired

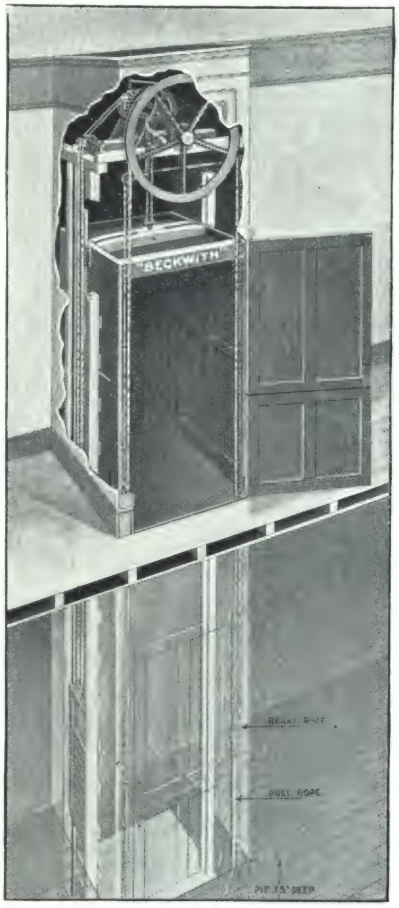


Fig. 7. Hand Power Invalid Lift, Operated by Pull Rope

Capacity, 400 lb. or larger, to suit. Clear inside sizes of shaftway should be 12 in. wider and 4 in. larger, front to back, than size of car desired. Standard size car is 3x3 ft. Size for wheel chair is 3 ft. x 4 ft. 4 in.

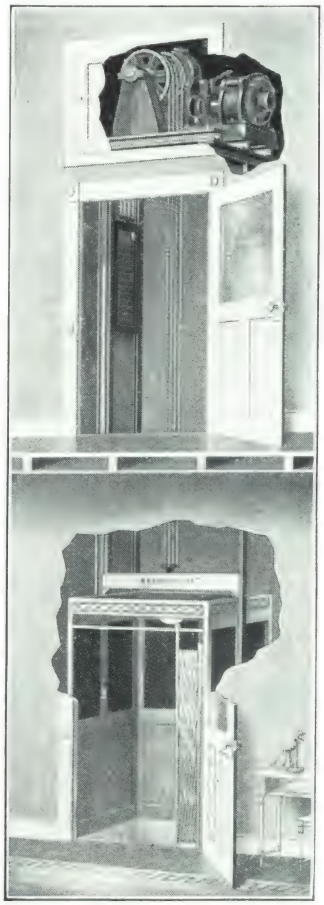


Fig. 8. Electric Invalid Lift or Small Passenger Elevator

Automatic push button or cable control. Capacities up to 2000 lb. Speeds to suit

ESTABLISHED 1876

CHELSEA ELEVATOR CO.

INCORPORATED 1912

Manufacturers of Electric Dumbwaiters and Elevators

OFFICE

101 Park Avenue, NEW YORK, N. Y.

FACTORY: NORTH BERGEN, N. J.

REPRESENTATIVES

KANSAS CITY, MO.
ROCHESTER, N. Y.
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BALTIMORE, MD.
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SOUTH BEND, IND.
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NASHVILLE, TENN.
HELENA, MONT.
SEATTLE, WASH.
WILKES-BARRE, PA.
LOS ANGELES, CAL.
PHILADELPHIA, PA.
ST. PAUL, MINN.
WASHINGTON, D. C.

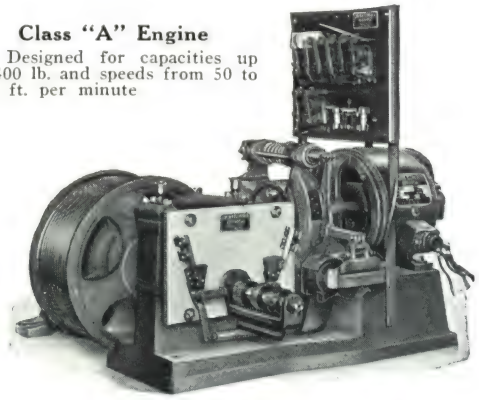
Products

ELECTRICALLY OPERATED DUMBWAITERS; ELECTRICALLY OPERATED SIDEWALK ELEVATORS; small PUSH BUTTON PASSENGER ELEVATORS (specialists in Push Button Equipment).

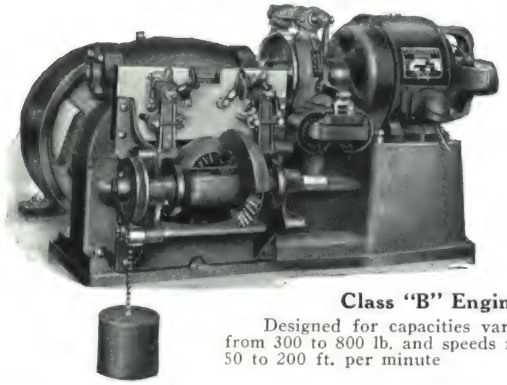
For dumbwaiters and sidewalk type elevators a full line of Selective Boxes, Electric Door and Gate Contacts, Mechanical Door Locks, Slack Cable Switches, Machine Limit and Hatchway Limit Switches.

For Hand Operated Dumbwaiters and Elevators for every purpose, see Manufacturers' Index.

CHELSEA
TRADE-MARK



Class "A" Engine
Designed for capacities up to 400 lb. and speeds from 50 to 200 ft. per minute



Class "B" Engine
Designed for capacities varying from 300 to 800 lb. and speeds from 50 to 200 ft. per minute

Experience

More than fifty years of manufacturing experience in one city assures reliability of products, and progressiveness in design and equipment assures highest quality in workmanship and materials.

Chelsea Electric Dumbwaiters

Combinations of capacities, speeds and sizes are obtainable to suit every requirement. Classes, hatchway sizes, car sizes, shipping weights, prices, outline specifications, etc., may be obtained from data tables sent upon request.

Representative Installations—

Federal Reserve Bank, New York, N. Y., York & Sawyer, Architects
Academy of Sciences, Washington, D. C., B. Goodhue, Architect
Post Office, San Francisco, Cal., U. S. Government Architects
Residences, Palm Beach, Fla., H. Mainzer, Architect
Hospital, Gary, Ind., Schmidt, Garden & Martin, Architects
Liggett & Co., New York and Chicago, Walter T. Williams, Architect
Bellevue Hospital, New York, N. Y., McKim, Mead & White, Architects
New York Telephone Co., New York, N. Y., Mackenzie, Voorhees & Gmelin, Architects
Bankers Trust Co., 10 Wall Street, New York, N. Y., John H. Carl, Contractor
New York Times, New York, N. Y., Ludlow & Peabody, Architects
N. Y. University, New York, N. Y., Augustus N. Allen, Architect
Vanderbilt Residence, New York, N. Y., York & Sawyer, Architects
Morgan Library, New York, N. Y., Benj. W. Morris, Architect

Chelsea Electric Sidewalk Elevators

Our sidewalk elevators are rugged and compact and may be obtained with either push button or hand cable control.

Our electrically operated elevators are designed for capacities from 300 to 2500 lb. and speeds from 20 to 200 ft. per minute.

Class "AA" Engine
Capacity 1 to 350 lb.

Representative Installations—

Luchow's, 105 East 13th Street, New York, N. Y.
Roosevelt Hospital, 10th Avenue and 59th St., New York, N. Y.
Louis Sherry, 62nd Street and Madison Avenue, New York, N. Y.

Push Button Passenger Elevators

Our small push button passenger elevators are substantially built, and positive and reliable in operation.

Representative Installations—

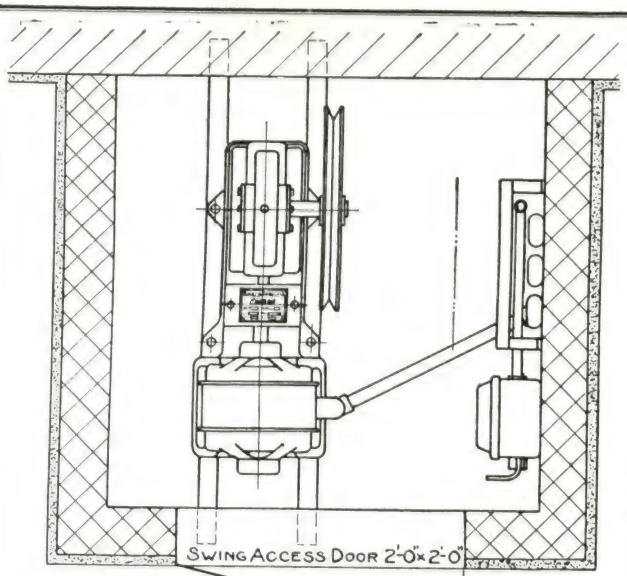
Aron Residence, Great Neck, Long Island, N. Y., Walker & Gillette, Architects
Harrison Williams Residence, Bayville, N. Y., Delano & Aldrich, Architects
Williams Residence, Westport, Conn., Charles E. Cutler, Architect
Ridgewood Bank, Ridgewood, N. J., Dwight James Baum, Architect
Coonley Residence, Great Barrington, Mass., Delano & Aldrich, Architects

Guarantee

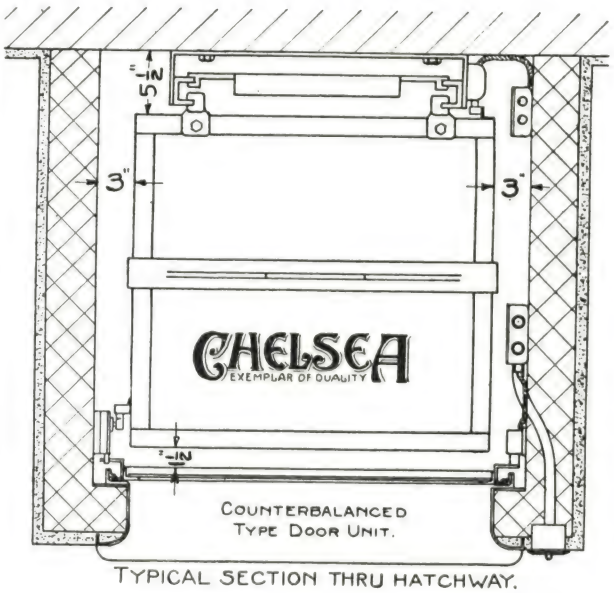
All parts are guaranteed for one year free from defects in both workmanship and materials.

Shipment Orders

Our organization is prepared to furnish and also erect full equipment in any part of the United States. We are fully prepared, however, to furnish any portion or the full equipment with complete instruction for erection by local mechanics.



DETAIL OF MACHINE ROOM-TOP OF HATCHWAY.



TYPICAL SECTION THRU HATCHWAY.

Specification Data

Car—Shall be built to suit hatchway and travel from .... floor to .... floor. It shall be constructed of steel angles with mitred corners strongly riveted to steel sheets No. 16 gauge and shelved as directed. Shall have lifting capacity of .... lb. and travel .... ft. per min. Available power current will be .... volts .... phase .... cycles.

Machine—To consist of traction sheave operated by worm gear and motor fastened to foundation beams. Traction sheave shall be accurately grooved for cable and sheave. Shaft shall be highest grade steel with accurate keyway. Worm and worm shaft to be made from a solid steel blank. Gear shall be of phosphor bronze accurately cut from solid blank, meshing with driving worm. Worm and gear contained in cast iron housing running in oil bath to insure lubrication at all times. Sight oil gauge to be furnished in gear case. All bearings throughout to be of ball type suitable for required duty maintaining perfect alignment of worm and gear.

Motor—Electric, slow speed, long bearings of ball type and self-adjusting brushes. Motor to be specially designed for electric dumbwaiter work, having high efficiency, great starting torque, and durability.

Electric Brake—Shall apply automatically at all times when dumbwaiter is stopped to securely hold car, except when electrically released during normal operation, and shall apply instantly in case current supply is interrupted from any cause. Limit switches to be provided to stop car at upper and lower limits of travel which will cut off current supply to machine and apply brake.

Operating Device—A bank of buttons to be placed at each floor so that car will immediately start for desired floor by means of momentary pressure on designated button. There will be .... landings, ... openings. If more than two landings are shown on plans. The required floor selectors are to be mounted in the hatchway and no part of the equipment is to project outside of the hatchway.

Safety Door Switches—To each door in the hatchway there is to be attached an electric contact so arranged that control buttons are inoperative and car cannot be operated unless all doors are closed.

Safety Door Locks—To be attached to each door in hatchway so door cannot be opened unless car is opposite same.

Counterbalance—To be so proportioned as to give most economical operation of dumbwaiter.

Cables—Car and counterweight to be suspended with cables with liberal factor of safety not less than ⅜-in. diam., 6 strands, 19 wires.

Guide Rails for Car and Counterweight—To be of cold drawn steel.

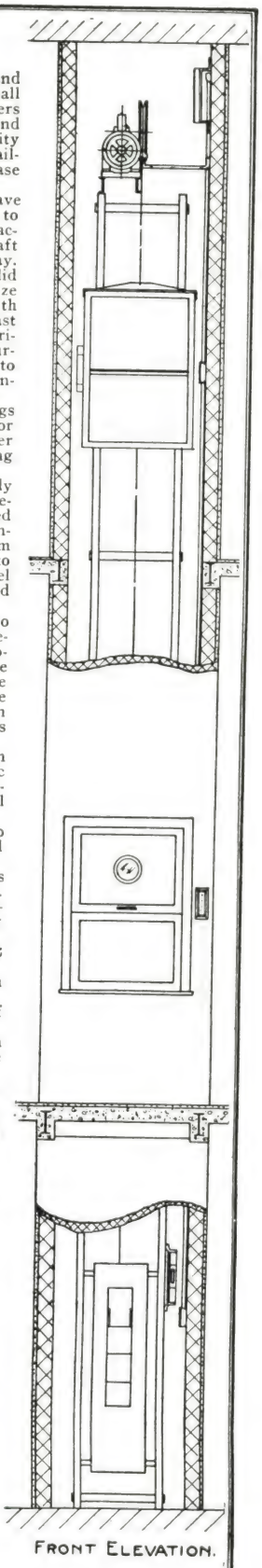
Controller—To be full magnet type on slate panel in machine room at top of shaft.

Overload Relay—Shall prevent passage of excessive current to motor.

Wiring—All electric wires to be run in solid iron conduit except at short bends where flexible conduit may be used.

Painting—All metallic parts to receive one shop coat of machinery paint.

Guarantee—Every part of this apparatus is to be guaranteed to be free from defects in both workmanship and material.



FRONT ELEVATION.

HATCHWAY AND SPECIFICATION DATA—CHELSEA CLASS AA ELECTRIC DUMBWAITERS

Car size width and depth, in.	Hatch size required, in.	Height required above top door, in.	Capacity, lb.	Car speed, ft. per min.
22x18	28x27	42	100	100
26x22	32x31	42	150	75
30x24	36x33	42	200	100
34x28	40x36	42	300	90
38x32	44x41	42	400	70
36x36	42x45	42	500	40

Note: The table above is given for comparative purposes, between car size and hatch. Any size car can be furnished and capacities and speeds may be varied to suit individual needs.

Types Control Systems—Chelsea Electric Dumbwaiters

Type 2—Push button control for two landings. Bank of push buttons at each floor marked "Up" and "Down." Momentary pressure on buttons sends car in designated direction. Control buttons inoperative while car is in motion.

Type 4—Full automatic, full selective (three floors or more). Full bank of buttons at each floor, one button corresponding to each floor served. By pressing corresponding button car can be sent to or from any desired floor. Momentary pressure on an additional "stop" button stops the car immediately. All other buttons are inoperative while car is in motion.

Note: Two control systems only are mentioned but a great variety can be obtained from Chelsea, such as: one point control where car is sent or called from one central point and only be returned from other floors, etc.

Types Signal Systems—Chelsea Electric Dumbwaiters

Glass Vision Panel in Door—Simplest form of signal device. (See drawing.) Enables attendant to see car when opposite door.

Red Bull's-eye—Red signal lamp at each opening lights automatically when car is opposite door and goes out when it leaves.

Buzzer or Bell on Car—Connected to a push button at each floor. Pressure on push button calls attention of attendant to arrival of car at floor.

Automatic Buzzer or Bell at Each Floor—Rings automatically when car arrives and ceases when door is opened.

Note: Only the simpler forms of signal devices are mentioned. All the above may be used in conjunction—or a telephone or annunciator system used. Special signal systems can be furnished.

Note: Electric contact on doors makes car inoperative while door is open. A mechanical lock locks door so it cannot be opened unless car is opposite. Standard cars are 42 in. high. 1 loose shelf. Standard door sill 30 in. above floor. Complete sliding door units furnished if desired.

ELECTRIC DUMBWAITERS, INC.

HOME OFFICE AND FACTORY
BUFFALO, N. Y.

Product

PUSH BUTTON OPERATED ELECTRIC DUMBWAITERS.

"Electric" DUMBWAITERS

Electric Dumbwaiter Equipment

"Electric" dumbwaiters are made in several sizes. They consist of a hoisting engine with controller all assembled and wired complete; car, counterweight, sheaves, guide rails, hoisting rope, push buttons, hatchway limit switches, door interlock switches and electrical fittings.

Used

In apartments, residences, stores, factories, offices, schools, restaurants, hospitals, laundries, bakeries.

Construction

The car is guided by rails at rear of hatchway; these rails are also used to guide the counterbalance weight. This construction is the simplest and most substantial, allowing the largest size car possible in a given hatchway.

The worm and worm gear shaft are made of high grade steel and run on the best make of ballbearings. The gear is of best phosphor bronze, accurately cut on machines built exclusively for this work.

The car and weight are each suspended from two steel ropes of ample capacity to carry the loads and flexible enough to last a long time. The cars are made of sheet steel, riveted and welded together; after finishing, cars are given two coats of baked furniture enamel, green. Cars are also made of select lumber, well seasoned and kiln dried before working.

The guides are of steel; very strong, and supported at frequent intervals. Wood guides can also be furnished for certain types of operation. These are made of select lumber, well seasoned and well finished. All moving parts are self-oiling.

Installation

The "Electric" has been particularly designed and manufactured so it can be connected to electric service or power line and installed by the ordinary mechanic. It takes very little current in operation due to the special motor. All parts are interchangeable.

Full instructions, wiring diagrams and drawings furnished with each outfit.

Guarantee

We guarantee the material and workmanship, and, if any part or parts prove defective within one year, we will supply the defective part or parts free of charge f.o.b. our factory.

Dumbwaiter Installation

Electric Control System

Used with Wood or Steel Guides—

UD1—Two or More Landings, Constant Pressure Push Button Control—Two buttons at each landing marked "up" and "down." Maintaining pressure on button will call or send car in any desired direction. Releasing pressure on button will stop car.

UD2—Two-floor Momentary Pressure—Three buttons at each landing marked "up," "down" and "stop." Momentary pressure of button will send car up or down where it will automatically stop.

Used with Steel Guides Only—

CCS1—Single Station Call and Send—A bank of buttons at one floor. Maintaining pressure on any button will send car to the floor indicated.

CCS2—Single Station Call and Send—A bank of buttons marked to correspond to the floors served by the car is located at the terminal floor, and, by means of a maintained pressure on the button, gives complete control of the car from this point.

A bank of two buttons marked "call" and "send" is located at all other floors and by means of constant pressure on button, car can be called to those floors and returned to controlling station.

CCS3—Same as CCS1 with momentary operation.

CCS4—Same as CCS2 with momentary operation.

MCS—A Full Selective Floor Call and Send Control—Multistation control is provided at each landing with a bank of buttons to correspond to number of floors served by car.

Momentary pressure on the button automatically calls or sends the car from any floor to any other floor.

MCS1—A bank of buttons is placed at some particular station and car can be called or sent to any floor from this station. Closing the door will return car to station.

MCS2—A bank of buttons is placed at some particular station. Momentary pressure on any button will send the car to any floor desired. A call button placed at every floor allows the car to be called to that floor and closing of the door returns the car to the station.

Minimum Current Required

The motor is one of standard make and has been specially adapted by the manufacturers to this machine. It has high torque and moderate speed of ample capacity, and due to the special design of the "Electric," it takes very little current to run.

Continued on next page

General Dumbwaiter Data

Capacity—75, 100, 150, 200, 250, 300, 400 and 500 lb.
Power—Alternating or direct current, 110 or 220 volts.
Speed—50, 75 and 100 ft. per minute.
Car Sizes—Steel or wood, up to 3x4x4 ft. high or as large as local regulations permit.
Space Required—Plans and elevations below give various types of installations with overhead machines and are for plumb dimensions. Allow for out-of-plumb sizes.

Elevation gives desirable heights. Height of car or height from top floor line to sill or space between machine and ceiling may be reduced slightly.

Information Required for Estimates

(1) State number of floors to be served—giving number and position of all door openings.
(2) Give finished inside dimensions of hatchway; of what material constructed—wood, brick, gypsum, etc.
(3) Give total height from lowest floor served to ceiling of top floor served.
(4) Give the height from floor to ceiling and from sill to ceiling at top floor.
(5) State capacity of car and speed of travel.
(6) State whether swinging or sliding doors.
(7) State available power—if direct current, give voltage; if alternating, give voltage, cycles and phases.

SUGGESTIONS FOR THE PREPARATION OF ARCHITECTS' SPECIFICATIONS

Capacity to lift a load of .. lb., exclusive of the weight of car at a speed of .... ft. per minute.

Power to be .... volts, ... phase, ... cycles, d-c.

Travel of car to be from basement to ..... floor, a distance of about .... ft. .... in.

Door openings to be located as follows:

Doors to be vertical sliding, inside of hatch or in door frame, or swinging doors if desired. If any particular make or type is to be used, mention same.

Car to be of steel, not less than No. 16 gauge sides and No. 14 gauge top, parts riveted solidly, and then welded. To be properly finished in baked enamel; color to be specified. A furniture green is a good wearable color.

If a light is wanted in car it can be specified. In specifying, state light must be so recessed in top of car to give clear, full height.

Guide rails to be of steel, properly fish plated and supported rigidly by brackets not less than eight feet apart.

Counterbalance weight to be sufficient to secure proper and economical running, sliding parts on rails to be of babbitt or other similar metal.

Steel rope to be used of sufficient size to have a factor of safety as used in standard elevator practice.

The hoisting machine to be of the worm gear traction type, made of the best materials and workmanship. The worm to be made of high grade steel. The gear to be made of the best phosphor bronze gear metal, accurately machined and cut.

All parts to be mounted on one continuous iron bed-plate of substantial construction and all running parts to be thoroughly self-lubricating.

The motor to be of the elevator type with high starting torque with the minimum of starting current, slow speed and adapted to meet the requirements of the service as specified.

The machine to be provided with a magnet brake which automatically stops and holds the car during normal operation; or if the current is interrupted the brake will stop and hold the car.

The machine to be provided with a magnet controller of the most improved type which automatically starts, stops and reverses the motor and applies brake. Must have overload and single phasing protection. Adjustable metal to carbon contacts.

Machine to be located ..... Location can be overhead or in basement or any floor. But overhead is the best if possible.

One limit switch at top and one at bottom of hatch to automatically stop car at terminal landing.

One mechanical and electrical door lock to be provided for each opening so car cannot be operated if door is opened or door cannot be opened if car is not at landing.

Push buttons of the proper number to be placed at the landings as specified.

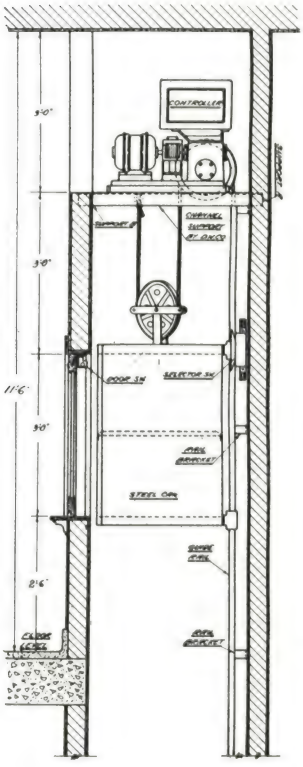
For different type of operation see preceding page.

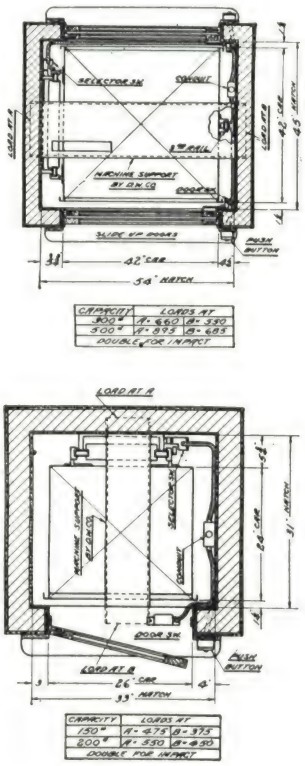
Signals can be of several types as—

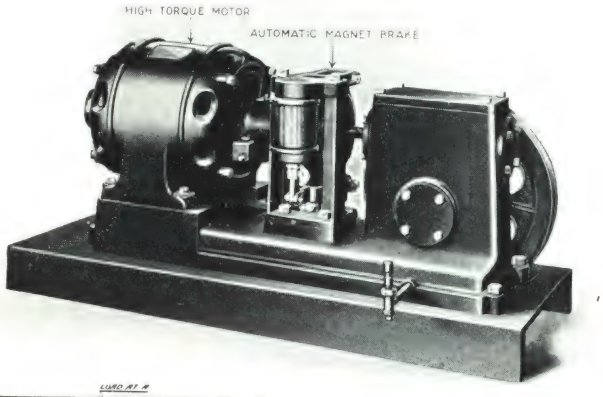
A light or buzzer to be placed in car to operate when car stops and cease when door is opened and not operated again until door is closed and button again operated.

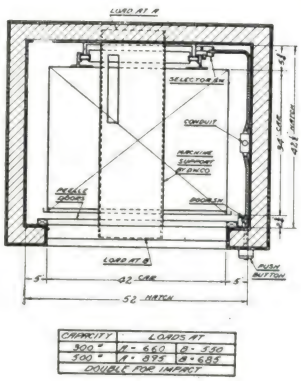
A light or buzzer placed over door to be operated when car stops and cease when door is opened and not operated again until door is closed and button again operated.

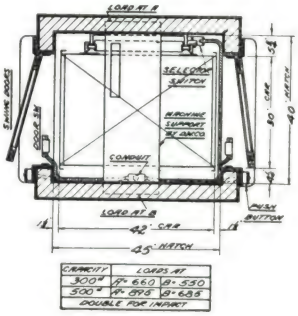
If wanted, a light can show in push button to indicate car is in operation.











ESTABLISHED 1847

GEO. T. McLAUTHLIN CO.

Manufacturers of Electric Elevators and Dumbwaiters

EASTERN NEW ENGLAND AGENTS FOR SEDGWICK HAND DUMBWAITERS

TELEPHONES
RICHMOND 3760

120 Fulton Street, BOSTON, MASS.

Products

McLAUTHLIN "UNIVERSAL" ELECTRIC DUMBWAITERS.

McLAUTHLIN EQUIBALANCED DUMBWAITER DOORS.

Also Passenger and Freight Elevators; Elevator Accessories; Metal Covered Doors.

McLauthlin "Universal" Electric Dumbwaiters

McLauthlin "Universal" Electric Dumbwaiter machines, developed by us, are extremely simple, compact, reliable and efficient. More than diminutive elevator machines, they are mechanisms designed to meet efficiently the special requirements of electric dumbwaiter service. Manufactured in five standard sizes, the correct equipment is available for any specific duty.

The machine is constructed with "built-in" motor, brake and worm gearing in one unit. This mounting preserves true alignment of motor, worm and gear and encloses the bearings and worm gearing in a dusttight casing in which they operate in an oil bath.

The motor is especially designed for electric dumbwaiter service. It has ball bearings, high starting torque, and uses no current when the car is not in motion. The motor shaft and worm shaft are one piece without coupling.

The worm gear is hobbed from a solid blank of special long life bronze gear metal. It is secured to the drum shaft by a large key and locked nut.

The drum shaft is supported on two double row ball bearings in the gear case, with an additional bearing in the outside stand.

The worm is accurately cut from special steel.

Bearings, including the thrust bearing, are ball or roller throughout.

The brake is unusually simple, effective and accessible. It is at the upper end of the motor shaft, of disc type, applied by adjustable spring tension, released by magnets. The brake disc is secured to the motor shaft by a key and locked nut. The braking surface is cork to cast iron and is of large area, insuring smooth stop and little wear.

The entire machine is mounted on a self-containing and oil-retaining subbase and may be arranged either with vertical or horizontal position of the motor, dependent on space conditions.

Types—***Traction***—This is the type most used. With automatic control the floor selector is operated by independent cable from the car.

Spiral Drum—For terminal landing service only; especially recommended because of the efficient method of operation. The car is started with the hoist cable on the small diameter of the winding drum so that the motor accelerates at a comparatively low torque. A second acceleration of car speed occurs when the cable climbs from the small to the large diameter of the drum. In stopping, the cable descends to the small diameter of drum reducing the speed to one-third immediately before stopping.

Winding Drum—Supplied when necessary to meet special requirements.

Location of Machines—The compactness of "Universal" electric dumbwaiter machines permits them to be usually installed directly over and within the area of the hoistway. This location reduces the cost both of original installation and of maintenance. The machines may be located elsewhere when conditions require.

Easy access to the machine should be provided by ample enclosure doors.

Control Systems—The usual controls are:

Control "A"—Terminal stops automatic. For two landing levels only, with "send" and "stop" buttons at landings. For dumbwaiters serving only terminal landings this control has many advantages of safety, convenience and speed of service, and it is the most simple and foolproof.

Control "B"—Terminal stops automatic. For two landing levels with "call," "send" and "stop" buttons at landings. Can be used for any number of floors with "up," "down" and "stop" buttons at landings.

Control "C-1"—For more than two landing levels—with all stops automatic. A gang button box containing button for each landing level and "stop" button at each landing opening.

Control "C-2"—For more than two landing levels—with all stops automatic. A gang button box containing button for each landing level and "stop" button at one landing opening. "Call" and "send" buttons at all other openings.

Control "C-3"—For more than two landing levels—with all stops automatic. A gang button box containing button for each landing level and re-set button in the car. "Call" buttons at each landing opening. Car is called by momentary pressure of a "call" button. Car is despatched by momentary pressure of a floor button in the car box and closing the landing door.

Note: This is our standard type full automatic control and we recommend it because of its simplicity.

Control "D"—Constant pressure "up" and "down" buttons.

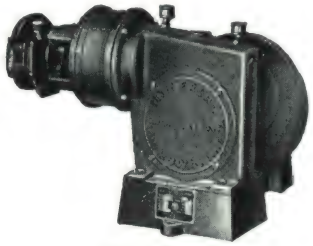
Various Combinations—We supply control systems other than the above, obtained with various combinations of our standard control accessories.

Signal Systems—Light in car. Lights at floors. Audible signals. Combinations can be provided as desired.

Engineering Service

"Universal" electric dumbwaiters are distributed throughout the country. Engineering service is available from us and our agents.

Traction



Spiral Drum

Basement Mounting

Types of "Universal" Dumbwaiter Machines

Where limited height prevents use of vertical machine, we supply horizontal machine as here illustrated

Continued on next page

McLauthlin Equibalanced Dumbwaiter Doors

The McLauthlin equibalanced dumbwaiter door is a quiet, fast and easily operated door unit, which is readily installed.

On account of its quiet and easy operation it is particularly adapted for hospitals, residences, offices, etc., where noise is objectionable and ease of operation important.

In restaurants, and other locations where maximum service is essential, the speed of this unit is extremely advantageous.

Covered with metal, the treatment of the finish can be suited to the requirements of the installation.

In factories and similar commercial service the usual finish is plain galvanized sheet metal, smooth front, without seams on the room side. In hospitals and restaurants, the finish is preferably Monel, Allegheny or other corrosive resistant metal, polished and unpainted, as this surface is best maintained clean and sanitary.

The complete door assembly consists of the door sections, side guide support rails, sheave header, and opening frame. The two door sections slide vertically and equibalance each other. They are of fire resisting construction, built of two thicknesses of thoroughly seasoned dry, tongued and grooved white pine, free from large or loose knots, securely nailed and covered with metal. Each door section is guided at its four corners with bronze guide shoes running on finished steel guide rails.

The doors are hung with metal tapes, running over ball bearing sheaves. A self-locking latch is mounted at the bottom edge of the upper section. The stop at full opening is cushioned, the top of the bottom section stopping even with the sill. When closed the sections are held together by the latch, and stops on the guide rail supports hold the door in closed position if during a fire the tapes should break.

The combination guide rails and supports are special finished steel section of great rigidity, and extend the full story height with fastenings to the building at each floor.

The opening frame is mounted on the guide rail, as part of the door unit. This frame is made of steel channel or angle to withstand the hard usage to which these openings are often subjected.

The finish of the frames may conform with that of the doors, and any desired decorative effect can be obtained. In hospitals and restaurants, the frames should be covered with the same corrosive resistant metal as the door sections, and left smooth, without trim. Where decorative effect is desired, trim can be applied to suit. Section cut shows three treatments of the opening frame. Types A and E without trim are recommended, with or without Monel, or other metal covering, depending on the use of the dumbwaiter. Types B and C show application of wood trim, and Type D of metal trim.

Optional—Electric contact to prevent operation of electric dumbwaiter if a landing door is open. Automatic door lock to prevent opening the door unless the car is at the landing. Self-closing attachment operated by fusible link.

McLauthlin equibalanced dumbwaiter door units are shipped completely assembled, ready to set in place, and fasten at the floors. *This should be done before the hoistway walls are built.* Installation is simple and can be done rapidly by competent mechanic. After the hoistway walls are completed the door units must be throughly cleaned and the guides oiled. The ball-bearing sheaves are held in protective frames and are grease packed before shipment.

STANDARD SIZES OF McLAUTHLIN "EQUIBALANCED" DOORS

For Electric Dumbwaiters			For Sedgwick Hand Dumbwaiters		
Door No.	Jamb opening, in.	Clear height through open door, in.	Door No.	Jamb opening, in.	Clear height through open door, in.
1	21 x 36	32	6	21 x 52	48
2	25 x 36	32	7	25 x 52	48
3	29 x 42	38	8	29 x 52	48
4	33 x 42	38	9	33 x 52	48
5	35 x 42	38	10	35 x 52	48

Other sizes are supplied as wanted.

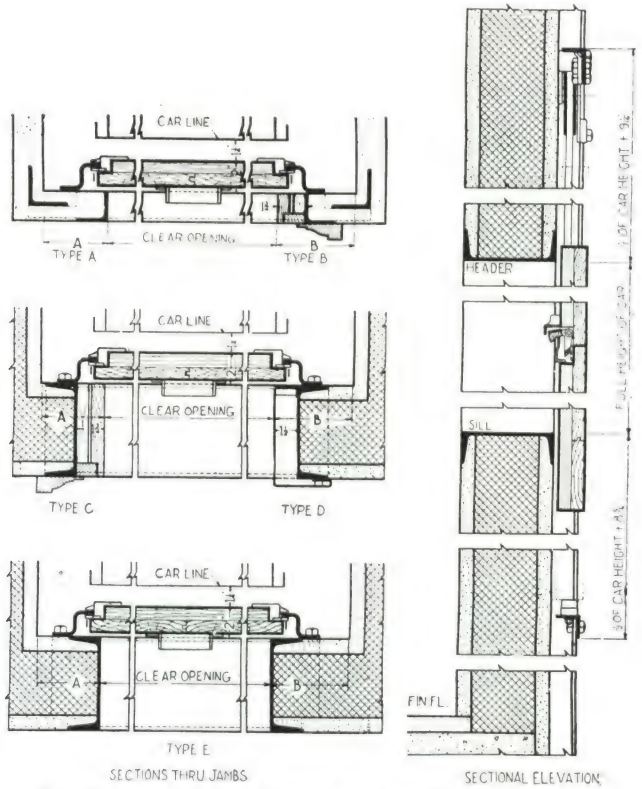
For electric dumbwaiters, sill should be 30 in. above the finished floor, door opening 2 in. higher than the clear height of the car, and the width of the opening the clear inside width of the car.

For hand dumbwaiters, sill should be 30 in. above the finished floor, door opening 4 ft. high to permit convenient pull of hand rope, and the width of the opening the clear width of the car.

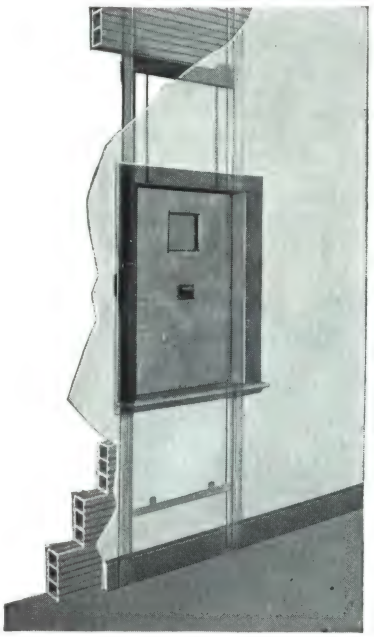
In all cases one door should be 4 in. higher and 2 in. wider than the clear inside size of the car to allow installing the car in the shaftway.

Data Required for Quotation

(1) Number of door units and clear opening size.
(2) Position of larger door if wanted.
(3) Floor to floor heights.
(4) Material of door covering—galvanized iron, furniture steel, copper, Monel or Allegheny, polished or plain, etc.
(5) Are doors to be painted after erection.
(6) Construction of shaftway, terra cotta, wire lath, brick, etc.; thickness of finished wall.
(7) Accessories wanted: vision panel, electric contacts, car operated mechanical door locks, fusible link attachment.



Equibalanced Dumbwaiter Doors Showing Clearance Dimensions Required



Phantom View of Equibalanced Door Showing Unit and Door Frame in Place

ESTABLISHED 1903

F. S. PAYNE CO.

Dumbwaiter Manufacturers

CAMBRIDGE, MASS.

BRANCH OFFICES

FRANKLIN, MASS. BOSTON, MASS. LOWELL, MASS. NEW HAVEN, CONN. PROVIDENCE, R. I. NEWARK, N. J.

Product

PAYNE ELECTRIC DUMBWAITERS.

For Payne Passenger and Freight Elevators, see list of manufacturers.

PAYNE

TRADE-MARK

Payne Electric Dumbwaiter Construction

The Payne electric machine represents the very latest in dumbwaiter machine construction, several distinctive features of which are new in the dumbwaiter field.

(1) Its design is such that it may be easily assembled for duty either as a *drum winding* or *traction machine*.

(2) By the use of universally mounted motors and brake magnets, the machine may be readily modified for either alternating or direct current service.

(3) The location of motor and brake combines to give a very compact unit.

Capacity and Speed

Payne electric dumbwaiter machines are constructed in various sizes with a wide range of capacities and speeds which will meet nearly every conceivable requirement.

Control Systems for Payne Electric Dumbwaiters

The following standard control systems for Payne electric dumbwaiters will be found to meet the usual requirements. Special forms of control furnished where required.

System "A," Hand Rope Control—Starting, stopping and reversing of machine controlled by means of hand rope in hatchway near landing doors.

System "B," Two-landing Push Button Control—***("B-1") "Call" and "Send" at Each Landing***—A two-button station at each landing marked "up" and "down." Momentary pressure of either the "up" or "down" button will send the car in corresponding direction.

("B-2") Single Button Control—A single button station at each landing, both being either "call" or "send."

System "C," Three-landing Push Button Control—***("C-1") "Call" and "Send" at Each Landing***—A three-button station at each landing marked "1—2—3" giving full selective control without a floor stop device.

("C-2") Call and Car Control—A gang of sending buttons marked "1—2—3—Stop" is located in car while calling buttons only are at landings. Momentary pressure of sending button pre-sets control and car will proceed to selected floor as soon as landing door is closed.

System "D," Semiselective Push Button Control—A three-button station marked "up," "down," "stop" is provided at each landing. Momentary pressure of either "up" or "down" button will send car in corresponding direction and it will continue to either terminal unless stopped at an intermediate landing. Landing doors should be provided with glass windows to permit seeing car as it approaches an intermediate landing.

System "E," Full Selective Push Button Control—***("E-1") Multistation Control***—A control station is provided at each landing with a button for each floor served by the car, thus allowing complete control from any landing.

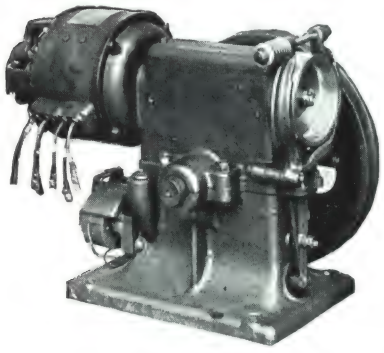
("E-2") Call and Car Control—A gang of sending buttons marked to correspond with the floors served by the car is located in the car. Calling buttons only are at landings. Momentary pressure of sending button pre-sets control and car will proceed to selected floor as soon as landing door is closed.

System "F," Single Station Full Selective Push Button Control—A gang of buttons marked to correspond to floors served by car is located at one floor, giving complete control of car from this floor. Single button stations only are provided at other floors for returning car to controlling station.

System "G," Single Station Full Selective Push Button Control with Call and Return—A gang of buttons marked to correspond to the floors served by the car is located at one floor, giving complete control of car from this floor. A two-button station is located at all of the other floors, permitting car to be called to different floors and then returned to controlling station.

References

Childs Company
Federal Reserve Bank of Boston
First National Bank of Boston
Seth Thomas Clock Company
Vermont Marble Company
Cleveland Public Library
Providence Biltmore Hotel
Sterling Memorial Library, Yale University
Harvard University
Dartmouth College
Massachusetts Institute of Technology
Ritz Carlton Hotel
Numerous hospitals and restaurants.

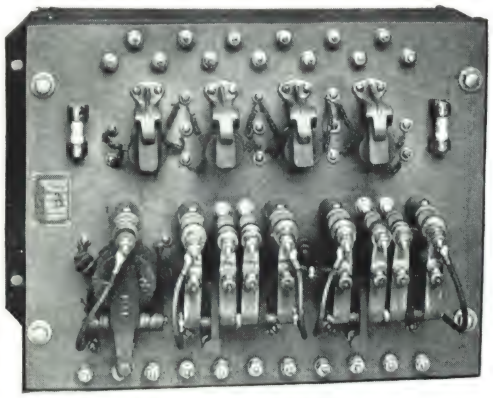


Traction Machine

Drum Winding Machine

Payne Electric Dumbwaiter Machine

Furnished for 115 and 230 volts d-c. and for 220, 440 and 550 volts, 2- or 3-phase, 60-cycle a-c. as standard units. Special machines made for 500 volts d-c. and 25 or 40 cycles a-c.

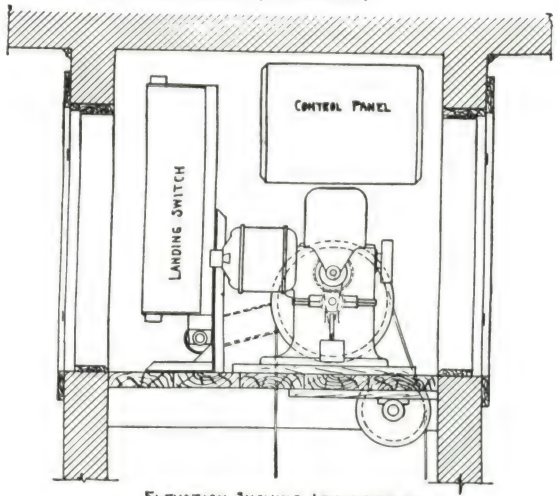


Bulletin 505 D.C. Control Panel
With relays for push button operation

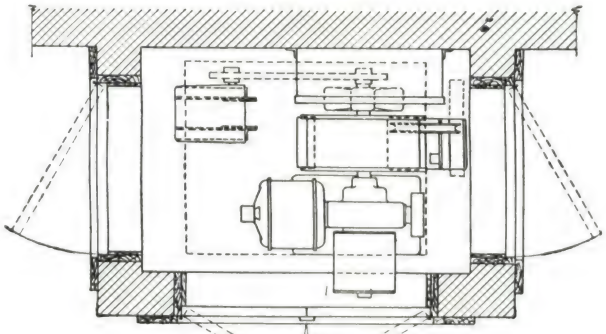
Continued on next page

Information Required for Estimates

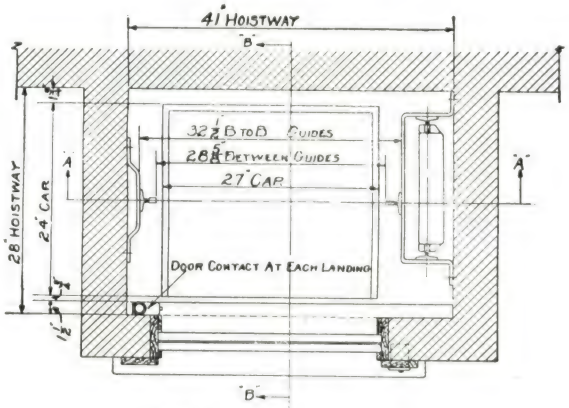
Location of building.
Type of machine, whether drum or traction.
Live load capacity; car speed per minute; car travel.
Outside dimensions of car; whether side or corner post, wood or metal; number of shelves and whether stationary, removable or hinged; whether single face or double face.
Give current characteristics (whether A. C. or D. C.), also phase, cycles and voltage.
Type of control system desired (specify by symbol).
How gang switches are to be marked.
Number of landings and landing doors.
Style of door, whether swinging or vertical slide.
Location of machine, whether directly overhead, in basement, on shelf on top floor or intermediate floor.
Kind of guides, whether steel or wood.
Number of door locks (if desired).



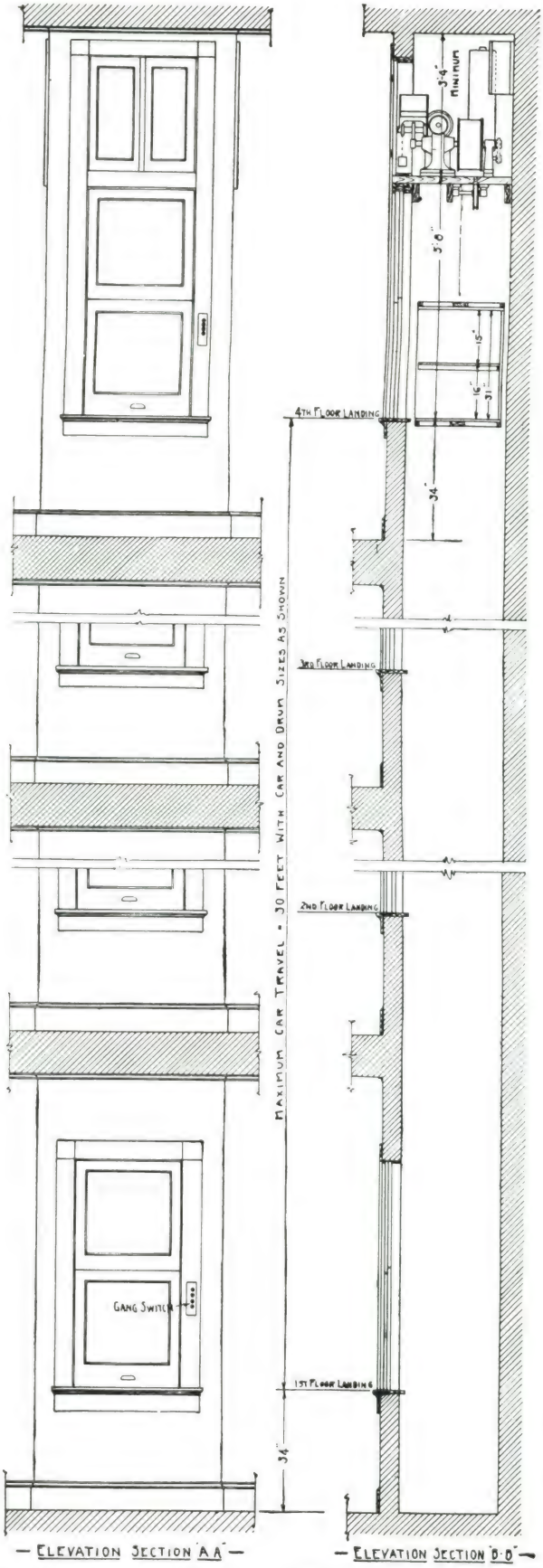
— ELEVATION SHOWING ARRANGEMENT — OF MACHINE ROOM —



— PLAN SHOWING ARRANGEMENT — OF MACHINE ROOM —



— PLAN OF HOISTWAY —



— ELEVATION SECTION A-A — — ELEVATION SECTION B-B —

Note: Layout as shown is for four landings. Arrangement and dimensions can be modified to meet other conditions.

Payne Dumbwaiter Machine Layout with Full Automatic Push Button Control

THE TELEVATOR CORP.

TELEPHONES
CHELSEA 5290, 5291, 5292

269 West 23rd Street
NEW YORK, N. Y.

For The Televeyor—The Portable Electric Tray Conveyor, see Manufacturers' Index

THE TELEVATOR—A COMPLETE, SELF-CONTAINED, ELECTRIC, PUSH BUTTON DUMBWAITER

Televators are complete electric, push button dumbwaiters entirely self-contained in portable telescopic steel cabinets, combining in a single unit the electrical and mechanical equipment and the enclosure, *delivered ready for service.*

Where Used

Televators in three standard models are designed for use in residences, hotels, duplex apartments, restaurants, bakeries, cafeterias, factories, stores, soda fountains, hospitals, industrial establishments, and wherever food or merchandise is to be carried between two connecting floors.

Advantages of Televators

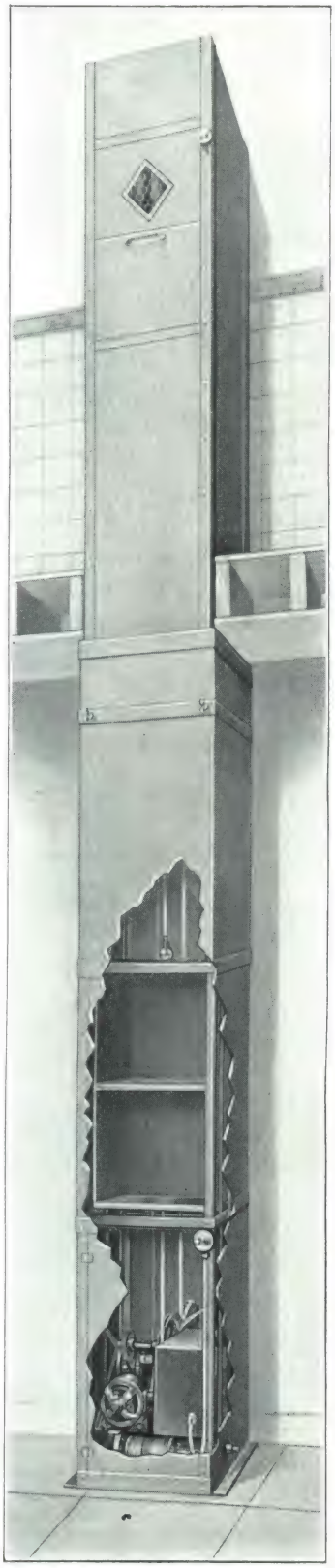
Televators are manufactured on a straight line factory assembly and standardized production basis—something that has never been accomplished before in this field, as the manufacturing and assembling of the material and its installation have been two entirely separate operations performed at widely separated points and by two entirely different groups of mechanics.

No Installation—In Televators the electrical and mechanical equipment is mounted complete in each unit, subjected to a rigid factory test before shipment and is ready for service immediately upon delivery. Not only is the cost of installation on the job eliminated—which cost comprises anywhere from 40% to 60% of the total—but the equipment is not subject to the vagaries of outside and possibly unsupervised mechanical skill.

No Construction—The only preparation necessary for the installation of a standard model Televator is to cut an opening, or hatchway, through one floor; beyond this there is no construction work and no skilled mechanics are required.

Portability—An especially desirable feature is the portability of Televators. They are not an integral part of the building and can be removed as furniture or office fixtures might be, and re-installed elsewhere without difficulty. This feature also establishes a resale value, which is out of the question where a shaft, or enclosure, has been constructed as part of the building.

Can Be Placed in Service by Any Handy Man—With the well-opening, or hatchway, previously prepared, a Televator can be placed in operation by any handy man in less than one hour. It is only necessary to raise the interior telescopic section to the upper floor by means of an easily operated detachable lever. When raised to the proper level the two sections are securely bolted together with specially designed toggle bolts, and the tension on the raising device and cables is released. The electric attachment is then plugged into any convenience outlet, in Models A and A/B, and into a motor circuit in Models B and C, and the equipment is ready for service.



General Description

Televators consist of a rigid telescopic steel cabinet in two sections, the upper section telescoping within the lower section. In this cabinet is contained and set and ready for operation a complete power unit, including control panel, a steel car, telescopic steel guides, steel cables, cast iron counterweight and all the other necessary miscellaneous equipment. At the base are fitted four ball bearing pivot castors, making it an easy matter to roll the Televator into position on the job.

Steel Cabinets—Cabinets are built of sheet steel with two openings for access to the car and one opening for access to the mechanical and electrical equipment, all of which is mounted at the base of the cabinet easily accessible for purposes of lubrication. The access openings are fitted with ball bearing counterbalanced sliding doors having electrically operated contacts so arranged that when either door is open the circuit is broken and the car stops instantly. As the car cannot move unless both doors are closed, it will be noted that absolute safety is assured.

Each door has a glass insert through which the car can be seen as it reaches the landing, and at each landing a two-button station is located.

Standard Models

Model A-24, 25 or 50-lb. Capacity*

Floor opening (to be previously prepared) 2 x 2 ft.
Steel enclosure..2 x 2 ft. outside dimensions.
Steel car.....1 ft. 8 in. wide, 1 ft. 6 in. deep and 3 ft. high.

Model A/B-27, 50 or 100-lb. Capacity*

Floor opening (to be previously prepared) 2 x 2 ft. 3 in.
Steel enclosure..2 x 2 ft. 3 in. outside dimensions.
Steel car .....1 ft. 8 in. wide, 1 ft. 8 in. deep and 3 ft. high.

Model B-30, 150 or 250-lb. Capacity*

Floor opening (to be previously prepared) 2 ft. 6 in. x 2 ft. 6 in.
Steel enclosure..2 ft. 6 in. x 2 ft. 6 in. outside dimensions.
Steel car.....2 ft. wide, 2 ft. deep and 3 ft. high.

Model C-36, 300 or 500-lb. Capacity*

Floor opening (to be previously prepared) 3x3 ft.
Steel enclosure.3x3 ft. outside dimensions.
Steel car .....2 ft. 6 in. wide, 2 ft. 6 in. deep and 3 ft. high.

**Note:* Standard models are motored and geared to deliver a car speed of 100 ft. per minute for the lighter capacity specified for each model, and 60 ft. per minute for the heavier capacity specified for each model.

Special sizes and capacities if desired.

Continued on next page

Finish—Televators in all standard models are finished with battleship gray machinery enamel, which for ordinary installations will be found entirely serviceable and attractive. If, however, certain wall conditions or fixtures have to be matched, or the equipment made to harmonize with special interior decorations, the straight steel Televator structure will serve as an excellent base for any type of decorative treatment or construction that may be necessary.

Information Required for Estimates for Televators—

(1) Whether alternating or direct current is to be used also phase, cycles and voltage.

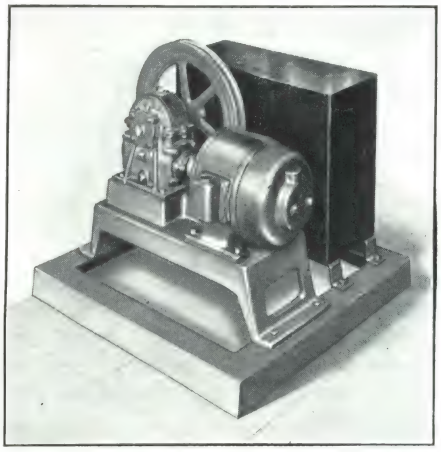
(2) Ceiling height on both floors.

(3) Dimensions between finished ceiling of the lower floor and finished floor of the upper floor—or, in other words, depth of floor beams with thickness of finished ceiling and finished floor added.

Televator Specifications

Furnish and install where shown on plans a Model .... Televator manufactured by The Televator Corp., 269 West 23rd Street, New York, N. Y. Installation shall be complete with Televator Steel Cabinet Enclosure and shall be in accordance with manufacturer's directions.

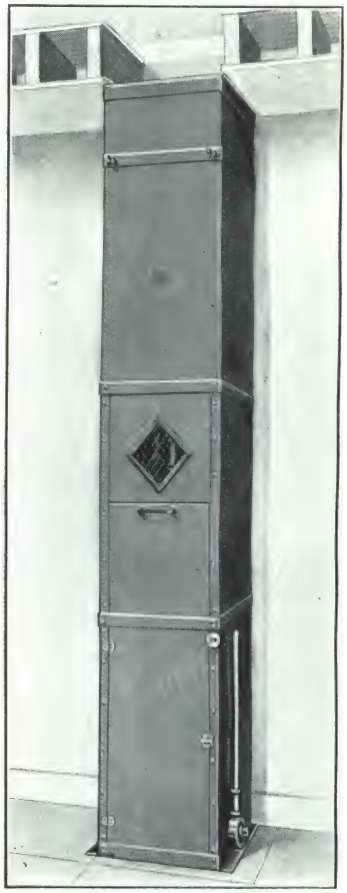
Note: Provision should be made in electrical contract for convenient power attachment.



Left:

Televator Power Unit Consisting of a Motor, Reduction Gears and Control Panel All Enclosed and Protected from Dust and Dirt,, and Mounted at the Base of the Cabinet

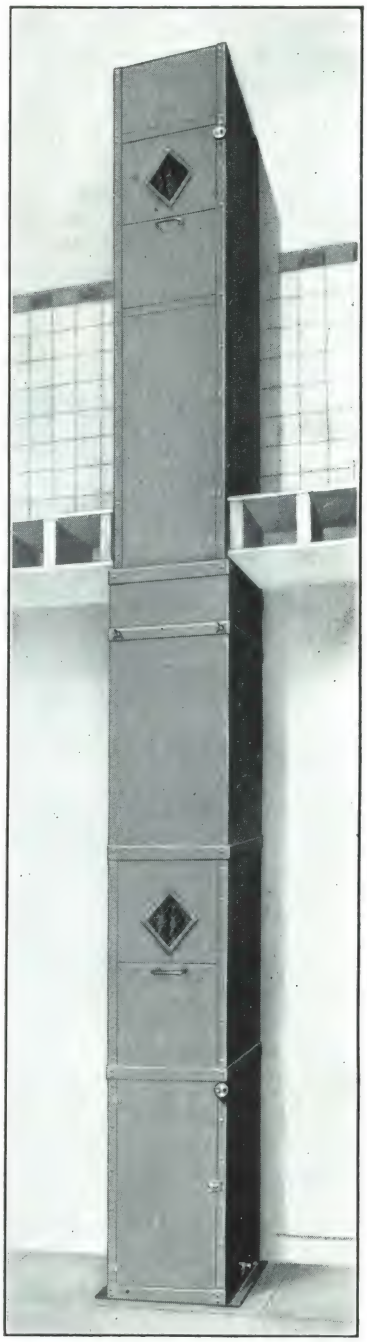
Entire unit comes set and ready for operation by simply plugging into any convenient source of power



Televator Cabinet as Delivered Completely Telescoped, Ready to Be Extended to the Upper Floor

Televator in Process of Being Extended to the Upper Floor

This is done by means of a removable manually operated, detachable ratchet lever furnished as standard equipment



Televator Completely Extended and Ready for Operation

With the well opening previously prepared, the Televator can be placed in operation in less than an hour after delivery.

Note: No highly specialized or skilled labor is necessary at any stage of the installation—any handy man can do the entire work

SECURITY FIRE DOOR CO.

Counterbalanced Dumbwaiter Doors

3036-3048 Lambdin Avenue, ST. LOUIS, MO.
REPRESENTATIVES IN ALL PRINCIPAL CITIES

For our Truckable and Other Fireproof Freight Elevator Doors, see Manufacturers' Index

Dumbwaiter Doors

"Seco" dumbwaiter doors are made with steel plate, metal clad, or kalamein panels securely fastened into angle frames, slide easily in steel guides and are hung on flat link steel cable chain operating over double race ball bearing sheaves. They require no counterweights, each section being equally balanced insuring absolute ease of operation. We suggest the use of steel plate panels wherever possible.

These dumbwaiter doors are extremely light and of very simple construction and take up very little space in the shaft. They have proven their greater practicability over swinging doors or one-piece vertically sliding dumbwaiter doors that are counterweighted because of the saving in floor space, time in opening and closing and because of their greater economy in upkeep and erection. There are no parts to get out of order and permanency is assured due to the construction and the method of installation.

"Seco" Steel Plate Dumbwaiter Door with Glass Vision Panel Showing Flush Steel Trim

This construction and excellent appearance make them especially adaptable for use in department stores, hotels, hospitals, restaurants and factories.

We recommend the use of Monel Metal doors for restaurants and hospitals.

"Seco" dumbwaiter doors are made in standard sizes and for special size openings where required. They are furnished with and without glass vision panels. Vision panels have a 6-in. light of clear wire glass and are only furnished when specified.

These dumbwaiter doors are usually furnished f.o.b. destination, and are made with angle frames ready to be anchored into the brick, concrete, tile or plaster wall forming the dumbwaiter shaft and can easily be set by the general contractor's mechanic.

Room side trim is not furnished by the SECURITY FIRE DOOR CO., unless specified. However, should trim be desired, we would recommend that flush trim be specified, such as is shown on the detail.

The interlocks and special latch devices for dumbwaiter doors are usually furnished and installed by the contractor for the dumbwaiter.

Suggested Specifications—For all dumbwaiter door openings shown on the plans and as noted, furnish "Seco" Dumbwaiter Doors as manufactured by the SECURITY FIRE DOOR CO., 3036 Lambdin Avenue, St. Louis, Mo.

The doors shall have sheet steel panels (or metal clad panels). These steel panels to be securely riveted into angle frames and to have the necessary steel guides, ball bearing sheaves, flat link cable chains and other hardware. Doors to be attached to angle frames for setting into the masonry wall. Doors and parts to receive a priming coat of paint at the factory.

Dumbwaiter doors to be guaranteed by the manufacturer against defects in workmanship and material for a period of two years.

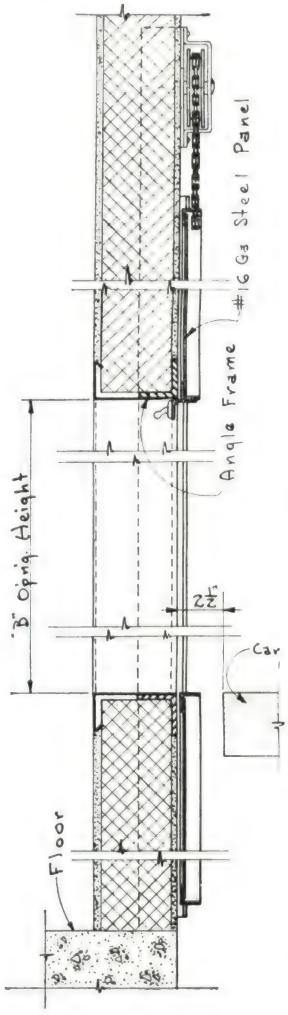
(A) Upper section of door to be provided with a 6-in. glass vision panel, having ¼-in. clear wire glass (if desired).

(B) Dumbwaiter door frames are to be provided with flush trim for room side of opening.

(Note: This trim is only furnished when specified and is used in connection with tile, concrete or other plastered walls.)

(C) Furnish—channel frames for the dumbwaiter openings. (Channel frames can be furnished for the openings in place of angle frames when required, in which case, angle extensions are provided for fastening to floor.)

Note: Locking devices and interlocks, as well as cams for locking devices are usually furnished by the dumbwaiter manufacturer.

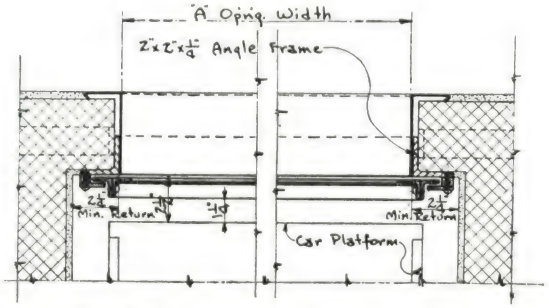


Section Showing Door in Open Position

STANDARD SIZES

Type	"A"	"B"	"C"	"D"
D-1	2′ 0″	3′ 0″	2′ 2″	8′ 2″
D-2	2′ 6″	3′ 6″	2′ 5″	8′ 11″
D-3	3′ 0″	4′ 0″	2′ 8″	9′ 8″

Note: Metal clad or kalamein dumbwaiter doors require 3 in. of space from car to wall.



Plan Showing Angle Frames with Flush Trim for Tile or Plastered Walls

Trim furnished only when specified

THE CAPITAL LIFT & MANUFACTURING CO.

Manufacturers of Electric and Hand Operated Ash Handling Equipment

Town and Lucas Streets
COLUMBUS, OHIO

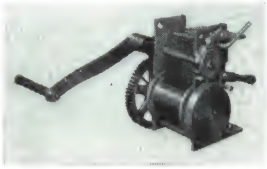
For our pages on Elevators and Dumbwaiters, see Manufacturers' Index

Model 18 Disappearing Folding Mast Can Lift (Hand Crank Operated)

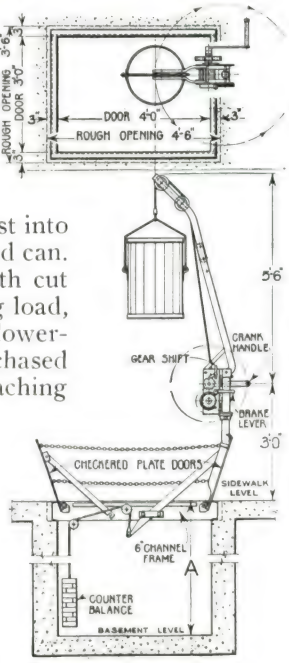
Built as part of a flush type sidewalk door, with hoist, frame and door shipped assembled, ready to cement in place. All erection expense is thus virtually eliminated.

The operator opens the balanced doors, unfolds the mast into place and readily raises the filled can.

Winch—Ball bearings with cut gears. Has ratchet for holding load, and gear shift with brake for lowering empties. It may be purchased separate from the lift for attaching to a column, wall, etc.



Hand Operated Ball Bearing Winch



Plan and Side Views, Model 18

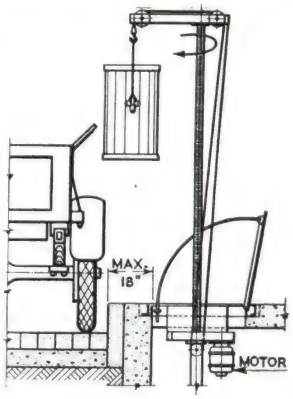
Model 19 Disappearing Screw Mast Can Lift (Electrically Operated)

This model is an inexpensive power driven outfit for the limited amount of ashes from schools, stores, apartments, hospitals, etc., for delivery from basement up through sidewalk door to truck. Its ⅓ hp. motor operates from a light or power circuit. Lifts a filled can of about 165 lb. at approximately 35 ft. per minute. Fits basements 7 to 17 ft. deep. From grade level to bucket hook, 7 ft.

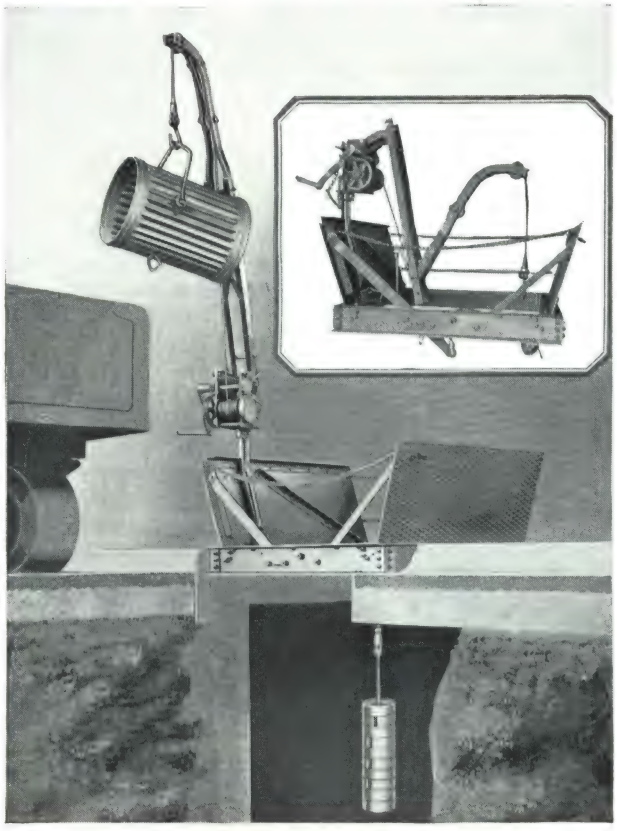
Its screw mast travels through the hub of a motor driven gear, as the bucket raises and lowers. Thus, by arrangement of ropes, the bucket is raised from basement to truck while the screw travels above grade level.

Operation—Open sidewalk door; use "Up" and "Down" switch placed there for full control of lift. Automatic switches fix limits of travel.

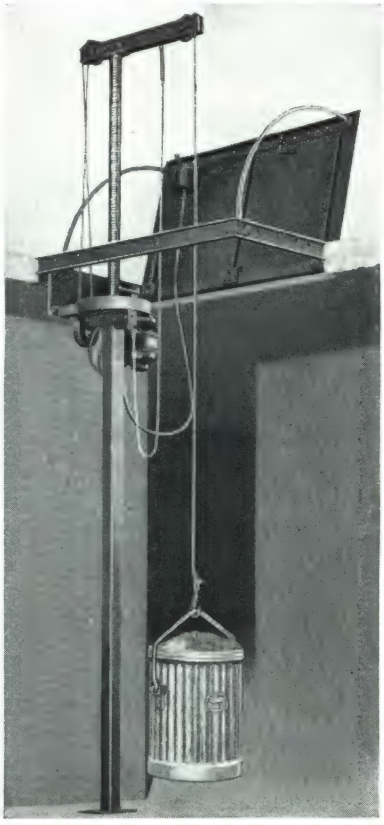
Ordering—In making inquiry, give basement depth "A" and electric current available.



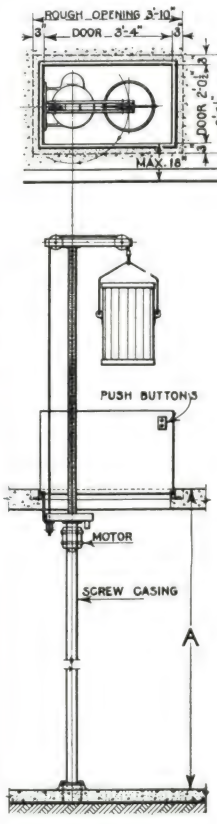
Cans Readily Swing to Trucks



Model 18 Disappearing Folding Mast Can Lift



Disappearing Screw Mast Can Lift



Details, Model 19

ESTABLISHED 1889 INCORPORATED 1917

BECKWITH ELEVATOR CO., INC.

TELEPHONE
LIBERTY 8333
113 Albany Street, BOSTON, MASS.
CHICAGO, ILL., L. G. TINGWALL CO., 349 West Randolph Street PHILADELPHIA, PA., SECURITY ELEVATOR CO., 901 Callowhill Street
SAN FRANCISCO, CALIF., PRICE BUILDING SPECIALTIES CO., 683 Howard Street

For our pages on Dumbwaiters and Elevators, see Manufacturers' Index

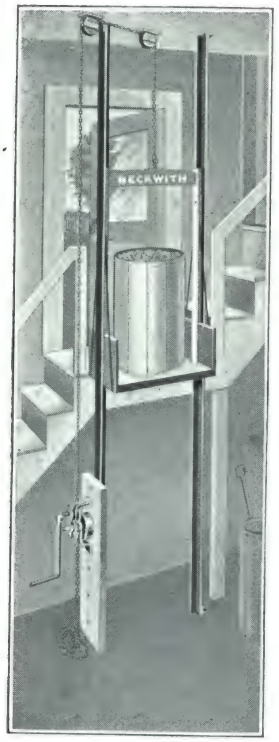
Beckwith Platform Type Ash Hoists—Hand-power, Hydraulic and Electric

Outfit furnished complete ready to erect or installed by us

Hand Power Ash Lift or Fuel Lift A4

Hand power ash lift or fuel lift, used to raise barrels from cellar or boiler room to a door opening or platform of higher level. A simple and reliable outfit easy to install and operate. Operates by crank-turned, two-speed hoist machine, fastened in any convenient place where a direct lead for chain may be obtained. Machine is equipped with automatic brake to insure absolute safety. Car well constructed and braced. Steel guide rails.

This outfit may be used for many purposes with different types and sizes of cars to suit various conditions. Space required for car and guides will be 7 in. wider than car, and 3 in. larger front to back. Machine crank, which is removable, projects out 21 in. beyond guide rail. Make pit 6 in. deep for car to land flush.



Hand Power Ash Lift or Fuel Lift A4

STANDARD A4 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.
1	4	300
2	9	500
3	16	1000

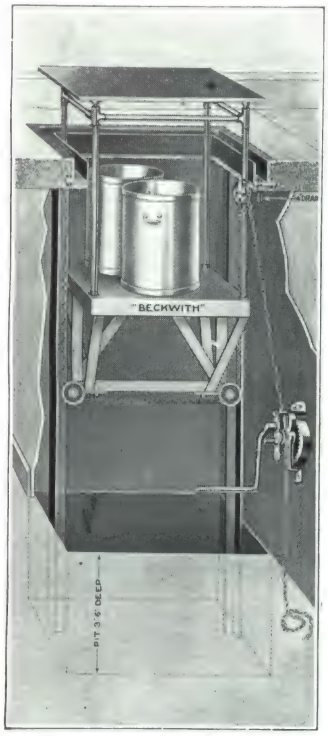
Hand Power Sidewalk Elevator A3

Hand power ash lift, operated by turning crank of machine which raises car by chain (2:1) hitch under car and through pulleys. Machine, which can be located at either side, has two speeds and automatic brake, thereby eliminating accidents. Car strongly constructed of hardwood and well braced. Long guide shoes insure smooth riding. Outfit requires a pit at least 3 ft. 6 in. deep, preferably 4 ft. deep. Clear shaft and opening should be 8 in. wider than car and 3 in. larger front to back. Outfit may be had with bow iron on car to open hinged covers or with pipe standards to lift cover as shown. Watertight steel cover and frame may be had as extra equipment.

STANDARD A3 OUTFITS

Outfit No.	Platform area, sq. ft.	*Capacity, lb.
1	9	500
2	16	1000
3	25	1500

*Exclusive of weight of sidewalk cover.



Hand Power Sidewalk Elevator A3

Hand Power Sidewalk Elevator, Types A6 and A5

Indirect Lift Type A6—Hand power, indirect lift, drum type sidewalk elevator.

Used where space for machine at side of platform is not available.

Operates by double geared machine located at front or back of platform at either side.

Sprockets and chain drive the drum shaft.

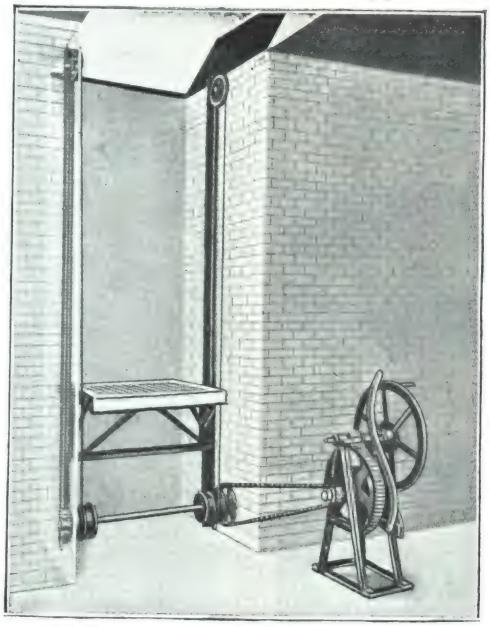
Band brake and lever control assure safety. Brakes may be locked when desired.

Platform of wood and steel construction is suspended by two steel ropes which wind on cast iron drums.

STANDARD A6 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.
1	9	750
2	16	750

Note: For heavier loads or larger cars see following page.



Hand Power Sidewalk Elevator, Indirect Lift Type A6

Long heavy guide shoes insure smooth, easy riding.

Ramp 15 in. above floor is necessary if pit is not used.

Can be equipped with bow iron or pipe standards on car for raising sidewalk cover.

Distance between walls 14 in. more than width of car, and 3 in. larger front to back.

Direct Lift Type A5—This outfit is similar to the A6 hand power, sidewalk elevator, indirect type, except that the machine is located at either side of platform, to give direct lift, instead of back or front of platform, as illustrated.

STANDARD A5 OUTFITS

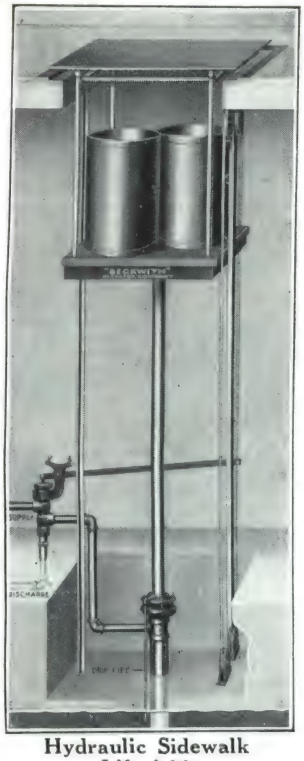
Outfit No.	Platform area, sq. ft.	Capacity, lb.
1	9	750
2	16	750

Note: For heavier loads or larger cars see following page.

Continued on next page

Hydraulic Sidewalk Lift A11

Hydraulic ash lift of direct plunger type made for any capacity or size. Recommended where travel of car does not exceed 20 ft. Operates on any sustained water pressure of 40 lb. per sq. in. and 1-in. supply or over, to suit load and speed. Reliable and satisfactory. Controlled by cable or handle. Stops automatically at top and bottom. Valve can be located at either side of shaft. Supply and discharge connections should be brought to operating valve. Requirements: pit, 3 ft. deep; shaft 10 in. wider and 4 in. larger, front to back, than car. Do not cement bottom of pit until plunger casing hole is dug and casing set. Cover may be either lift-up type (as shown) or hinged, with bow on car to open hinged cover. State type cover desired, as capacity allowance is made for lifting cover.



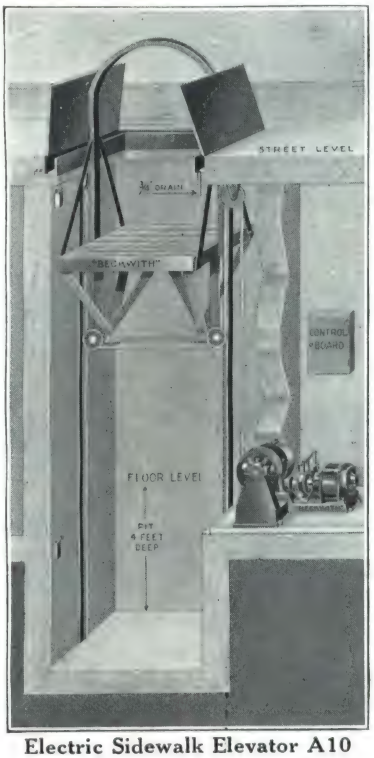
Hydraulic Sidewalk Lift A11

STANDARD A11 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.	Speed, ft. per min.
1	9	500	30 to 50
2	16	1000	30 to 50
3	25	1500	30 to 50

Electric Sidewalk Elevator A10

Standard electric motor type, push button control. Capacity up to 2000 lb. with platform any size. Car operates by rope (2:1) hitch underneath car. Stops automatically at top and bottom. Standard worm gear, electric brake, drum type machine, with high grade motor, is located at either side or back of shaft. Platform equipped with bow iron (illustrated) for opening hinge type sidewalk covers. Pipe standards furnished to raise cover vertically if required by State regulations. Standard machined steel tee-rails. Requirements: pit 4 ft. deep; opening and shafts to be 10 in. wider and 4 in. larger (front to back) than car; wall slot for rope; machinery space 4 ft. long, 2 ft. 6 in. wide, 2 ft. 6 in. high. State type cover desired as capacity allowance is made for raising cover. One control button box, (up-down-stop) is usually placed on car, and another in basement.



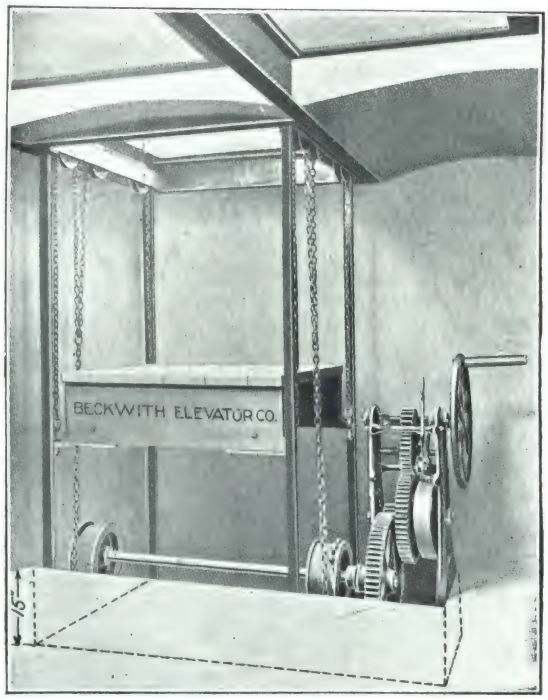
Electric Sidewalk Elevator A10

STANDARD A10 OUTFITS

Outfit No.	Platform area, sq. ft.	Capacity, lb.	Speed, ft. per min.
1	9	500	30
2	16	1000	30
3	25	1500	30

Hand Power, Heavy Duty, Sidewalk Elevator A7

Hand-power, drum type, platform ash lift for heavy loads and large cars. Geared machine of heavy duty, roller bearing, band brake type, wheel or crank operated, and placed either side of car. Platform, with heavy guide shoes, is supported by lift chain fastened to four corners of car. Allow 24 in. beyond edge of car for machine space. Provide pit 24 in. deep. Car can be arranged to open cover at sidewalk. Clearance for car, cover and frame furnished to suit car sizes.



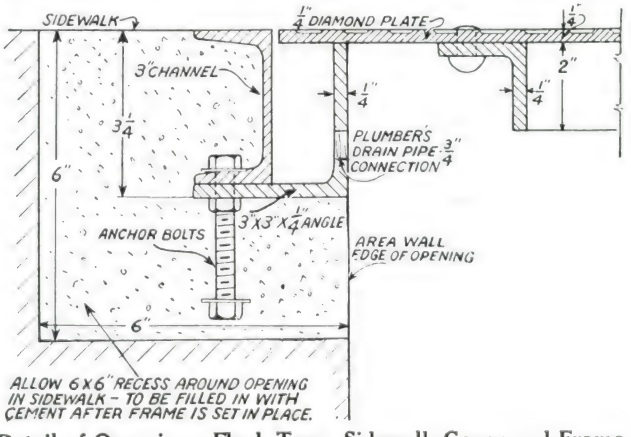
Hand Power, Heavy Duty, Sidewalk Elevator A7

Sidewalk Cover and Frame

One-piece flush type steel sidewalk elevator cover and frame of watertight construction. Cover—made of checkered steel plate, ¼ in. thick, reinforced throughout to support a live load of 300 lb. per sq. ft.—may be the one-piece lift-up type, or the two-piece hinged type. Frame made of steel channel and angle, with corners welded, forming a gutter to catch water. Plumbers' drain pipe connection is provided for carrying off water. Anchor bolts secure frame in concrete. Made any size.

Note: Capacities of car do not include weight of cover to be opened or lifted. Unless specified, allowance for weight of cover if it is to be operated by car must be made when figuring machine capacity.

Note: Hinged covers at sidewalk opened by the ascending car are not acceptable in some cities and states, as they may prove an accident hazard. Vertical lifting one-piece covers are, so far as we know, acceptable anywhere.



Detail of One-piece, Flush Type, Sidewalk Cover and Frame

FRANK ELIAN & CO.

Hoistwell Ash Lift Manufacturers

36-39 23rd Street, LONG ISLAND CITY, N. Y.

Products

HOISTWELL ASH LIFTS—hydraulic, pneumatic, electric, and hand power (from basement to sidewalk level or direct to truck).

SIDEWALK DOORS—any size or type—with or without Hoistwell automatic opening and closing device, integral guard gates, and warning gong.

ASH CANS and ASH CAN TRUCKS, IRON LADDERS.

Telescopic Hoistwell Ash Lift, Hydraulic

A simple, strongly made automatic lift operated by water at a pressure of 30 lb. and up; water connection taken from house main or roof tank. Also operated by compressed air, from your plant. The operating cost of water is very low—to raise 15 cans of ashes 15 ft. costs 1c, according to the New York City rate—10 cu. ft. per cent. The upkeep is negligible.

Small space is required for installation; the lift is attached to the basement wall or to the floor and ceiling.

Hoistwell is the only lift we know of that uses solely the intake of water for the hoisting operation and the discharge of water for lowering any load by gravity with absolute control, at any desired speed, by means of the operating valve. The cylinder is thus automatically drained and freezing absolutely prevented.

Model A—Operated by a 3-way valve, with all movements regulated by fixed controls for use independent of a sidewalk door opening device. The first piston stroke automatically raises and locks crane in position above the sidewalk; lifting of cans then proceeds; at the completion of work, the crane descends to the basement and drains off all water.

Model B—Similar to Model A with the exception of a hand operated gearing in the basement that automatically raises the crane, rings the signal gong, opens the sidewalk doors and locks the crane in the lifting position. Cans are lifted by hydraulic power as in Model A.

Door opening and closing device is shown under Models B, C, D, E.

Specification—Models A and B—*Ash Hoist*—Furnish and install in the ash hoist area one Telescopic Hoistwell Ash Lift Model (specifying A or B) hydraulic, including operating valve, ready for pipe connections (pipe connections to be included in plumber's contract). The lift is to have a brass cylinder, cast iron heads, monel metal piston rod, and 3-way brass operating valve. The capacity of lift—250 lb., with a speed of 35 to 75 ft. per minute, according to the water pressure.

Sidewalk Doors—Furnish and install over the ash hoist area, one pair of flush type $\frac{3}{16}$-in. checkered steel plate, waterproof sidewalk doors, 4x4 ft., mounted in 4-in. channel iron frame (welded corners) with condensation gutter tapped for plumber's drain pipe. The doors are to be equipped with the Hoistwell automatic opening and closing device, swinging safety guard gates, electric warning gong and sign, as required by the Department of Highways.

Iron Ladder—Furnish and install iron ladder in hoistway from basement to sidewalk level.

Ash Cans—Furnish (quantity) standard size, 17x24 in., black or galvanized plain, fixed- or swing-bail ash cans.

Ash Can Truck—Furnish one rubber-tired ash can truck.

Note: Water connection, additional to above, to be included in plumbing specifications, as follows:

Furnish and connect $1\frac{1}{4}$-in. galvanized iron supply and waste pipe lines from operating valve of Hoistwell ash lift to nearest house main or tank line and to nearest sewer pipe or sump; and install a $1\frac{1}{4}$-in. brass body gate valve in the supply line, at a convenient height above the operating valve.

Telescopic Hoistwell Ash Lift, Hand Power—Models C, C-1, and C-2

Model C hand power lift to be used with or without automatic sidewalk doors. A hand operated gearing in the basement automatically raises the crane, rings the signal gong, opens sidewalk doors, and locks the crane in position. The lifting mechanism with simple friction clutch and brake is mounted on the steel crane for operation from the sidewalk. The cranking handle does not revolve when the load hook is being lowered. The operation is practically noiseless. At completion of the work, lowering of crane automatically closes sidewalk doors.

Model C-1 is same as Model C, except hoisting head is equipped with shifting gear release instead of friction clutch.

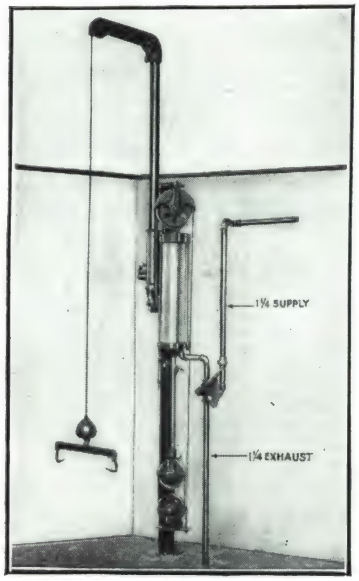
Model C-2 is same as Model C-1, except built with overhead crane for dumping ashes directly into truck.

Specification—Models C, C-1, and C-2—*Ash Hoist*—Furnish and install in the ash hoist area one Telescopic Hoistwell Ash Lift Model (specifying C, C-1, or C-2) hand power, with geared lifting mechanism mounted upon swiveling steel crane arm for operation from sidewalk. Also to have a geared crank for raising the crane post, which shall automatically open and close sidewalk doors, ring warning gong, and lock crane post in lifting position above the sidewalk.

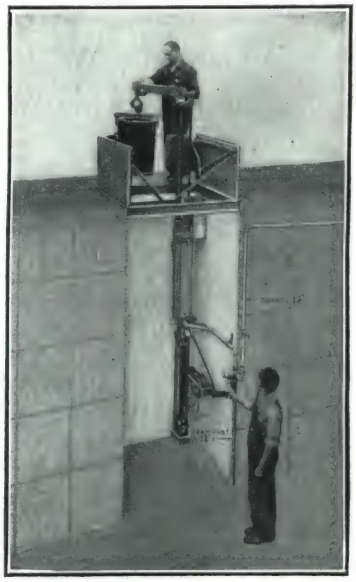
Sidewalk Doors—Furnish and install over the ash hoist area, one pair of flush type $\frac{3}{16}$-in. checkered steel plate, waterproof sidewalk doors, 4x4 ft., mounted in 4-in. channel iron frame (welded corners) with condensation gutter tapped for plumber's drain pipe. The doors are to be equipped with the Hoistwell automatic opening and closing device, swinging safety guard gates, electric warning gong and sign, as required by the Department of Highways.

Hoistwell Model C-2 Hand Power

With overhead crane for dumping ashes directly into truck

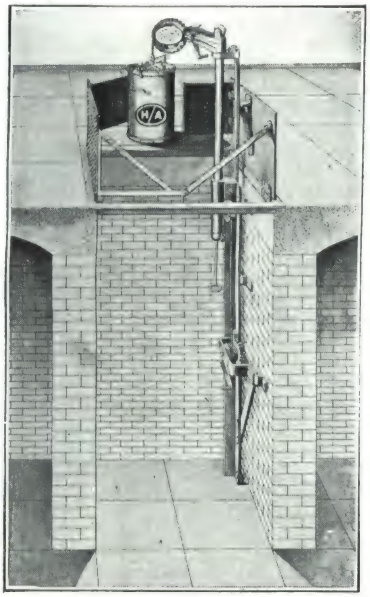


Hoistwell Model A, Hydraulic



Hoistwell Model B, Hydraulic

Models A-2 and B-2, hydraulic, are made with overhead crane for dumping directly into truck



Hoistwell Models C and C-1, Hand Power

Model C-2 for dumping directly into truck is illustrated above in center of page

Continued on next page

Iron Ladder—Furnish and install iron ladder in hoistway from basement to sidewalk level.

Ash Cans—Furnish (quantity) standard size, 17x24 in., black or galvanized plain, fixed- or swing-bail ash cans.

Ash Can Truck—Furnish one rubber-tired ash can truck.

Telescopic Hoistwell Ash Lift, Model D, Electric

This model is similar to Model B, except that electric power is used for hoisting operations. The crane head is raised by a few turns of a hand operated gear to hoisting position above sidewalk, automatically opening the sidewalk doors, ringing warning gong, and locking the crane in position ready for hoisting.

Hoisting operations then proceed by an electric motor conveniently located in basement, and controlled from either basement or sidewalk level. When hoisting is completed, the crane is released from its fixed position and its descent to basement automatically closes the sidewalk doors.

The capacity of this unit is 500 lb. at a speed of 50 ft. per minute.

Hoistwell Ash Lift Model E, Electric

Model E is similar to Model D in design, except that the motor is mounted on telescopic post; it is recommended where the hoistway area is limited in size.

This remarkably simple ash hoist can be furnished to operate on single, 2 or 3-phase alternating or direct current. The machine consists of a totally enclosed 1½ hp. G-E ball bearing motor, equipped with worm drive gear reduction in bath lubrication, magnetic brake, single speed controller and positive upper limit switch; it combines improved hoist elements in simplest possible construction to secure the greatest strength and reliability. The capacity of this unit is 300 lb., at a speed of 60 ft. per minute.

Note: Model E is operated from sidewalk level and can be furnished either with reversible controller for lowering electrically or by a gravity lowering mechanism.

Specification—Models D and E—*Ash Hoist*—Furnish and install in the ash hoist area one Telescopic Hoistwell Ash Lift Model D, electric, 500-lb. capacity, complete with 1½ hp. G-E ball bearing motor with magnetic brake and worm drive gear reduction, hoisting speed 50 ft. per minute.

Sidewalk Doors—Furnish and install over the ash hoist area, one pair of flush type ⅜-in. checkered steel plate, waterproof sidewalk doors, 4x4 ft., mounted in 4-in. channel iron frame (welded corners) with condensation gutter tapped for plumber's drain pipe. The doors are to be equipped with the Hoistwell automatic opening and closing device, swinging safety guard gates, electric warning gong and sign, as required by the department of highways.

Iron Ladder—Furnish and install iron ladder in hoistway from basement to sidewalk level.

Ash Cans—Furnish (quantity) standard size, 17x24 in., black or galvanized plain, fixed- or swing-bail ash cans.

Ash Can Truck—Furnish one rubber-tired ash can truck.

Completely Built in Our Own Shops

"Hoistwell" ash lifts are completely built in our own shops; we guarantee all equipment to be free from mechanical defects. Lifts built to suit every requirement.

Inquiries

When making inquiries kindly furnish correct information as to:

(1) Height between the two hoisting levels.
(2) Size of opening. (A rough sketch if possible.)
(3) Kind of power to be used.
(4) If pneumatic or hydraulic, pressure available.
(5) If electric, whether direct or alternating current; phase and voltage.

Sidewalk Door Opening and Closing Device

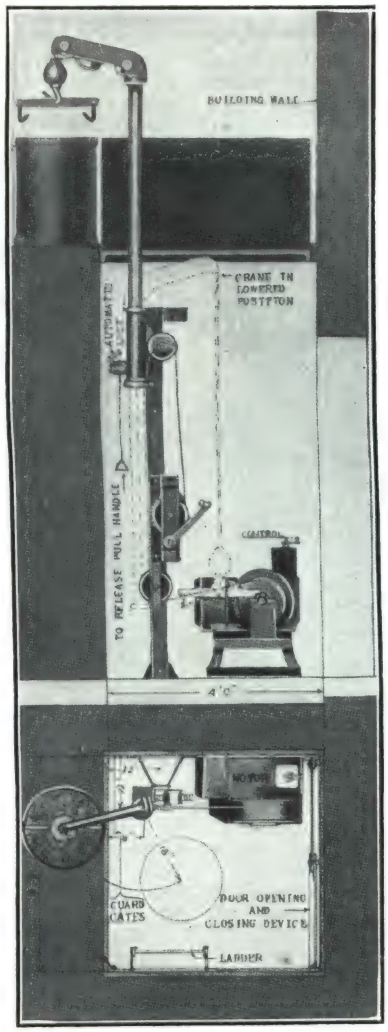
Hoistwell Ash Lifts can be furnished with or without automatic sidewalk door opening and closing device.

Patents

All our equipment is fully protected by patents.

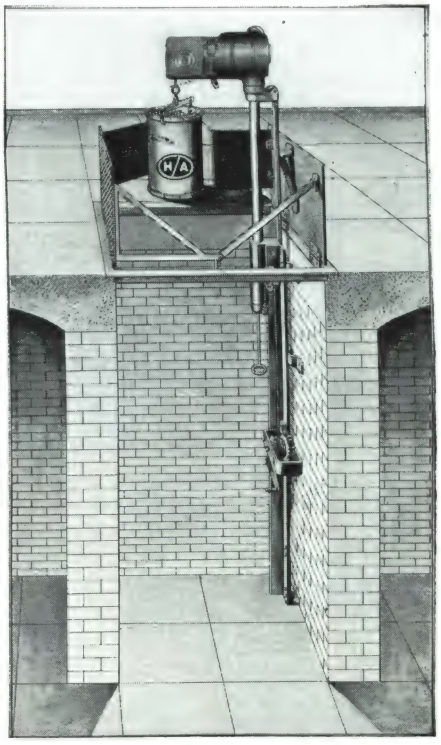
Service

Submit your hoisting problems to our engineers. They will help you select the types which best meet the conditions involved.



Hoistwell Ash Lift, Model D, Electric

Model D-2 same as Model D except made with overhead crane for dumping directly into the track



Hoistwell Ash Lift, Model E, Electric

Partial List of References

In New York

C. P. H. Gilbert, Architect
F. DeLancey Robinson, Architect
Schwartz & Gross, Architects
Board of Education
Turner Construction Co.
Dwight P. Robinson & Co., Consulting Engineers
Sibley & Featherstone, Architects
George G. Miller, Architect
Goodwillie & Moran, Architects
William N. Smith, Architect
Sugarman & Berger, Architects
James P. Whiskeman, Architect and Engineer
Frank Parker, Architect
Emery Roth, Architect
Landsman & Smith, Architects
John Russell Pope, Architect
Cross & Cross, Architects
J. E. R. Carpenter, Architect
M. L. & H. G. Emery, Architects
F. T. H. Bacon, Consulting Engineer
Pease & Elliman
Park Operating Corp.
Edinburgh Realty Corp.
Gresham Realty Co.
J. V. Schaefer Construction Co.
Eyrich & Ward
John Lowry, Jr.
Bing & Bing, Inc.
Shroder & Koppel
Kenneth M. Murchison, Architect
Jacob & Youngs
Jos. G. Siegel, Inc.
William Crawford
Julius Tishman & Sons
G. Richard Davis & Co.
Manger Hotels
Lehn & Fink
Hotel Lucerne
Hotel Peter Stuyvesant
Hungerford Building
Grand Street Boys' Club
Church of The Blessed Sacrament
State Banks

Elsewhere

Brooklyn-Manhattan Transit Corp., Brooklyn, N. Y.
State Banks, Brooklyn, N. Y.
St. Paul's Church, Brooklyn, N. Y.
J. Osborne Hunt, Architect, Trenton, N. J.
Grace Episcopal Church, Orange, N. J.
A. F. Wagner Architectural Iron Works, Milwaukee, Wis.
Sheridan Iron Works, Sheridan, Wyo.
Western Union Building, St. Louis, Mo.
Y. M. C. A. Building, Flushing, N. Y.
South Street Realty Co., Stamford, Conn.
H. E. Abbott, Architect, Stamford, Conn.

CHAS. K. ERNST, INC.

Manufacturers of Sidewalk Elevators and Ash Hoists

998-1006 East Ferry Street, BUFFALO, N. Y.

Products

TELESCOPIC ASH LIFTS, with and without Overhead Crane, Hand and Electric; PLATFORM SIDEWALK LIFTS, Hand and Electric; CELLAR WINDOW ASH LIFTS; SAFETY-GUARDED SIDEWALK DOORS; DOOR OPERATING DEVICE; SAFETY GATE; ASH CANS and ASH CAN TRUCKS; NON-TELESCOPIC HOISTS.

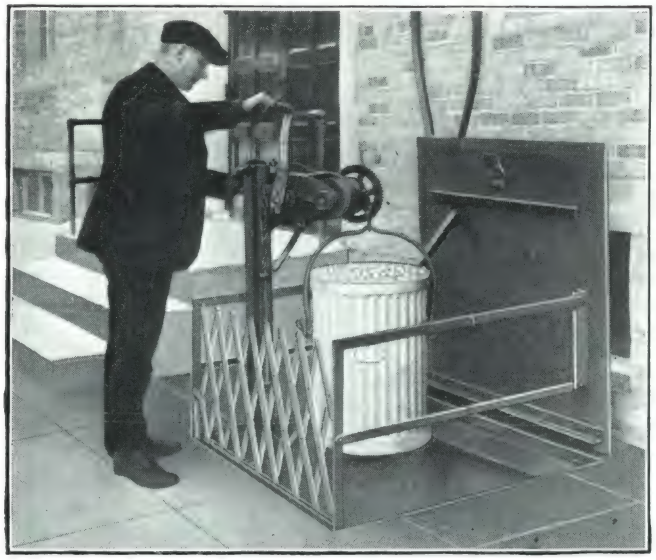
Also Automatic Stokers and Special Grates for forced draft, to preheat air on top of fire-bed.

Type "1" Ernst Sidewalk Operative Hand Power Telescopic Hoist and Safety-guarded Door with Door Operating Device, One-man Operated—Capacity, 500 Lb.; Speed, 30 to 40 Ft. Per Minute

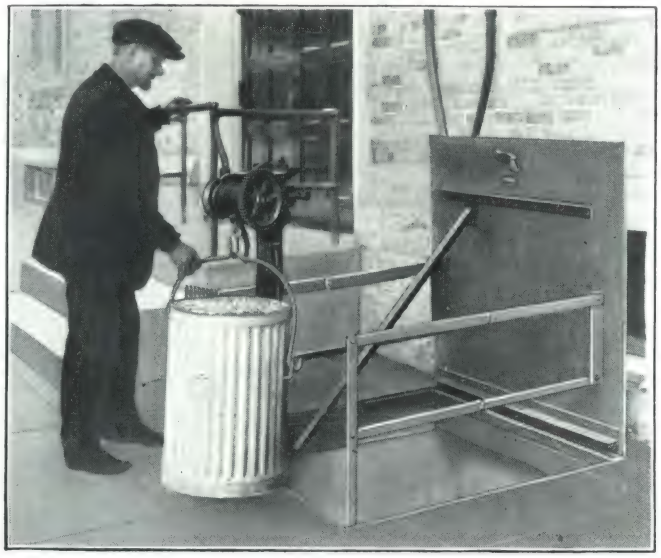
Designed especially for one-man removal of ashes, handling of kegs, crates and boxes, etc. Thousands of installations in schools, apartment houses, churches, banks, public and office buildings, etc.

Features—Operates at speed of 35 ft. per minute, requiring pressure of only 7 lb. on hoisting handle for each 100 lb. of load. Hoist equipped with automatic gear shifting and brake device, so lowering is accomplished with no movement of hoisting handle. Telescopic head raised and lowered by our improved machine cut rack and gear telescopic elevating device (no cables or chains to get out of order).

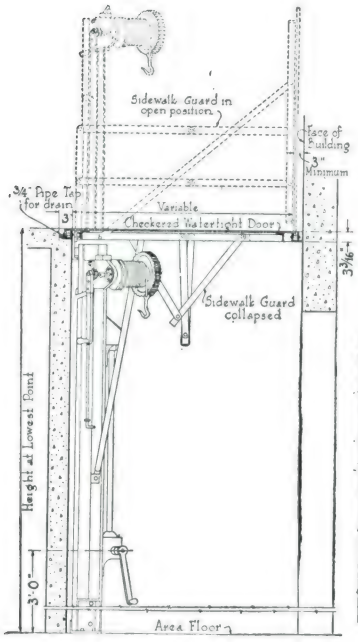
Operation—A few turns of telescopic handle raises hoist as well as sidewalk door into position, as illustrations show. The whole door opening is enclosed by safety guards and spring gate. Operator from sidewalk level can, unaided, hook on cans that are in the cellar and rapidly hoist ash cans to grade level by means of winch on telescopic arm. From 6 to 8 ash cans may be hoisted to sidewalk level before operator has to go to cellar to place another batch of cans in areaway under ash lift. When through hoisting, operator goes down ladder in areaway to cellar, lowers hoist and door closes automatically, flush with sidewalk and is automatically locked, no part being visible under closed sidewalk door.



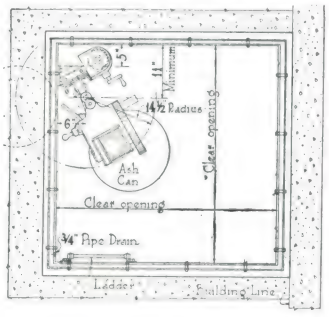
Door Opening Enclosed on Entire Four Sides. Cans Hoisted to Sidewalk—Passes All City Regulations



Can Swung on Sidewalk, Safety Gate Automatically Closes Front of Door Opening After Can Passes Gate



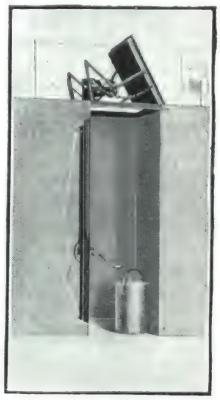
Section



Plan

Details of Ernst Type "1" Telescopic Ash Hoist and Safety-guarded Sidewalk Door Operated by Rack and Pinion

See details of door on fifth following page



Hoist and Door Automatically Raised in a Single Operation by Operator from the Cellar

Door locked in any position

Construction—Main upright consists of a 6-in. channel into which telescopes an extension arm which carries the hoisting apparatus. Drum on hoisting head revolves on ball bearings and is operated by compound gears and a handle; it is grooved to take ¼-in. flexible steel cable. All gears machine cut and entire hoist made in the most substantial manner.

Non-telescopic hoists can be furnished for any special conditions.

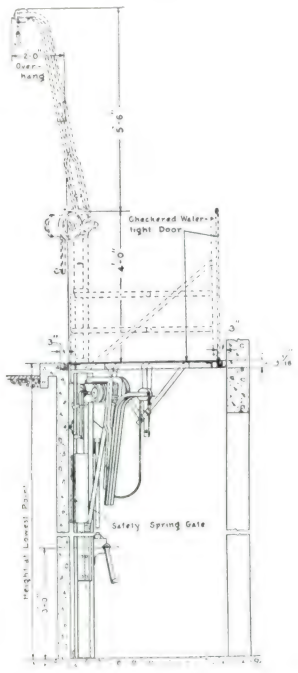
How to Specify—Furnish and install complete where indicated on plans, in accordance with manufacturer's drawings and instructions, as follows: an Ernst Type "1" Telescopic Hoist with automatic gear shift and brake device, with improved rack and gear elevating telescopic mast complete; an Ernst One-piece Safety-guarded [checkered top] [vault light] Sidewalk Door with flush, watertight door frame; size 4x4-ft. clear opening with guttered frame tapped for ¾-in. drain pipe connection. Frame to be of concealed flush type embedded in concrete, complete with Ernst automatic door opening, closing and locking device, Ernst safety spring gate and electric warning alarm. Also furnish 12 Ernst galvanized swing bail ash cans size 18x26 in. with an ash can truck, and heavy iron ladder. Outfit to receive a coat of black graphite paint at factory. (*Note:* Painter to give another coat after erection.) Hoist to be guaranteed for one year against defects in materials or workmanship. Extra heavy door for traffic can be furnished when required.

Continued on next page

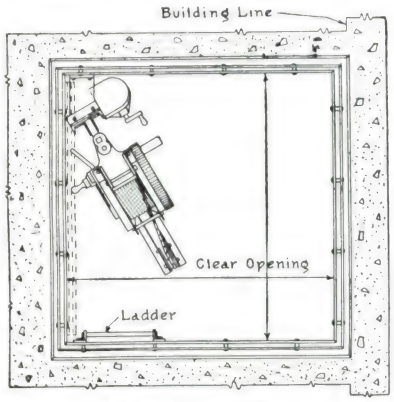
Type "2" Ernst Hand Operated Telescopic Hoist with Overhead Crane, Sidewalk Door and Door Operating Device, One-Man Operated—Capacity, 300 Lb.; Speed 35 Ft. Per Minute

The overhead crane that extends 9 ft. 6 in. above sidewalk level enables one operator at grade level to hoist ash cans from cellar and empty them directly into a wagon 6 ft. above grade, saving rehandling at grade level. Size of door recommended, 4x4 ft., which should be so located that door opening is near curb. Raises loads of 300 lb. at speed of 35 ft. per minute, and is equipped with gear shifting device, brake, ball bearing winch, safety ratchet and crane mounted to swing on ball bearings. Hoisting handle does not revolve when lowering loads to cellar. Recommended to be used with the Ernst safety-guarded door with door operating device.

Ernst Hand Operated Vehicle Type "2" Hoist with Can Raised 9 Ft. Above Grade



Section Through Areaway Showing Hoisting Arm Lowered Below Door



3/8-in. Scale Plan

How to Specify—Furnish and install where indicated on plans an Ernst Type "2" Telescopic Hoist with overhead crane, gear shifting and brake device, having improved rack and gear elevating telescopic mast, complete with an Ernst one-piece safety-guarded door with safety spring gate, door frame (to be embedded in concrete) of concealed type, size 4x4-in. opening, and having condensation gutter tapped for a 3/4-in. drain. Also Ernst automatic door opening, closing and locking device, with electric alarm. Supply 12 Ernst galvanized swing bail ash cans size 18x26 in., ash can truck and iron ladder from floor to sidewalk.

Outfit to receive a coat of paint at factory and another coat by painting contractor after erection. Hoist to be guaranteed for one year against defects in workmanship or materials. Extra heavy door can be furnished for truck traffic if desired.

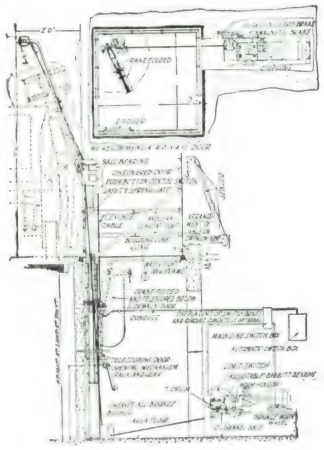
Ernst Type "2" Vehicle Hoist with Overhead Crane Swung and with Can Tilted to Empty Directly into Wagon

Crane swings on ball bearings

Type "3" Electric Telescopic Hoists for One and Two-man Operation

Where a considerable amount of ashes is to be hoisted from cellar to sidewalk or wagon height, and for deep cellars, the electric model should be used. It hoists ash cans at a speed of 70 ft. per minute and has a capacity of 300 lb. This model can be furnished with or without overhead crane. It is operated by a 2 hp. G-E motor, mounted in cellar, with worm gear drive enclosed in case and bathed in oil. It has a positive upper and lower limit switch, with magnetic wall switch, magnetic brake, and, being entirely automatic in operation, is suited for heavy duty work.

Control—Can be furnished with hand starter in cellar for two-man operation but can be operated entirely from sidewalk level by one man by means of remote control push button switch mounted on head of hoist. The motor control stand is in the cellar out of the way. It has one hoisting and one lowering speed. All bearings are bronze bushed end thrust bearings in worm gear drive. We have hundreds of installations in schools, hotels, apartment houses and public institutions.



Ernst Electrically Operated Type "3" Telescopic Ash Hoist, Door Combination and Operating Device

How to Specify—Furnish and install where indicated on plans an Ernst Type "3" Telescopic Hoist (state whether to have or not to have a vehicle crane), complete with 2 hp. motor, with upper and lower limit switch [hand starter] [push button control], magnetic brake, wall switch for entire automatic operation, and worm gear drive. Also furnish an Ernst one-piece safety-guarded door with watertight frame and condensation gutter, size 4x4-ft. opening, safety spring gate, bell alarm, and door operating device. Also a wrought iron ladder from cellar floor to sidewalk, ash can truck and 12 Ernst galvanized swing bail ash cans size 18x26 in.

Outfit to be installed in accordance with manufacturer's drawings and instructions to satisfaction of the architect and guaranteed for one year against any defects in materials or workmanship. Outfit to be given one coat of black graphite paint at the factory and another coat of paint by painting contractor after erection.

Continued on next page

Type "4" Ernst Electric Self-raising Platform Lift, Push Button Control, One-Man Operated—Capacity, 1000 Lb.; Speed, 20 Ft. Per Minute

Unique in construction, practically foolproof, with many exclusive features which permit the installation of an electric platform elevator that is entirely automatic in operation and which can be installed in most any areaway, making one of the most satisfactory and economical lifts made. Upright, inclined but 2 ft. 5 in. from vertical lift, with motor and control built in between the uprights, taking up little room in basement and permitting complete elevator to be installed in any areaway.

By deepening pit, platform can be extended 3 ft. 6 in. above sidewalk, to permit unloading of cans directly onto a wagon, no part of lift showing when sidewalk doors are closed. Can be made any height to 26-ft. travel, with or without pit.

Lift operated by a 3 hp. motor at speed of 20 ft. per minute, and can handle from 4 to 6 ash cans per trip. Passes all city ordinances, due to ease of handling and safety to operator. It has an endless chain double drive eliminating replacements and breakage of cables ordinarily used. Lift worm gear driven, with gears bathed in oil. It is equipped with an automatic upper and lower limit switch with magnetic brake and wall switch, operated by push button switches ordinarily found only in much more expensive elevators; platform locks at any desired height. All gears are machine cut and keyseated, enclosed by guards, and all bearings are babbitted for extra long life. Ideal for use in schools, hotels, stores, banks, apartment houses and public buildings.

Window Model—This lift can be installed at a window, eliminating an outside areaway. By locating door or window 7 ft. above grade level, ash cans may be emptied directly into a wagon, saving rehandling at grade.

How to Specify—Provide where shown on plans an Ernst Type "4" Elevator with 3 hp. motor, automatic upper and lower limit switch, with magnetic brake and wall switch, worm gear drive with two 3-way push button controls for one-man operation, capacity for 1000 lb., to operate at speed of 20 ft. per minute for alternating or direct current. Include one Ernst double leaf flush type sidewalk door with frame and condensation gutter tapped for ¾-in. drain pipe connection. Include a bow on platform to automatically open sidewalk doors, also furnish bell ringing alarm, 12 standard Ernst galvanized ash cans 18x26 in., with an Ernst ash can truck. Platform and doors to be of size shown on plans.

Type "4" Electric Self-raising Elevator Installed in Buffalo Consistory, Buffalo, N. Y.

Serves 3 floors 26-ft. travel. Uprights inclined but 2 ft. 5 in. from vertical lift. Passes all municipal regulations. Has no cables to break or replace. Exceptionally strong and safe. Ideal for large buildings, schools, hotels, apartments, etc.

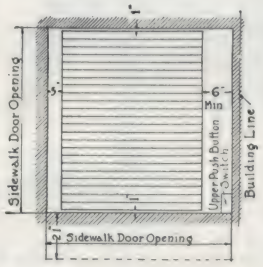
Lift Installed in Buffalo's Main Post Office, Ellicott Street

This building occupies a whole square block. Note bow to open sidewalk doors automatically, and push button control. Lift entirely automatic. This installation hoists 170 ash cans in an hour, with 2 men, to grade level, at operating expense of 3¢ for current

Lift Installed in Buffalo Athletic Club, Buffalo, N. Y.

Installed in areaway but 4 ft. 6 in. wide enclosed by walls on three sides. Handles 6 ash cans per trip. Requires less room than a vertical elevator. Nothing overhead, easier to install and one of the least expensive electric elevators made. One that will give many years of satisfactory service.

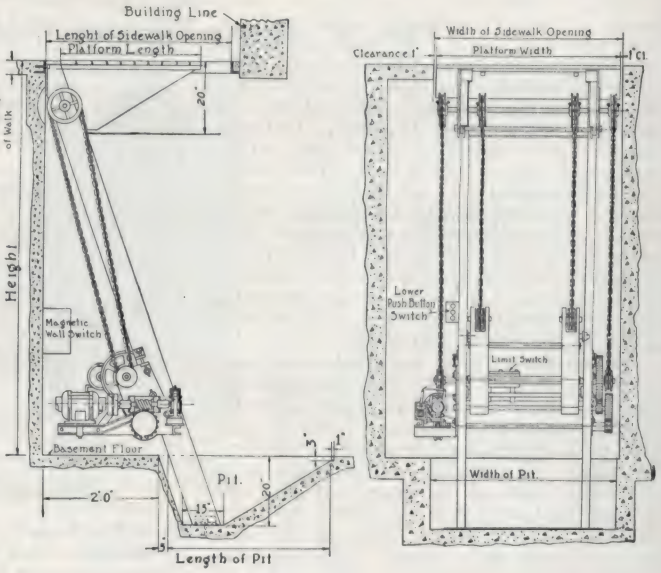
Many lifts installed that make 50 to 100 trips a day, with no repairs required after 10 or more years' use



Plan, Section and Elevation of Ernst Electric Type "4" Platform Lift

Made for operation by electricity. One-man operated.

Detail shows space requirements



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Type "5" Ernst Self-raising Platform Elevator, Hand Power— Capacity, 1000 Lb.; Speed, 12 Ft. Per Minute

A platform lift of unusual merit inclined but 2 ft. 5 in. from vertical lift, having a counterbalanced platform to avoid one-half of cranking ordinarily required. Loaded platform lowers by gravity to cellar and, when empty, platform will rise automatically to sidewalk level. Lift is operated by endless chain drive, there being no cables to rust out or break and need replacement; also has two driving and lifting chains. Lift requires 18-in. space for winch to operate elevator from side; or we can furnish extended winch mechanism to operate lift from inside the cellar where areaway is not wide enough to house operator at side of elevator (see drawings below). Handles barrels, ash cans, boxes, trunks, etc.

Construction — Uprights made of two 7-in. channels attached to plates to door frame and cellar floor. Lift, upon being assembled, requires but four anchor bolts to install it rigidly. Quadruple geared mechanism, attached directly to uprights, has all gears machine cut and keyseated, operating a platform that is suspended between channel flanges. Platform runs on roller bearings, adjusting device taking out slack of chain, so that platform cannot sag nor bind. Being counterbalanced by weight carriage makes it one of the easiest platform lifts to operate. Has powerful, lined brake on a 24-in. hand wheel crank.

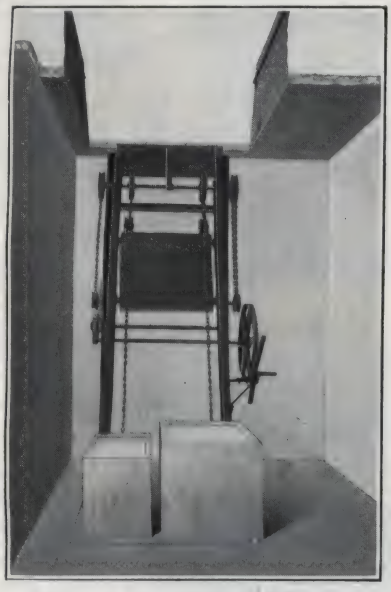
Platform made of hardwood 2 in. thick.

Safety ratchet locks platform at any desired height. There are no working parts in pit to deteriorate or rust out. Pit but 20 in. deep required.

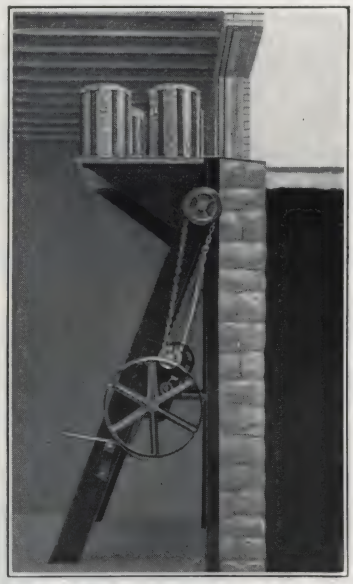
Window Model Type "5"—This lift can be installed in boiler room at window 3 ft. or more in height, so that no outside areaway is needed. It requires but four anchor bolts to install it rigidly in place.

We have hundreds of this type lift installed, that have never had a repair or replacement though installed 10 or more years and they work as well as when first installed.

How to Specify—Provide where shown on plans an Ernst Type "5" Platform Lift of 1000-lb. capacity, with counterbalanced platform [operated by winch at side] [with extended winch for operation in basement]. Platform to be ....x ....ft. Include an Ernst double leaf flush type sidewalk door with frame and condensation gutter tapped for ¾-in. drain pipe connection, tops of doors checkered for above size platform and with bow to open sidewalk doors, bell ringing alarm, and (state number desired) standard Ernst galvanized ash cans 18x26 in., and Ernst ash can truck.



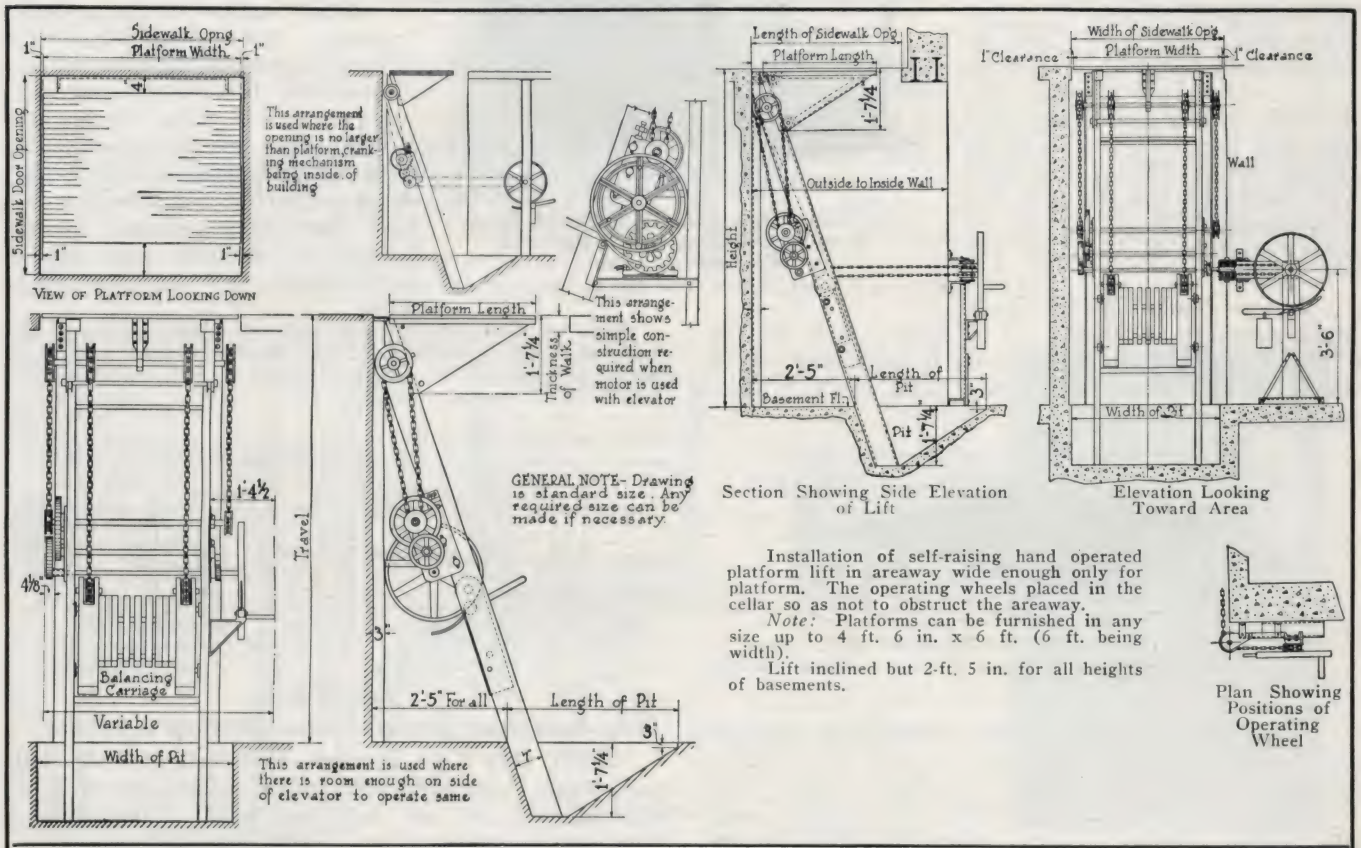
Lift Used in Areaway and Showing Platform Level with the Floor Will raise automatically to grade level when platform is emptied



Lift Installed at Window Makes an Excellent Four-can Ash Lift Operated by one man

Typical Installations of Ernst Type "5" Platform Lifts

Eliminates all elevator cable troubles and costly replacement expense. Passes all city regulations.



Typical Details of Ernst Type "5" Platform Lift

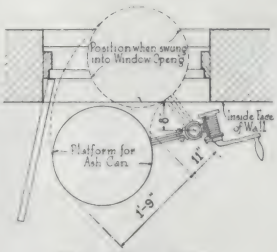
Continued on next page

Type "6" Ernst Perfection Cellar Window Hand Operated Ash Lift
Capacity, 300 Lb.; Speed, 25 Ft. Per Minute

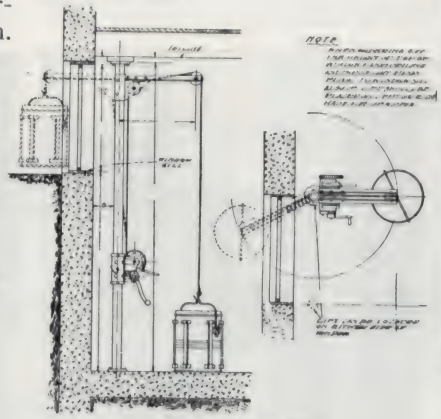
Permits removal of ashes through cellar window where building has no outside areaway for access to cellar. Can be operated through any window 30x30 in. Platform 21 in. in diameter allows standard sizes of ash cans to be hoisted to grade level by winch directly attached to 3-in. pipe upright. Lift is equipped with powerful brake, safety ratchet, cable grooved drum and 3/8-in. cable. Lift is very compact, easy to install, and affords a rapid and economical means of hoisting ash cans.

Type "7" Ernst Window Swing Crane Lift—This lift is similar to our Perfection Elevator, but has a crane to handle swing bail ash cans through window to grade, instead of having platform. See drawing.

How to Specify—Provide and install where indicated on plans an Ernst Perfection Elevator [Ernst Window Swing Crane Lift] having capacity of 300 lb. and hoisting speed of 25 ft. per minute. (State height of ceiling, and height of window sill from cellar floor.) Include an Ernst ash can truck, six Ernst standard or swing bail ash cans, and an iron ladder for access from cellar to grade level.



Plan (Type "6")

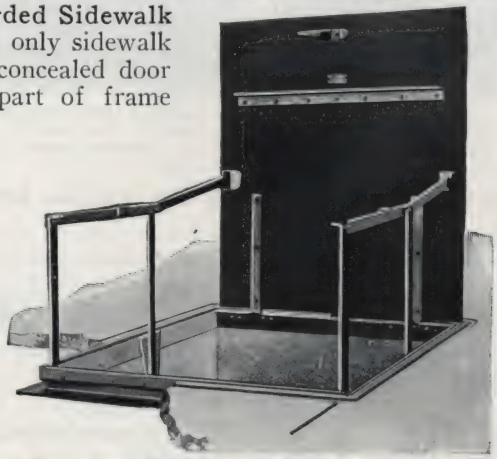

Section (Type "7")

Ash Can on Platform Ready to Be Hoisted to the Window (Type "6")

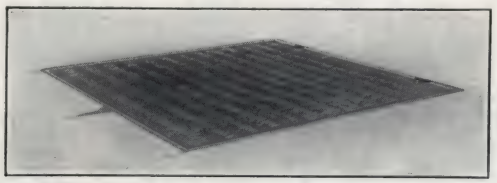
Details of Ernst Perfection Cellar Window Ash Lift

Ernst Safety-guarded Sidewalk Doors and Watertight Frames; Ash Can Trucks

Ernst One-piece Safety-guarded Sidewalk Doors—In so far as we know, the only sidewalk door made in one-piece having a concealed door frame embedded in concrete, no part of frame visible, and which is automatically guarded to protect the hatchway when open. Neat appearing and long life. Can be provided with our regular frame or with condensation gutter tapped for 3/4-in. drain pipe connections. Has no middle seam to bend down, warp or leak water. Perfectly flush with sidewalk, having a new concealed type door hinge, as well as inside locking device. Doors are made with checkered non-slip tops and to withstand loads of 300 lb. per sq. ft. Made in all sizes from 3 to 5 ft. square.


One-piece Safety-guarded Sidewalk Door Showing Complete Guard Rail and Concealed Frame
A bar encloses front side of door

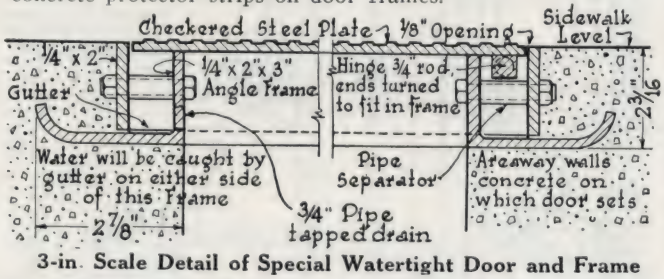
Sizes—Made in all sizes. Stock sizes are as follows: 3 ft. square; 3 ft. x 3 ft. 6 in.; 3 ft. 6 in. x 4 ft.; 3 ft. 6 in. square; 4 ft. square; 4 ft. x 4 ft. 6 in.; 4 ft. x 5 ft. and 4 ft. 6 in. square.


Ernst One-piece Safety-guarded Sidewalk Door Closed
Note concealed frame, flush with walk and neat appearance of door closed. Rail guards invisible

Two-Leaf Doors—We can furnish our doors in double leaf with checkered tops, for any size of door openings having our regular concealed frame embedded in concrete, perfectly flush with sidewalk, with or without special forged watertight door frame with condensation gutter. All door frames electric welded.

Watertight Door Frames for Single and Double Doors—One of the best watertight door frames obtainable, due to special one-piece, forged, angle iron frame. Embedded in concrete, the gutter catches all surface water on door as well as water that leaks in around outside edge of door frame (a special feature of Ernst door frames). Note detail drawing. Hinges bronze bushed; easily replaceable if broken and are entirely concealed. Door frames are $3\frac{3}{16}$ in. high, providing for extra deep and wide gutter. All Ernst doors are perfectly flush with sidewalk, there being no part of frame to slip or stumble over, while checkered top plates are non-slippery.

How to Specify—Furnish and set where indicated on plans, an Ernst [one-piece] [2-leaf checkered steel sidewalk] door with [standard door frame] [special forged one-piece door frame with condensation gutter] tapped for 3/4-in. pipe connection of size shown. The one-piece doors to have automatic guard rail enclosures with concealed hinges. All doors to have concrete protector strips on door frames.



3-in. Scale Detail of Special Watertight Door and Frame

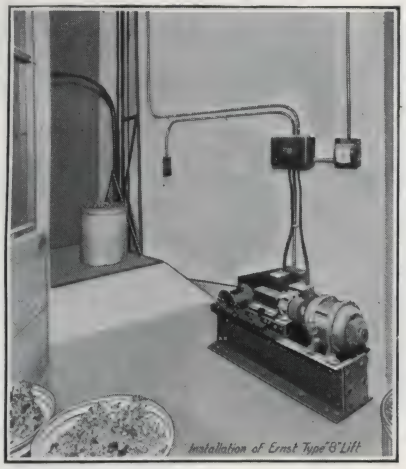
Ernst Ash Can Trucks—Our strong, 2-wheeled hand truck, fitting all makes of standard ash cans, is recommended for use with our lifts. Saves labor; eliminates noise; lengthens life of cans.

Rubber tired trucks also can be furnished if desired.

Continued on next page

Ernst Type "8" Electric Platform Lift, with Push Button Control, One-man Operated—Capacity, 500 to 1000 Lb.; Speed, 20 Ft. Per Minute

Ernst Type "8" lift is giving perfect satisfaction in hundreds of buildings, such as schools, apartment houses, banks, hotels, theaters, etc. One man unaided can use this lift from either floor level. Its operation is entirely automatic. Being equipped with a 2 hp. motor with automatic upper and lower limit switch, magnetic brake and magnetic wall switch, it makes one of the simplest and most economical installations on the market. Motor stand located in basement where most convenient, or in areaway. It handles ash cans, barrels, boxes, trunks and cases to and from basement; noiseless in operation.


Installation of Ernst Type "8" Lift

Uprights in Corners—These can be furnished if uprights at sides are not desired.

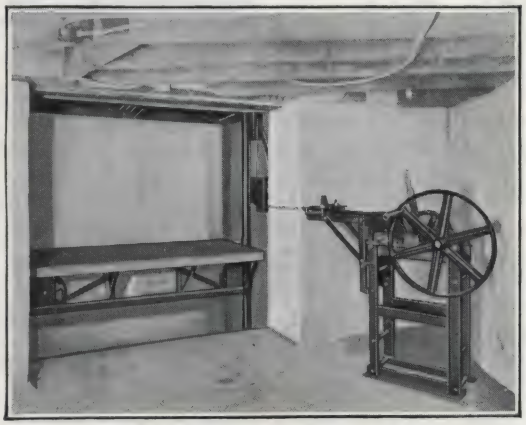
Platform can be made any size up to 4x4 ft.

How to Specify—Furnish and install an Ernst Electric Type "8" Lift complete with motor, limit switch, worm gear drive, with magnetic brake and wall switch, with two 3-way push button control switches, of capacity of [500] [750] [1000] lb. with worm gear drive, for automatic one-man operation. Include an Ernst double leaf flush type sidewalk door with watertight door frame tapped for ¾-in. pipe connection, bow to open sidewalk doors, bell alarm, and 12 standard Ernst galvanized ash cans 18x26 in., and an Ernst ash can truck. Platform not to exceed 4x4 ft.

Ernst Type "9" Hand Operated Platform Lift—Capacities, 500, 750, 1000 Lb.

Has 1 or 2 cables and drums.

A strong, fast, dependable, easy operating elevator. Can be furnished in any of above capacities to handle merchandise and ashes. Suitable for use in hotels, banks, apartment houses, stores, etc., where an inexpensive operating lift is desired.


Ernst Type "9" Platform Lift

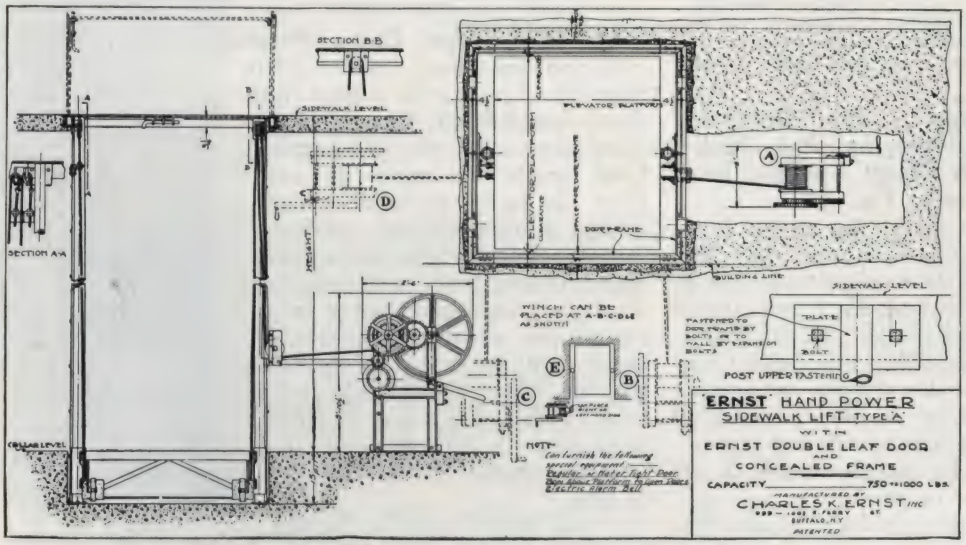
Construction—Consists of two 3-in. uprights with platform and necessary winch, made of the strongest and most durable materials for long life. Platform made of sheet iron, electric welded to platform assembly, so that anything can be easily handled on and off platform. Uprights are bolted to cellar floor and door frame by plates. Roller bearing platform slides are non-binding and platform is very well cross braced and stiffened. All gears machine cut; drum cable grooved; operating wheel 24-in. in diameter; with powerful brake for lowering; is equipped with safety-ratchet to lock platform any desired height. Various types of winches can be furnished as illustrated. Winch can be at side of elevator, extended in basement or around corner.

Pit—For hand operated lifts, pit should be 15 in. in depth; for electric lifts, 20 in.

How to Specify—Provide where indicated on plans an Ernst Type "9" Platform Lift, capacity [500] [750] [1000] lb. Platform to be of (state size) [with] [without] pit. Also furnish an Ernst double leaf flush type sidewalk door of proper size for above platform with [standard door frame] [special watertight door frame with condensation gutter], tapped for ¾-in. drain pipe and with bow to open sidewalk doors automatically. (Bell ringing alarm can be provided if specified.)

Ernst Type "12" Pitless Platform Lift

This lift is similar to Type "8" but is for use inside of a building. Uprights extend from cellar floor to ceiling, with added feature of pit in basement being unnecessary, as platform lowers directly onto cellar floor. Can be furnished for hand power as well as electric. Makes an excellent 4-can ash lift.



Installation Details of Type "9" Platform Lift

Ernst Type "12" Hand or Electrically Operated Platform Lift

ROBERT GILLESPIE CO.

Manufacturers of Telescoping Ash Hoists and Sidewalk Lifts

GENERAL OFFICES AND FACTORY

WARE, MASS.

REPRESENTATIVES IN PRINCIPAL CITIES

Products

TELESCOPING ASH HOISTS, hand and electric operation, in various types.

CELLAR WINDOW ASH LIFTS.

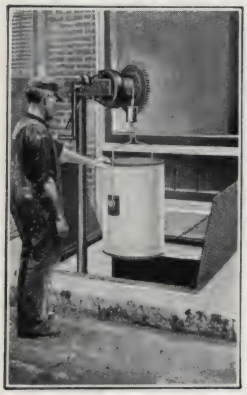
PLATFORM SIDEWALK LIFTS, hand and electric.

SIDEWALK DOORS with Automatic Opening and Closing Attachments and Safety Guard Gates.

Also Monorail Overhead Ash Handling Systems, Overhead Cranes.

Gilco Type T Telescoping Ash Hoist, Fig. 8

Where it is desired to use hand power and where trucks can not drive alongside the sidewalk, this type of equipment should be used. The complete unit consists of telescoping hoist as shown, Gilco automatic opening and closing doors with safety guard gates, operator's steel ladder, warning bell and truck. This is a one-man outfit; the pressure on the handle is 8 lb. for each 100 lb. of load. The capacity of the machine is 500 lb.; lifting speed, 30 ft. per minute.

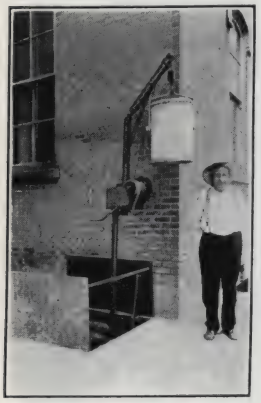


Type T Telescoping Ash Hoist, Fig. 8

A powerful band brake with woven lining controls the lowering of can and, to avoid danger to operator, crane handle does not rotate. The machine operates without noise. The telescoping element is 2½-in. heavy steel pipe; the supporting column is built up of structural channels securely connected by guides, permitting accessibility to all parts of the machine. The hoisting head rotates on ball bearings.

Note: The usual size of areaway is 4x4 ft. in clear, but this hoist may be operated in 3½ x3½ ft.

How to Specify—Furnish and install, where shown on plans, one Gilco Telescoping Type T Ash Hoist with Gilco flush watertight doors, automatic opening and closing device and safety guard gates, twelve 17x24-in. galvanized No. 16 gauge swing bail ash cans, ash can truck and steel ladder.



Type W Direct Truck Loading Ash Hoist, Fig. 14

Gilco Type W Hand Operated Telescoping Ash Hoist for Direct Loading Into Truck, Fig. 14

This model is arranged so that the operator may raise the can from the basement and dump it directly into the truck about 7 ft. above grade. Rehandling is eliminated. The crane head folds under the doors when not in use. The opening for door should be near the curb and 4x4 ft. in clear. The capacity is 300 lb. at 30 ft. per minute.

A powerful band brake with woven lining controls the lowering of the can, and to avoid danger to the operator, the hoisting handle does not rotate. The telescoping unit is 2½-in. heavy steel pipe, supported by steel channel column. This column is fastened to floor and wall with heavy steel brackets and expansion bolts. The machine is noiseless in operation and head rotates on ball bearings.

How to Specify—Furnish and install, where shown on plans, one Gilco Telescoping Type W direct truck loading ash hoist with Gilco flush watertight doors, automatic opening and closing device and safety guard gates; twelve 17x24-in. galvanized No. 16 gauge swing bail ash cans, ash can truck and steel ladder.

Gilco Type PR Window Ash Hoist, Fig. 9

This machine raises the can and swings it through the window of basement or boiler room. It is simple in construction and easy to operate. Capacity, 300 lb.; lifting speed, 30 ft. per minute.

It can be made for any height basement floor to ceiling. The window opening should not be less than 30 in. high by 30 in. wide for standard cans. The platform comes within 2 in. of floor, rides on rollers on the steel column and travels free from binding.

The hoist has machine cut gears and an automatic brake which holds the load at any point.

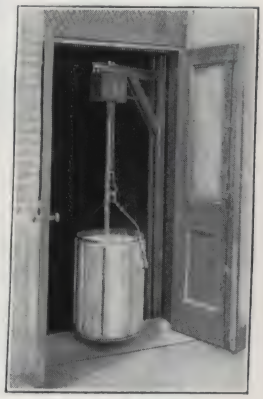
This is an economical hoist to use. It is simple in construction, easy to install and the cost of areaway and doors is saved.

Type PR Window Ash Hoist, Fig. 9

How to Specify—Furnish and install, where shown on plans, one Gilco Window Ash Hoist Type PR having swing platform and roller guides. Height to suit boiler room.

Gilco Type J Ash Crane, Non-telescoping, Fig. 11

It is sometimes convenient to arrange a standard doorway at grade with ladder from boiler room. Where this is possible our Type J non-telescoping ash crane is a simple hoist to use. It raises the can from the boiler room floor and swings it through the opening. Several cans may be landed before a trip to grade is necessary. The operating chain hangs in a convenient position behind the mast. By using our special bail on the crane hook, two cans can be raised at once. The capacity is 500 lb. and the load is raised at 30 ft. per minute.



Type J Ash Crane, Fig. 11

The crane rotates on sockets bolted to floor and ceiling or

Continued on next page

wall. The hoisting unit has machine cut gears and automatic brake.

How to Specify—Furnish and install, where shown on plans, one Gilco Type J Non-telescoping Ash Hoist to swing can through doorway (with bail for handling two cans at once). Height to suit boiler room and doorway. Also twelve 17x24 in. No. 16 gauge swing bail ash cans, ash can truck and steel ladder.

Gilco Type TE Telescoping Ash Hoist, Electrically Operated, Fig. 20

Type TE Telescoping Ash Hoist, Fig. 20

This model has a capacity of 500 lb., and raises the load at 60 ft. per minute. It should be used where the quantity of ashes is large or the areaway of more than usual depth. It telescopes under the sidewalk when not in use.

The hoisting unit has enclosed worm drive—bronze machine cut gear and steel worm hardened and ground. Motor is fully enclosed type, 1½ hp., designed for hoist service. A magnetic brake operates on the motor shaft, retarding the hook as well as supporting the load. The controller is built into the head and is of the single speed reversing type. The same lever gives up, down and stop motion. An automatic upper limit fixes the hook travel and prevents overwinding of the cable. The hoisting head rotates on ball bearings.

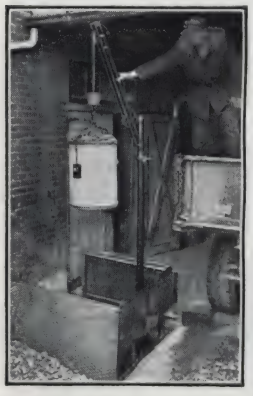
Note: The inside clear dimensions of areaway should be not less than 4x4 ft.

How to Specify—Furnish and install, where shown on plans, one Gilco Electrically Operated Telescoping Ash Hoist, Type TE, with Gilco flush watertight sidewalk doors, automatic opening and closing device and safety guard gates; twelve 17x24-in. galvanized No. 16 gauge swing bail ash cans; ash can truck and steel ladder.

The electrical contractor at the building shall provide and install all wiring and switches up to the service lugs on motor.

Gilco Type WE Telescoping Ash Hoist, Electrically Operated, for Direct Wagon Loading, Fig. 10

In large buildings where it is possible to drive alongside the opening, this equipment delivers the ash can directly into truck 7 ft. above grade. When not in use it telescopes under the sidewalk. It operates electrically and has a capacity of 300 lb. at 60 ft. per minute. The hoisting unit has totally enclosed worm drive running in oil, magnetic brake and automatic upper hook-travel limit. Motor is 1½ hp. fully enclosed with single speed reversing controller.



Type WE Telescoping Ash Hoist, Fig. 10

The electric machine with motor is usually placed on the basement floor in a convenient position near the areaway.

How to Specify—Furnish and install, where shown on plans, one Gilco Type WE Telescoping Ash Hoist, wagon height; electric power operation, flush water tight sidewalk doors with automatic opening and closing device and safety guard gates, twelve 17x24-in. No. 16 gauge swing bail ash cans, ash can truck and steel ladder.

The electrical contractor at the building shall provide and install all wiring and switches up to the service lugs on motor.

Gilco Type JE Ash Crane, Non-telescoping, Electrically Operated, Fig. 16

Type JE Ash Crane, Fig. 16

This machine is used at a door or window and swings the ash can clear through and lowers on to grade or direct to truck. The window should not be less than 5 ft. high to clear can and hoist.

The mast is fixed about 8 in. from wall to center and the can swings on a 2 ft. 6 in. radius. This radius may be varied if conditions require it for better operation.

The lower bearing is bolted to floor, the top one to ceiling or a bracket on wall. Capacity, 300 lb. at 60 ft. per minute. The hoisting unit has totally enclosed worm drive running in oil, magnetic brake, automatic upper hook-travel limit. Motor 1½ hp., fully enclosed and single speed reversing controller, operated by pendent cords from floor or grade.

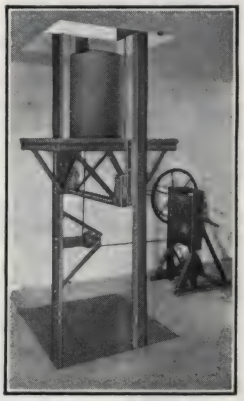
How to Specify—Furnish and install, where shown on plans, one Gilco Type JE Electric Power Operation Non-telescoping Ash Hoist to swing can through doorway. Height to suit boiler room and doorway. Also twelve 17x24-in. No. 16 gauge swing bail ash cans; ash can truck and steel ladder.

Gilco Type PS1 Hand Operated Platform Lift, Fig. 18 (Capacities 500 and 750 Lb.)

This is a simple; strong and durable machine used mainly in an areaway outside the building for handling merchandise and ashes.

The platform is made of hardwood bolted to steel angle frame through steel cover strip. The under frame is built up of steel angles forming a rigid structure. Guides are heavy steel angles, bolted to floor and door frame. Sheaves are of large diameter and fitted with roller bearings. The hoisting machine has compound gearing, steel sides, and supporting frame, steel hoisting wheel, powerful band brake on machined brake pulley. Steel pawl holds the load at any point.

Hoisting machine may be placed on either side, front or back to suit floor space available. The maximum platform size on the 500-lb. capacity is 3 ft. 6 in. x 3 ft. 6 in. and on the 750-lb. capacity 4x4 ft. The platform size is 4 in. less in width than the clear opening and 2 in. less front to back. A steel bow to automatically open the doors may be fitted to platform if desired.



Type PS1 Hand Operated Platform Lift, Fig. 18

How to Specify—Furnish and install, where shown on plans, one Gilco Sidewalk Platform Lift, Type PS1. Capacity [500] [750] lb., Platform size (state size), with Gilco flush watertight double leaf sidewalk doors (and opening bow on platform).

Sidewalk Doors

Gilco double-leaf sidewalk doors are constructed of heavy diamond pattern steel plates on steel supporting frame of either plain type or watertight construction with drainage gutter. All corners are welded. Hinges are bronze heavy pattern flush type.

ESTABLISHED 1866

GILLIS & GEOGHEGAN
INCORPORATED

TELEPHONE
SPRING 7-7800

Manufacturers of Telescopic Hoists
542 West Broadway, NEW YORK, N. Y.

For Sales Agencies, see Our Other Section

The responsibility of selecting proper equipment for ash removal rests with the specification writer. As an aid to the large group of specification writers who have occasion to specify G&G Ash Removal Equipment, we publish the four general classifications covering ash removal—and the proper G&G Telescopic Hoist Equipment to do the work. Solutions of the following typical problems were found by using a practical formula which may be obtained upon request. Where there is a special problem involving an unusual combination of conditions, ask our Engineering Department to help you.

the G&G ELECTRIC
Telescopic Hoist
With Automatic Stop and Gravity Lowering Device

the G&G
Telescopic Hoist
with Automatic Gear Shifting Brake Device and Silencer

*FOUR TYPICAL PROBLEMS OF ASH REMOVAL

PROBLEM No. 1

Small volume of ashes. (about 6 cans daily.)
Short distance of lift. (about 10 feet.)
Hoistway opening against side of building.

SOLUTION

Specify a Model A G&G Telescopic Hoist, operated by hand power. Hoisting head revolves on ball bearings and can is deposited on pavement clear of hoistway without tilting or spilling of ashes. Empty cans are lowered by gravity under control of powerful band brake with brake lining. One man can easily perform the entire operation of ash removal. Operator exerts a pressure of only 12¼ lb. in raising an average filled can weighing 175 lb. at speed of 30 ft. a minute.

Model A

PROBLEM No. 2

Small volume of ashes. (about 6 cans daily.)
Short distance of lift. (about 10 feet.)
Hoistway opening near curb or in driveway.

SOLUTION

Specify a Model B G&G Telescopic Hoist, with Overhead Crane, operated by hand power. Ashes are dumped directly into wagon without rehandling cans at grade level. One man can easily perform the entire operation of ash removal. The Hoist occupies little space and when not in use no part shows above grade. Filled cans are raised at a speed of 30 ft. a minute and hoisting pressure of only 12¼ lb. is required for the average can weighing 175 lb.

Model B

PROBLEM No. 3

Large volume of ashes. (more than 15 cans daily.)
Deep hoisting area (15 feet or more.)
Hoistway opening against side of building.

SOLUTION

Specify a Model E G&G Telescopic Hoist, electrically operated. This Hoist is built for heavy continuous duty and tests have proven to be astonishingly economical in current consumption. While a large volume of ashes might make it desirable to employ more than one man, Hoist can be practically operated by one man and is therefore a labor saver. Loads up to 500 lb. are raised at a speed of 60 ft. a minute and are lowered by gravity.

Model E

PROBLEM No. 4

Large volume of ashes. (more than 15 cans daily.)
Deep hoisting area (15 feet or more.)
Hoistway opening near curb or in driveway.

SOLUTION

Specify a Model D G&G Telescopic Hoist, electrically operated. This Hoist has the Overhead Crane feature which makes it possible to dump ashes directly into wagon without rehandling at grade. The motor is mounted near base of Hoist and two men can easily handle a large quantity of ashes. Loads up to 300 lb. are raised at a speed of 60 ft. a minute. Surprisingly little current is used in operation of this Hoist.

Model D

The safety and labor-saving features built into these Hoists can be secured only by the installation of complete G&G Equipment (Hoist, Operator's Ladder, Swing Bail Hoisting Cans, Checkered Steel or Vault Light Sidewalk Doors, with Spring Guard Gates, Automatic Sidewalk Door Opening and Closing Device, Warning Gong and Ash Can Truck).

Full description, illustrations, scale drawings and specifications in our other section

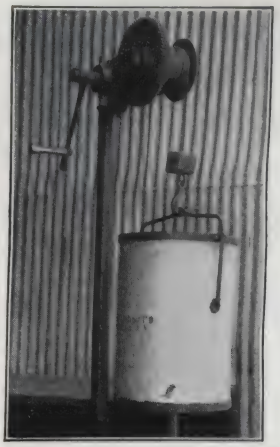
*Including garbage and rubbish.

SILENT HOIST WINCH & CRANE CO.

TELEPHONE
CUMBERLAND 6-3910

GENERAL OFFICES AND WORKS
762-772 Henry Street, BROOKLYN, N. Y.

AGENTS IN
PRINCIPAL CITIES



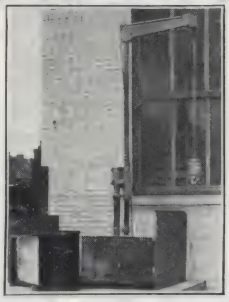
Left:

Model AH
Hand operated, gravity lowering

Uses

For removal of ashes, garbage, refuse and other materials. Recommended for use in apartment houses, churches, factories, office and public buildings, schools, libraries. Made in hand and electric models, with gravity lowering feature, for raising to sidewalk level, or crane type for raising high enough to dump directly into truck. Unusually simple to operate, strictly a one-man hoist, and absolutely safe at all times and under all conditions.

SILENT TELESCOPIC HOIST



Model AEC
Electric crane type for direct loading into truck

Features

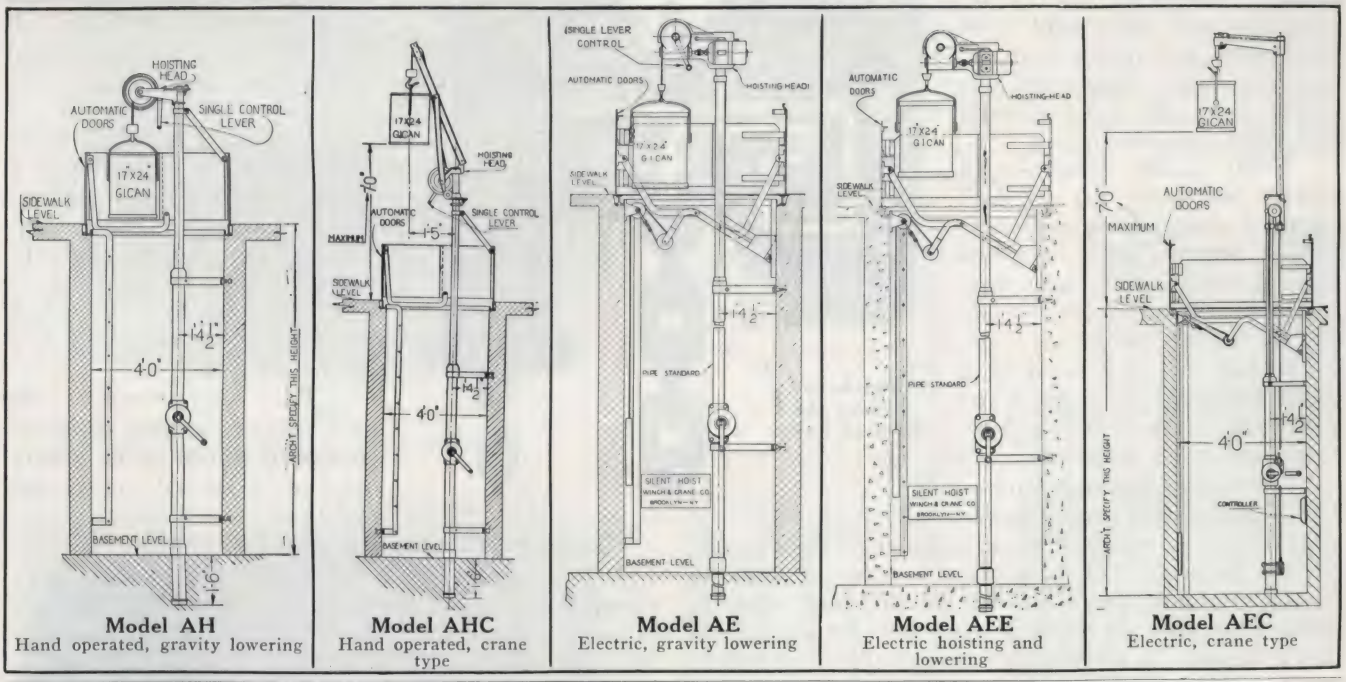
Many new, exclusive and notable features. Made in 5 standard models. Simple, safe and economical and guaranteed first class in workmanship and material for 5 years. Approved by foremost architects and engineers in the country.

Service

Silent Hoist engineers will be glad to co-operate with information and data and in writing of specifications.

Right:

Model AE
Electric, gravity lowering



Model AH
Hand operated, gravity lowering

Model AHC
Hand operated, crane type

Model AE
Electric, gravity lowering

Model AEE
Electric hoisting and lowering

Model AEC
Electric, crane type

Model and Code Word	Recommended for	Specifications and Data	Remarks
Model AH Code word ASHAND Hand operated, gravity lowering, for raising to *sidewalk level.* Capacity: 500 lbs. at 30 ft. per min.	For a small volume of ashes, about 5 cans daily, a small height of lift, about 10 ft., and where opening is against the building.	Machine cut tooth gears for minimum turning effort and maximum efficiency. Machine turned drum, for smooth winding, is mounted on ball bearings. Entire hoisting head revolves on ball bearings. Lowers at high speed by gravity without disengaging any gears. Hoisting handle does not revolve when lowering. Load stops instantly when desired and automatically when handle is released. All operations of hoisting, holding and lowering are by movements of one single control lever. Weight with doors and accessories, 1000 lbs.	*For a Complete Installation* Specify a Silent Telescopic Hoist (model and description as given to left: if Electric, advise current). Consideration should also be given for including in addition to Hoist: (1) Flush Water Tight Sidewalk Doors (checkered-steel or vault-light type if required), with condensation gutter tapped for drain connection. (To use standard doors, the opening should be 4x4 ft.) (2) Automatic Sidewalk Door Opening, Closing and Locking Device. (3) Safety Hinged Guard Gates. (4) Operator's Steel Ladder. (5) Electric Warning Gong with Automatic Switch and Transformer or Batteries. (6) Ash Cans (specify how many), 17x24 in. of 16 gauge galvanized iron with fixed bail or swing bail that stays put. (7) Ash Can Truck.
Model AHC Code word ASHANDCRAN Hand raising to *truck body,* gravity lowering. Capacity: 500 lbs. at 30 ft. per min.	For same volume of ashes and height of lift as Model AH where opening is at driveway.	Same as for Model AH and, in addition, there is provided a collapsible, telescoping, all-steel, boom crane which reaches high enough to permit dumping the cans directly into the wagon, truck or car. Weight with doors and accessories, 1200 lbs.	
Model AE Code word ASHELEC Electrically operated, gravity lowering, for raising to *sidewalk level.* Capacity: 500 lbs. at 60 ft. per min.	For a large volume of ashes, more than 15 cans daily, over 10 ft. lift and where opening is against the building.	A 2 hp. totally enclosed, dustproof, waterproof and weatherproof electric motor with totally enclosed automatic, electro-magnetic brake; motor is direct connected to hoist drive which consists of phosphor bronze gear meshing with nickel steel worm; worm, running at high speed, is always immersed in bath of oil. Operations of hoisting, holding and lowering are by movements of *one* single control lever. Lowers at high speed by gravity without disengaging any gears. "Dead man" control stops hoist instantly (power is shut off) when control lever is released. Automatic upper limit switch. All shafts mounted on ball bearings. Weight with doors and accessories, 1600 lbs.	
Model AEE Code word ASHELECTED Electric hoisting to *sidewalk level.* Capacity: 500 lbs. at 60 ft. per min.	Same as Model AE but this Model AEE is less in first cost; lowers by power instead of gravity.	Same as Model AE but lowers by power. Drum is keyed to shaft and complete hoisting head revolves on ball bearings. Always under control of operator through automatic push button station for hoisting, holding and lowering. Automatic operating upper limit switch makes for safety at all times. Weight with doors and accessories, 1600 lbs.	
Model AEC Code word ASHELECRAN Electric lowering and hoisting to *truck body.* Capacity: 500 lbs. at 60 ft. per min.	For a large volume of ashes and a greater height of lift and where opening is at driveway.	Same as Model AEE except that power unit is in basement with hoisting cable run up and over sheaves and with elevating mast provided with telescoping, all-steel, boom crane which reaches high enough to dump cans directly into wagon, truck or car. Weight with doors and accessories, 1900 lbs.	

HERBERT MORRIS INCORPORATED

Manufacturers of Modern Telescopic and Platform Ash Hoists

FACTORIES

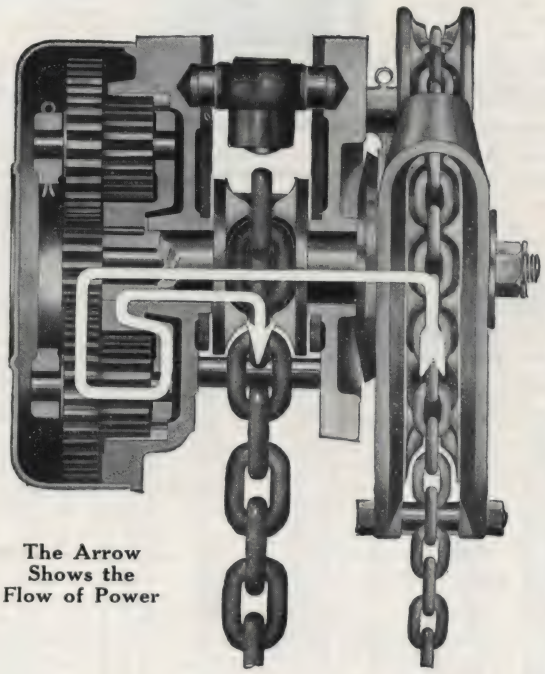
15 Lawrence Place
BUFFALO, N. Y.

1030 W. North Avenue
CHICAGO, ILL.

Exclusive Features

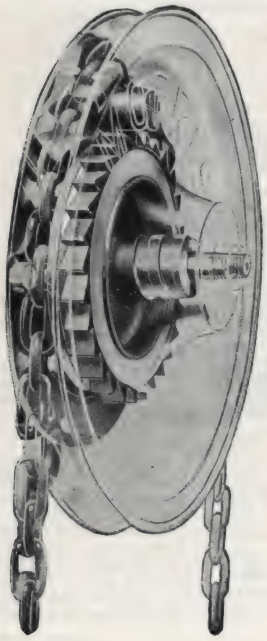
Balanced, Planetary Gears—In this arrangement of the gears, known as the epicyclic gear train, the tooth-thrusts are exactly balanced so that bearing pressures and consequent friction losses are reduced to the very minimum. Engineers recognize it as the most efficient gear train ever developed.

Steel Load Chain—All Morris ash hoists lift on steel chain. A chain is extremely flexible—it does not kink, twist nor fray. A chain is durable because it exposes the minimum possible surface to the action of rust, which may be very rapid in a damp areaway. It is good for a lifetime of service—we have never replaced a single chain.



The Arrow Shows the Flow of Power

Compact Construction—The Morris lifting gear is simple and compact. In the telescopic model the weight is kept close to the mast. This arrangement not only reduces the telescoping effort, but makes the hoisting head easier to rotate when cans are swung around on to the sidewalk or into a wagon. In the platform models this compactness permits placing the lifting gear in a narrow space beside the platform, so that no room is required on floor or in basement.

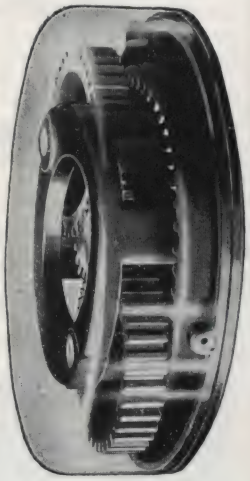


Automatic Brake—Back of the hand chain wheel is the sturdy, dependable, automatic brake, the same as used in hundreds of thousands of industrial hoists. It requires no attention whatever, either while hoisting or lowering—there are no brake handles to operate, no gear-shifting levers to manipulate. Nothing the operator can do—or fail to do—can possibly affect its safety. It is foolproof in the hands of a careless or ignorant operator. In short, it is what an automatic brake *should* be—automatic.

Operation by Pendent Hand Chain—Both the telescoping motion and the hoisting motion are obtained by pulling on an endless hand chain. This method of operation is the least tiring for the operator. It permits him to use his weight rather than his muscles. The chain acts as a flywheel, its momentum helping to keep the load going up smoothly and easily. The operator need not stand in a certain fixed position—in the case of the telescopic models he operates the hoisting head just as easily from either the basement floor or the sidewalk.

The correctness of the principle of pendent chain operation is shown by its general use on industrial cranes and hoists the world over.

Enclosed Gearing—A dust-tight, waterproof casing encloses and protects the gearing. No dirt or grit can get in. The lubricant, which need be applied only once or twice in a season, cannot get out.



There is no possibility of the operator's fingers or clothing being caught in the gears. Modern engineering practice insists on this feature wherever hoists are used.

About Specifying

Always call for Morris ash handling equipment *by name*—it has no "equal."

The exclusive features of design and construction which make Morris hoists supremely satisfactory, are not obtainable in any other equipment. Include all necessary accessories.

Guarantee

Morris ash hoists are guaranteed for one year against defective materials or workmanship.

Continued on next page

Morris Telescopic Ash Hoists

Model "A" raises can to sidewalk level.
Model "B" raises can to wagon height.

The tubular telescopic mast is raised and lowered by pulling on the telescoping hand chain. The mast is self-sustaining, and therefore perfectly safe, at any height.

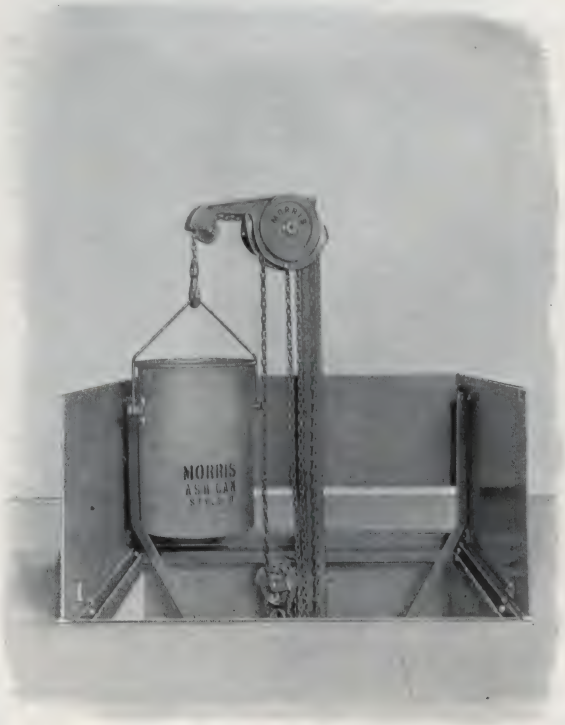
When elevated, the hoist is ready to operate. The lifting capacity is 500 lbs. The hoisting head rotates on ball bearings. Cans are raised at a speed of 30 ft. a minute by pulling lightly on the hoisting chain. The operator may stand either on the sidewalk or on the floor of the areaway, whichever is more convenient.

The Model "B" hoist has longer telescoping pipes, permitting the hoisting head to rise to the additional height necessary for conveniently dumping cans into a wagon. There is no crane arm to be propped up—no cannon-ball on the lifting hook. Operation is exactly the same as the Model "A" grade-level hoist illustrated.

Automatic doors, when furnished, open and close as the telescoping mast is raised or lowered. A counterweight makes their operation practically effortless. Guard gates may be fitted to one or both ends.

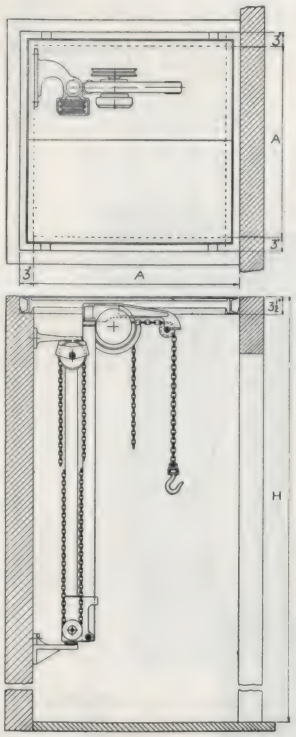
Electric warning gong. When specified a 5-in. extra-loud warning gong is mounted within the counterweight. It rings while the doors are in motion and requires no outside wiring or connections whatever, being actuated by dry cells.

Advantages—Easy to install, because no part of the hoist extends below the floor. Easy to operate—just a light pull on the pendent chain raises or lowers the mast or the cans. No open, exposed gearing—gears run in oil for silence, safety and long life. Safety not dependent on the operator—no levers, pins, catches or brake handles to manipulate.

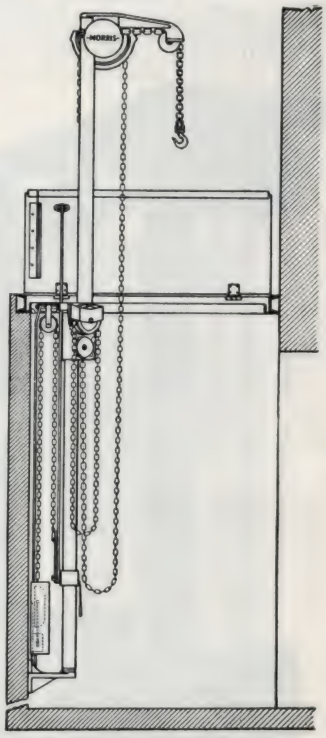


Open
Hoisting head rotates on ball bearings. Note its neat, compact appearance, with weight close to the mast, not at end of arm

Closed
No part of hoist extends below floor. This feature greatly reduces cost of installing



With Non-automatic Doors
Min. opening
A = 3 ft.



With Automatic Doors
Min. opening
A = 3 ft. 6 in.

Specification—Furnish and install a Morris [Model A] [Model B] telescopic ash hoist with enclosed gears operated by pendent chain and lifting on a steel chain. Include Morris [plain] [watertight] double-leaf steel doors, automatic door opening and closing device, safety guard gates at [one end] [both ends], electric warning gong, Morris steel ladder with safety treads, Morris roller bearing ash can truck and ..... Morris style ..... seamless drawn steel ash cans.

Continued on next page

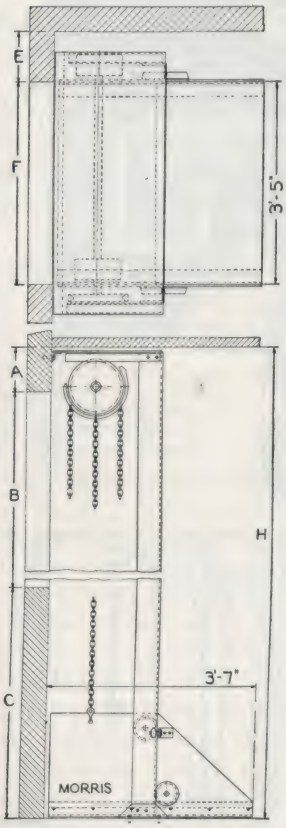
Morris Platform Hoists—General Description

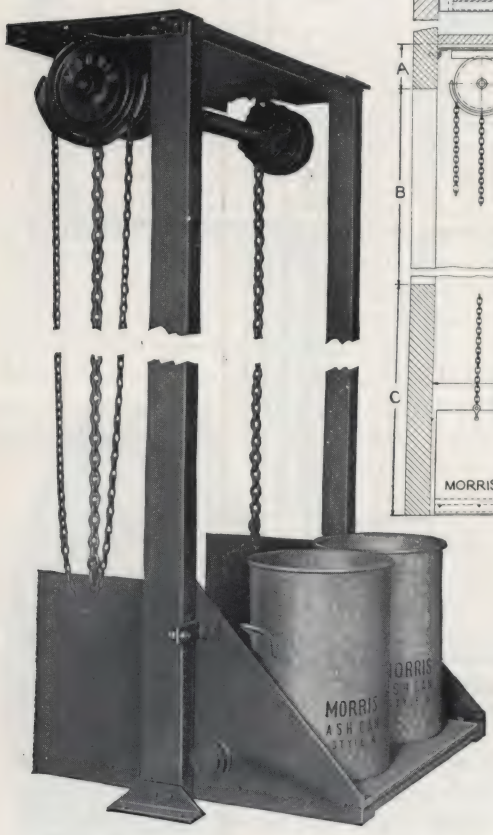
Capacity 1000 lbs., or 4 cans.

Roller bearing platform cannot bind or lift unevenly regardless of how the load is distributed. The enclosed, high speed lifting gears are placed at the top, above the dust and out of the way. They exert a directly vertical lift on the platform through two $\frac{7}{16}$-in. steel chains. Operation is by pendent hand chain. An automatic foolproof brake holds the load when the operating chain is released. There are no catches, stops, handles or other devices to operate. Mechanism is self-contained—no separate winch or cables to line up. Any model may be built for either right-hand or left-hand operation.

Pitless Type Platform Hoist

In this model the platform is placed *between* the guides. The top plate and gears are placed *above* the door or window opening to which the platform is to travel. Dimension "A" is 10 in. When down, the platform is only 2 in. above the floor, so that no pit is required for this model. It occupies the least space in the basement or boiler room; where space is very limited, the platform may be kept elevated and the floor space between the guides used for other purposes.





Morris Pitless Type Platform Hoist

Specification—Furnish and install a Morris Pitless type platform ash hoist, with roller bearing platform, enclosed twin gears operated by pendent chain and lifting on two steel chains. Include Morris steel ladder with safety treads, Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.

Basement Type Platform Hoist

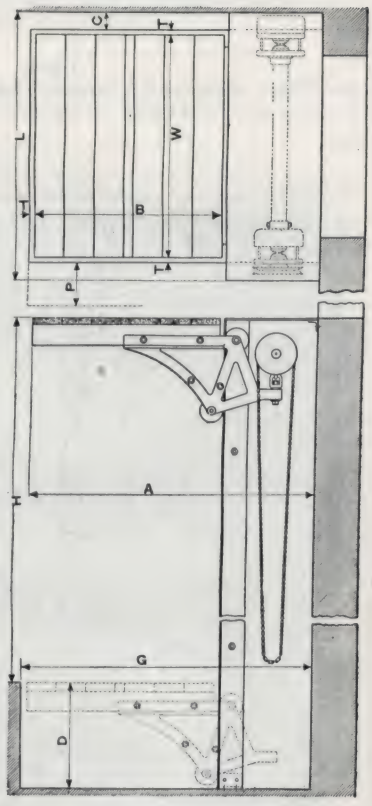
In this model the lifting gears and top plate are placed level with the door or window sill.

Basement Type Platform Hoist

The platform, supported by two substantial steel brackets, rises level with the top plate, and will lower level with the floor if a pit 1 ft. 9 in. deep is provided.

Installation is a very simple matter. Two bolts hold the top plate to the wall, two floor bolts anchor the guides. The twin lift hoist and the platform are then attached and the hoist is ready to use.

Specification—Furnish and install a Morris Basement type platform ash hoist, with roller bearing platform, enclosed twin gears operated by pendent hand chain and lifting on two steel chains. Include Morris steel ladder with safety treads, Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.



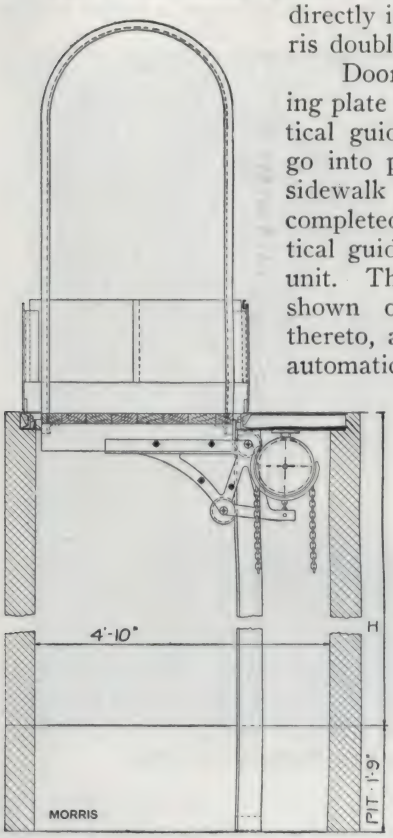
A	4′ 9″	D	1′ 9″	P	1′ 6″
B	3′ 2″	G	4′ 10″	T	1″
C	2½″	L	4′ 5″	W	3′ 10″

Continued on next page

Morris Sidewalk Type Platform Hoist

Capacity 1000 lbs., or 4 cans.

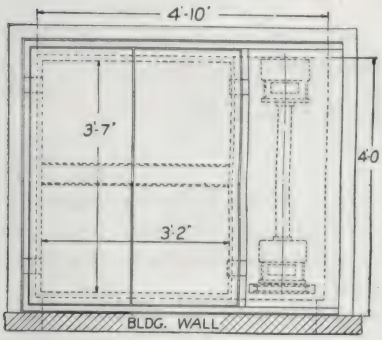
This convenient hoist is inexpensive and very easy to install. It requires a space only 4 ft. x 4 ft. 10 in. Permanent alignment between the platform and the door opening is insured by building the steel top plate, to which the lifting gears and guides are attached, directly into the frame of Morris double-leaf doors.

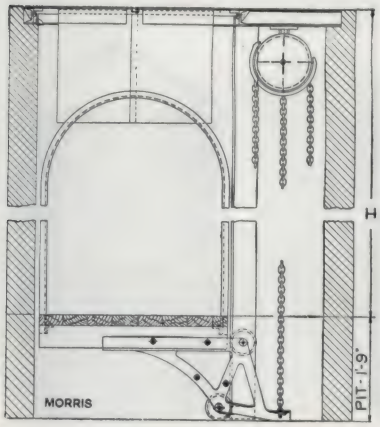


Sidewalk Platform Hoist

Door frame and supporting plate for the gears and vertical guides are a unit. They go into place like an ordinary sidewalk door. Installation is completed by attaching the vertical guides and the twin hoist unit. The doors may open as shown or at right angles thereto, and if desired may be automatically unlocked, opened, closed and locked and fitted with fixed or swinging guard gates at one or both ends. The hoisting gears may be placed either to the right of the platform, as illustrated (right-hand operation) or to the left (left-hand operation).

The platform, lifted by two heavy steel chains, travels on four large roller bearing wheels. It can not bind on the guides no matter how the load is distributed.





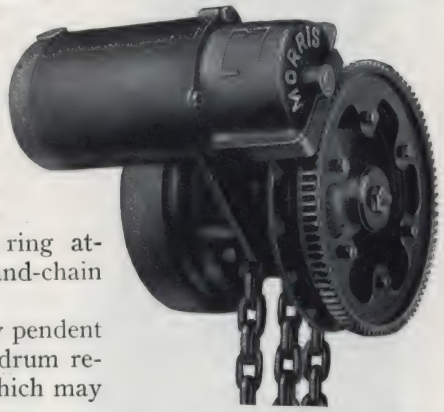
Specification—Furnish and install a Morris Sidewalk type platform ash hoist, with roller bearing platform, enclosed twin gears operated by pendent hand chain and lifting on two steel chains, built integral with Morris [plain] [watertight] double-leaf steel doors, automatic door opening and closing bow, safety guard gates at [one end] [both ends], electric warning gong, Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.

Morris Motor Operated Platform Hoists

Capacity 1000 lbs., or 4 cans.

An inexpensive, but simple and practical power driven hoist.

Any Morris platform hoist may be motor operated. The driving unit is a Morris ½ hp. totally enclosed ball bearing motor with a built-in, planetary type speed-reducing gear.



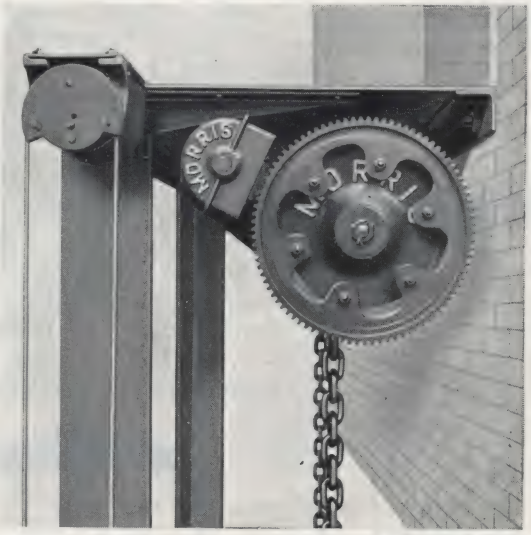
Enclosed Ball Bearing Motor Unit

This compact but highly efficient unit is bolted rigidly to the frame of the twin lift gear, which it drives through a spur ring attached to the hand-chain wheel.

Control is by pendent cords through a drum reversing switch which may be placed wherever convenient.

A foolproof mechanical brake, the operation of which is not affected by interruption of the current supply, sustains the platform at all times.

Safety is further insured by an ingenious slipping clutch which positively prevents damage to the motor or lifting gears in case of accidental overhoisting or overlowering. This feature also guards against overloading the platform.



Motor and Twin Gears Are Placed Directly Under Top Plate—Out of the Dirt—Out of the Way

Dimensions of Morris motor operated hoists are the same as those given on the preceding pages for hand operated platform hoists, except that the 4 ft. 10 in. dimensions of the basement and sidewalk types must be increased to 5 ft. 3 in.

Lifting speed approximately 9 ft. per minute.

Specification—Use specification for equivalent hand operated platform hoist (pitless type, basement type or sidewalk type) and insert "motor operated." State current supply. Not made for single phase.

Continued on next page

Morris Window Ash Hoist

Capacity 250 lbs., or 1 can.

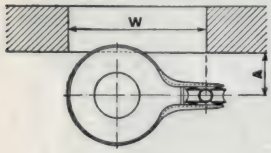
This is a low cost, fast operating hoist for handling a moderate volume of ashes. The platform travels 1 ft. for each 4 ft. of hand chain pulled. The lifting gear is a high speed chain block, mounted at the top of the mast where it gives a directly vertical lift on the load. No effort is wasted by introducing idlers. The brake of course is entirely automatic, holding the load whenever the operating chain is released.

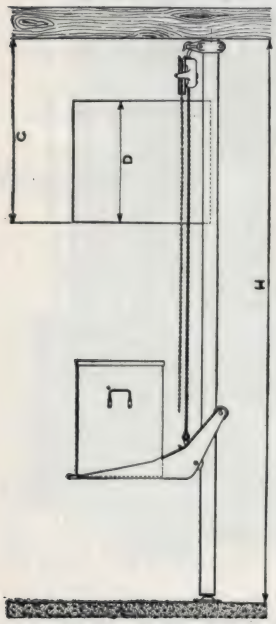
Morris Window Ash Hoist

The platform does not slide, but travels freely on two large rollers. The tubular mast is mounted on a ball-and-socket floor bearing. A touch rotates both mast and platform when can is to be swung into window opening. A window only 27 in. square is large enough, and top may be flush with ceiling.

Any handyman can install one of these hoists in an hour or two.

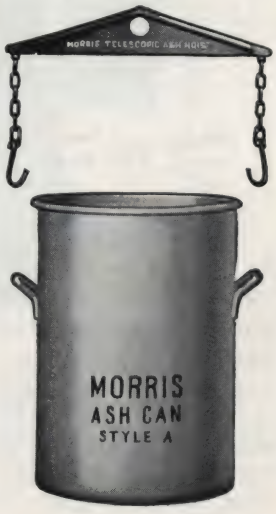
Specification — Furnish and install a Morris Window ash hoist, with high speed gears operated by pendent chain and lifting on a steel chain. Include Morris roller bearing ash can truck and ..... Morris Style "A" seamless drawn steel ash cans.





MINIMUM DIMENSIONS

A	8½	in.
D	27	in.
W	27	in.
C (hand op.)	27	in.
C (electric)	30	in.



Morris Motor Operated Window Ash Hoist

Capacity 250 lbs., or 1 can.

This is an efficient power operated lift at low cost. The power unit is a ½ hp. totally enclosed ball bearing motor, with built-in speed-reducing gear. It is direct-geared to the enclosed, planetary lifting gears. The brake is mechanical, automatic, and foolproof. Pendent control cords operate the hoist through a drum reversing switch. The current is shut off automatically when the platform reaches the top. Lifting speed 20 ft. per minute.

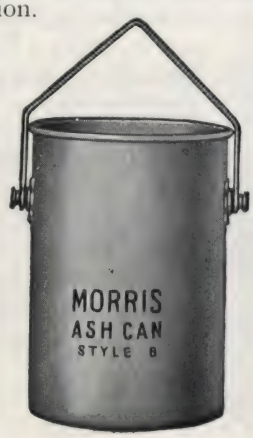
Motor Operated Window Ash Hoist

Specification—Use the specification at the foot of preceding column and insert "motor operated." State current supply. Not made for single phase.

Morris Seamless Drawn Steel Ash Cans

Size inside, 16x24 in.; weight 45 lbs. each. Each can is drawn from a single plate of 12 gauge steel. (Most ash cans are made of much lighter material, usually 16 or 18 gage.) Trunnions or handles are cast steel, brazed on. The bottoms are raised to provide a good handhold for emptying.

When Style "A" cans are to be handled on a telescopic hoist, include a Morris ash can bail in the specification.



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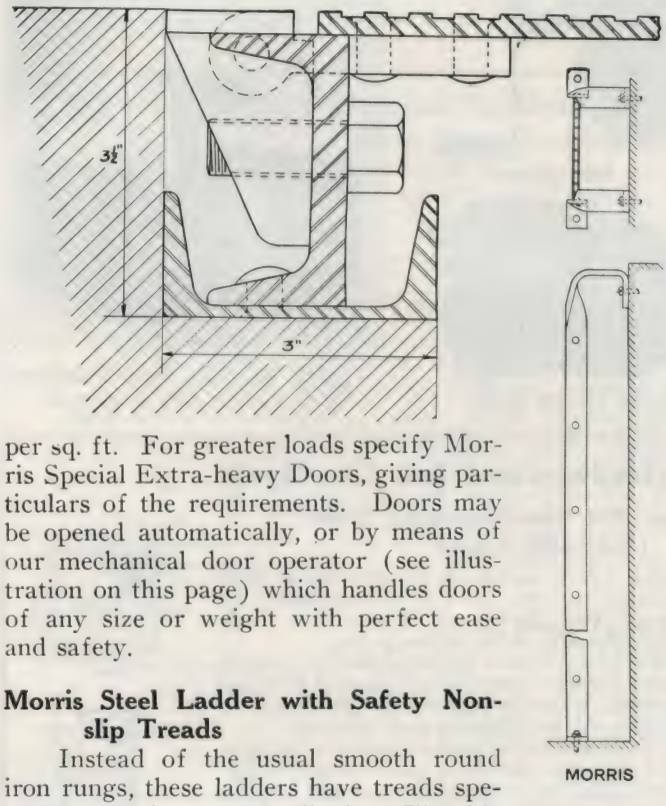
Morris Double-leaf Sidewalk Doors

These doors are made in two types—the *plain door* without gutter, and the *watertight door,* with gutter and elbow connection for ¾-in. drain.

The drawing shows the watertight door. The gutter is a *channel,* which effectively prevents leakage back of the frame, a weakness of many so-called watertight doors.

The door frame is a heavy channel weighing 6 lbs. per ft., with a web ⅜ in. thick. All corners are welded. Door leaves are ¼-in. steel plates with improved raised-tread surface. Hinges are extra heavy cast bronze, with bronze hinge pins which cannot rust or bind. They are self-aligning, perfectly flush, and readily removable after doors are set.

Morris standard doors sustain a load of 300 lbs.



per sq. ft. For greater loads specify Morris Special Extra-heavy Doors, giving particulars of the requirements. Doors may be opened automatically, or by means of our mechanical door operator (see illustration on this page) which handles doors of any size or weight with perfect ease and safety.

Morris Steel Ladder with Safety Non-slip Treads

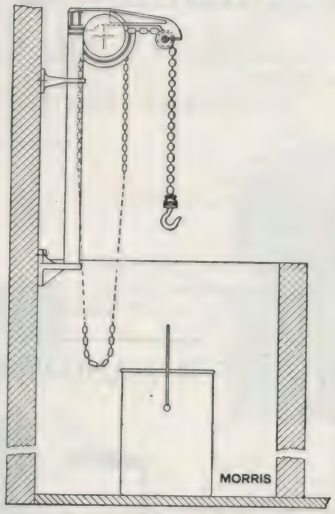
Instead of the usual smooth round iron rungs, these ladders have treads specially formed to prevent slipping. The side rails are forged back to the wall, leaving no sharp corners to catch the clothing.

Morris Roller Bearing Ash Can Truck

Adjustable for any size of can. It grips the can by the top rim, lifting it directly off the floor without preliminary tilting. It enables a man to handle the heaviest can with one hand. The frame is tubular, galvanized. The wheels are 10-in. diameter—large enough to roll easily, even on a rough boiler room floor.

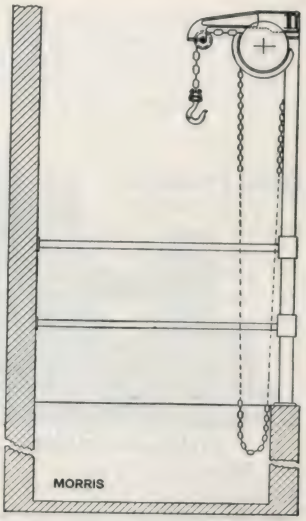
Weight 35 lbs.

Other Morris Ash Hoists



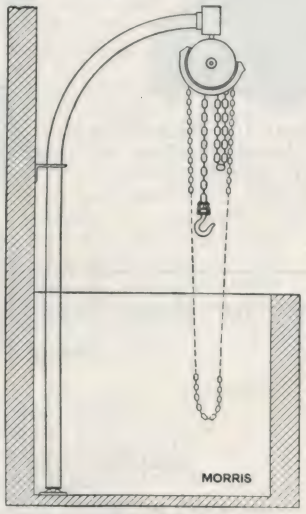
Wall Type Non-telescopic

Includes pipe and two wall brackets with bolts. Mount at any desired height above grade



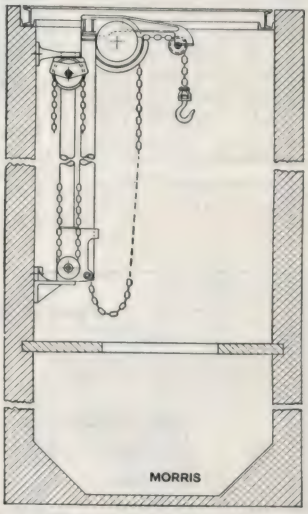
Railing Type Non-telescopic

Mounted in 2½-in. corner pipe of pipe railing, to be extended 4 ft. above top rail



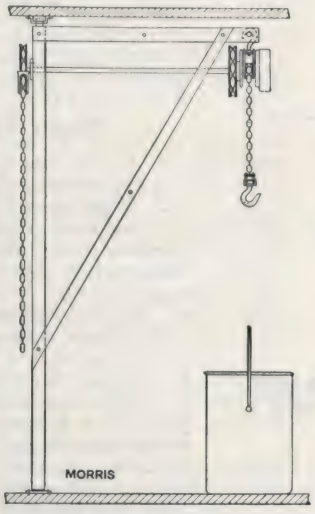
Davit Hoist

With steel suspension plates and non-removable high speed triple gear chain block. Enclosed gears, automatic brake



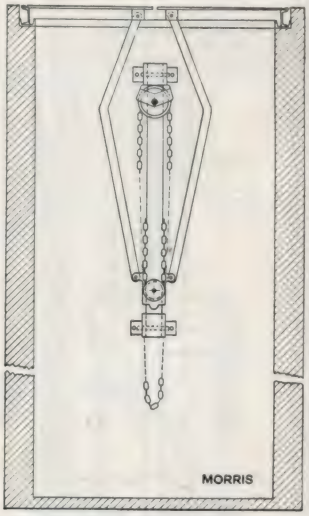
Model "A" Telescopic Screenings Hoist

Grade level. If cans are to be raised to wagon height, specify Model "B"



Jib Type

With high speed triple gear hoist and extended hand chain. For swinging cans through elevated door or window



Mechanical Door Operator

Opens and closes old or new sidewalk doors of any size or weight, with ease and perfect safety

WASHBURN & GRANGER, INC.

Manufacturers of Ash Can Hoists and Equipment

50 Church Street, NEW YORK, N. Y.

Dean Products

ASH CAN HOISTS: Telescopic, Air, Steam, Hydraulic, Electric or Hand Power.

ASH CANS and HAND TRUCKS.

SIDEWALK SAFETY DOORS and DOOR OPENING DEVICES.

Also manufacturers of Boiler Castings and Fronts, steel or cast iron; Boiler Room Floor Plates; Ash Hopper Gates; Flat Suspended Arches; Blast Gates; Manhole, Trench and Sump Pit Covers, Frames and Plates; Ash Pit or Cleanout Doors; Metal Ladders; Wood Patterns; Cast Iron Industrial Track; Cut-off or Hopper Valves.

For Dean Incinerators and Armored Flooring, see Manufacturers' Index.

DEAN TYPE B HAND-OPERATED ASH CAN HOISTS

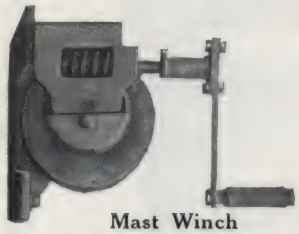
Dean Type B Hand-operated Ash Can Hoists

The Dean Type B Hoists are hand-operated and made in two styles: Type B-1 for raising can to sidewalk only, and Type B-2 for raising can to dump directly into wagon.

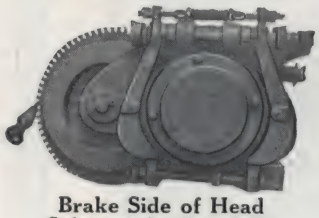
A few of the main parts are illustrated here to show their rugged construction. Complete specifications and details are given below.

Load Winch for Type B-2

Holds mast and load in any position with hand of operator removed from winch handle



Mast Winch



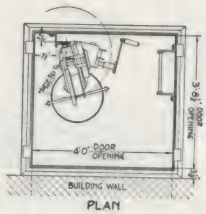
Brake Side of Head

Safety pawls all enclosed

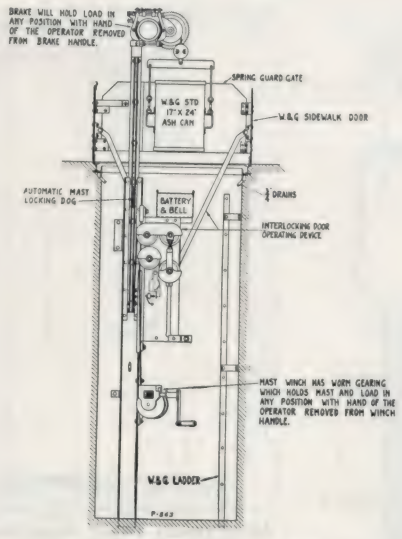
Type B Ash Can Hoist Installed

Type B-1 lifts cans to sidewalk
Type B-2 lifts cans to wagon

Specifications for Dean Type B Hand-operated Ash Can Hoists



PLAN



Dean Type B-1 Hand-operated Hoist (Sidewalk Type)

Dean Type B-1 Hand-operated Hoist (Sidewalk Type)

Furnish and install where shown on the plans, one Dean model B-1 hand-operated ash can hoist, as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y., designed to place the can on the sidewalk only.

Hoist shall have cut gears, bronze bushings and be equipped with a brake arranged so that the can will not drop if the hand of the operator is removed from the brake lever. Head shall be provided with a ball bearing to facilitate easy turning.

Safety pawls shall be furnished to prevent backward rotation.

Winch for raising the mast shall be a worm actuated self-locking device, and be capable of holding the mast and also the load in any position on the up or down stroke with the hand of the operator removed from the winch handle.

Distance from basement floor level to pavement, approximately .... ft. .... in.

Dean Type B-2 Hand-operated Hoist (Wagon Type)

Furnish and install where shown on the plans, one model B-2 Dean hand-operated ash can hoist as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y.

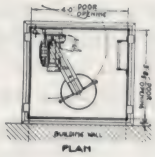
Hoist shall be capable of raising the can 5 ft. above the pavement so that the contents may be dumped directly into a wagon.

Hoist shall have cut gears, bronze bushings, and be equipped with a brake arranged so that the can will not drop if the hand of the operator is removed from the brake lever. Head shall be provided with ball bearings to facilitate easy turning.

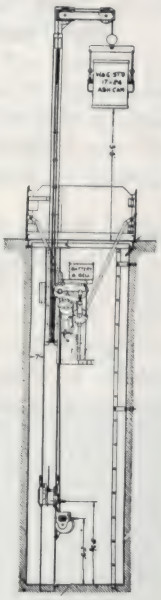
Safety pawls shall be furnished to prevent backward rotation, and a locking device to automatically lock the mast when it has been raised to its proper position. Winch for raising the mast must be worm actuated so as to permit mast to be held in any position with the hand of the operator removed from the handle.

Distance from basement floor level to pavement, approximately .... ft. .... in.

For Dean Equipment for Ash Can Hoists, see third page following



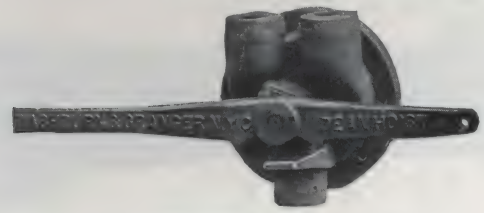
PLAN



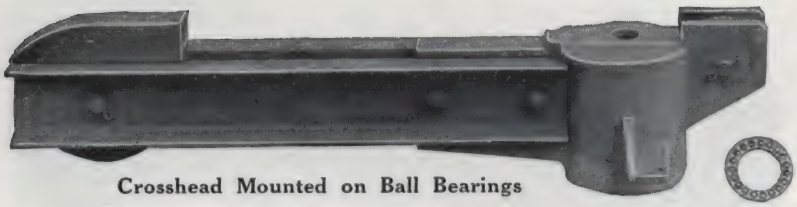
Dean Type B-2 Hand-operated Hoist (Wagon Type)

Continued on next page

DEAN TYPE F ELECTRIC ASH CAN HOISTS

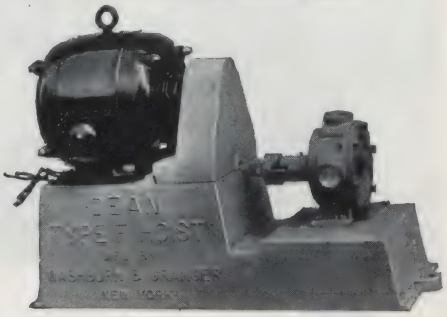


Direction Valve



Crosshead Mounted on Ball Bearings

A sturdy, efficient, correctly designed machine that will give long trouble-free service. Made in two styles—Type F-1 for raising can to sidewalk only and Type F-2 to dump directly into wagon.



Positive Pressure Pump
Pump, motor and reducing gears are mounted on one bed plate. Pump is driven by 2 hp. motor

Specifications for Dean Type F Electric Ash Can Hoists

Dean Type F-1 Electric Hoist (Sidewalk Type)

Furnish and install where shown on the plans, one Model F-1 Dean electric ash can hoist, as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y. Plunger shall be 5-in. diameter Shelby steel tubing, turned and polished and of sufficient length to raise the can to the sidewalk level. Cylinder shall be of lap-welded pipe.

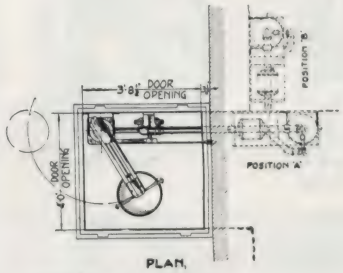
The crosshead shall be mounted on ball bearings and rotate independently of the steel piston. An automatic stop shall be provided to retard the speed and stop the plunger at the extreme limit of the upward stroke. A by-pass and operating valve with counterbalance shall be installed.

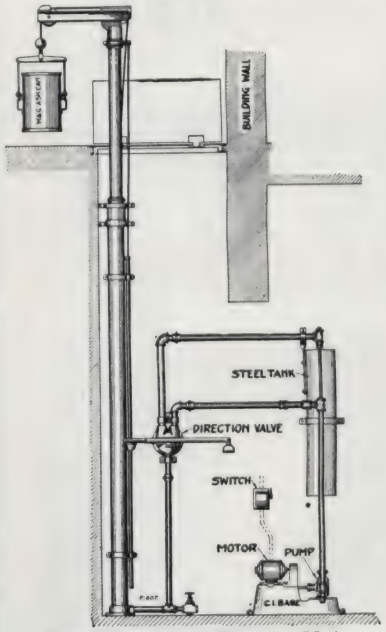
The necessary pressure required to raise the plunger shall be produced by a positive pressure pump driven by a 2 hp. ..... current ..... phase ..... cycle ..... volt motor of approved make. The pump, motor and reducing gears shall be mounted on one bed plate and shall be located as shown on plans.

A reservoir of ample capacity shall be furnished and installed on wall where shown on plans.

Hoist shall be complete with special non-rotating hoisting rope and steel bail with safety catches. An enclosed safety starting switch of approved make shall be furnished. The above starting switch and the necessary conduit and wiring between the motor and the switch shall be installed by the contractor for the wiring.

Distance from basement floor line to pavement, approximately ..... ft. ..... in.





Dean Type F-1 Electric Hoist (Sidewalk Type)

Dean Type F-2 Electric Hoist (Wagon Type)

Furnish and install where shown on the plans, one Model F-2 Dean electric ash can hoist, as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y.

Plunger shall be 5-in. diameter Shelby steel tubing, turned and polished, and of sufficient length to raise the can 6 ft. above the pavement.

Cylinder shall be lap-welded pipe.

The crosshead shall be mounted on ball bearings and rotate independently of the steel piston, from the position of hoisting through the area opening to a position above the ash cart.

An automatic stop shall be provided to retard the speed and stop the plunger at the extreme limit of the upward stroke. A by-pass and operating valve with counterbalance shall be installed.

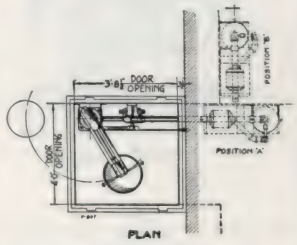
The necessary pressure required to raise the plunger shall be produced by a positive pressure pump driven by a 2 hp. ..... current ..... phase ..... cycle ..... volt motor of approved make. The pump, motor and reducing gears shall be mounted on one bed plate and shall be located where shown on plans.

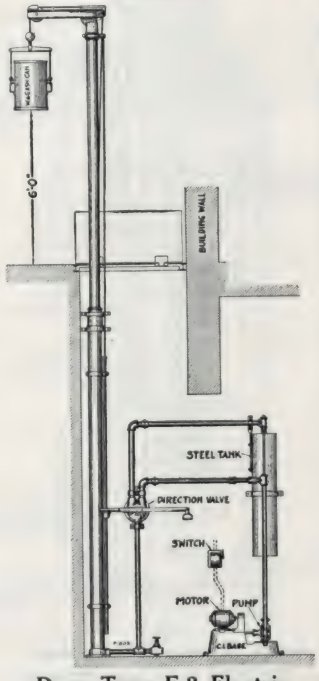
Hoist shall be complete with special non-rotating hoisting rope and steel bail with safety catches.

An enclosed safety starting switch of approved make shall be furnished by this contractor.

The above starting switch and the necessary conduit and wiring between the motor and the switch shall be installed by the contractor for the wiring.

Distance from the basement floor level to pavement, approximately ..... ft. ..... in.



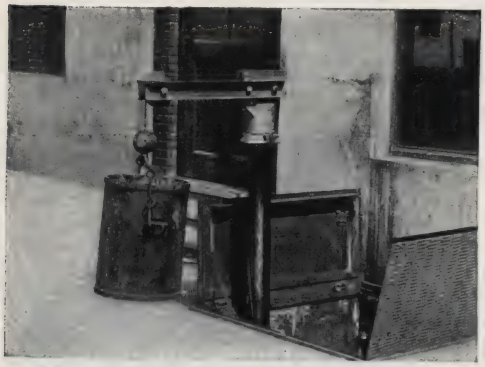


Dean Type F-2 Electric Hoist (Wagon Type)

For Dean Equipment for Ash Can Hoists, see second page following

Continued on next page

DEAN TYPE A STEAM-OPERATED ASH CAN HOISTS



Crosshead Mounted on Ball Bearings

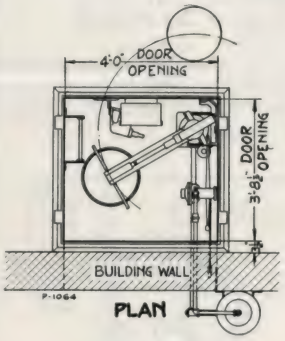
Rotates independently of steel piston from the position of hoisting through the area opening to a position on the sidewalk or above the ash cart

Direction Valve

Pressure Tank

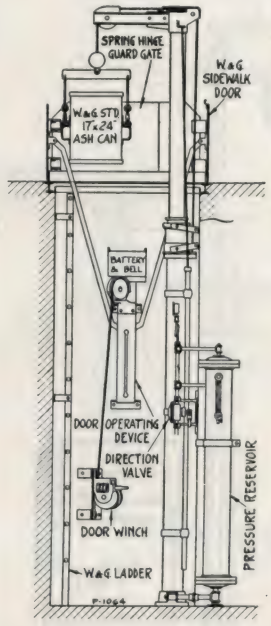
Specifications for Dean Type A Steam-operated Ash Can Hoists

Dean Type A-1 Steam-operated Hoist (Sidewalk Type)



Furnish and install where shown on the plans, one model A-1 Dean steam-operated ash can hoist, for 75 to 125-lb. pressure, as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y. Plunger shall be of 5-in. Shelby steel tubing, turned and polished, and be of sufficient length to raise the can to the sidewalk level. Cylinder shall be of lap-welded pipe. The crosshead shall be mounted on a ball bearing and rotate independently of the steel piston. An automatic stop shall be installed to retard the speed and stop the plunger at the extreme limit of the upward stroke. Control valve shall be simple in construction and arranged for suitable pressure and exhaust connections. The reservoir shall be of ample size for the lift required, and equipped with special port castings to eliminate noise in operation. The stuffing box in the head casting shall be of generous depth to provide for ample packing. Hoist shall be complete with special, non-rotating hoisting rope and steel bail with safety catches.

The ½-in. supply and exhaust pipe connections between the operating valve and the main piping system are to be furnished and installed by the heating contractor. Height from basement floor level to pavement, approximately .... ft. .... in.



Dean Type A-1 Steam-operated Ash Can Hoist (Sidewalk Type)

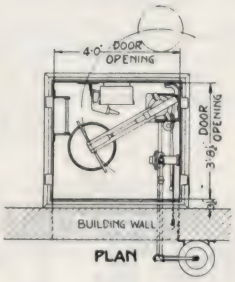
Dean Type A-2 Steam-operated Hoist (Wagon Type)

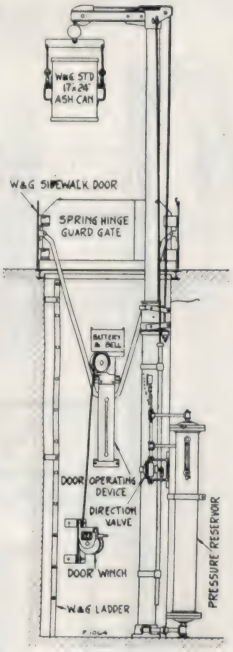
Furnish and install, where shown on the plans, one model A-2 Dean steam-operated ash can hoist for 75 to 125-lb. pressure, as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y. Plunger shall be 5-in. diameter Shelby steel tubing, turned and polished, and be of sufficient length to raise the can 6 ft. above the pavement. Cylinder shall be of lap-welded pipe. The crosshead shall be mounted on a ball bearing and rotate independently of the steel piston, from the position of hoisting through the area opening to a position above the ash cart. An automatic stop shall be installed to retard the speed and stop the plunger at the extreme limit of the upward stroke. Control valve shall be simple in construction and arranged for suitable pressure and exhaust connections. The reservoir shall be of ample size for the lift required and equipped with special port castings to eliminate noise in operation. The stuffing box in the head casting shall be of generous depth to provide for ample packing. Hoist shall be complete with special, non-rotating hoisting rope and steel bail with safety catches.

The ½-in. supply and exhaust pipe connections between the operating valve and the main piping system are to be furnished and installed by the heating contractor.

Height from basement floor level to pavement, approximately .... ft. .... in.

For Dean Equipment for Ash Can Hoists, see next page



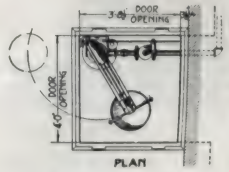


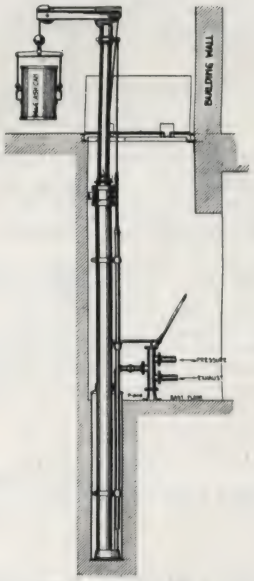
Dean Type A-2 Steam-operated Ash Can Hoist (Wagon Type)

Continued on next page

DEAN TYPE D HYDRAULIC ASH CAN HOISTS

These hoists have the same general features of construction as shown in the illustrations for the Type A steam-operated hoist on the previous page. They operate on 75 to 100-lb. water pressure; are sturdy and should last indefinitely. The Type D-1 is for raising can to sidewalk only. The Type D-2 raises can for dumping in wagon.





Dean Type D-1 Hydraulic Hoist (Sidewalk Type)

Dean Type D-1 Hydraulic Hoist (Sidewalk Type)

Furnish and install where shown on the plans, one model D-1 Dean hydraulic ash can hoist, to operate on 75 to 125-lb. water pressure, as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y. Plunger shall be 5-in. Shelby steel tubing, turned and polished, and to be of sufficient length to raise the can to the sidewalk level. Cylinder shall be of lap-welded pipe. The crosshead shall be mounted on ball bearings and rotate independently of the steel piston. An automatic stop shall be installed to retard the speed and stop the plunger at the extreme limit of the upward stroke. Furnish a special 3-way operating valve with counterbalance. The stuffing box in the head casting shall be of generous depth to provide for ample packing. Hoist shall be complete with special non-rotating hoisting rope and steel bail with safety catches.

The 2-in. supply and exhaust pipe connections between the operating valve and the main piping system are to be furnished and installed by the heating contractor.

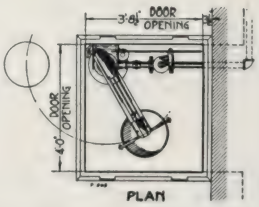
Distance from basement floor level to pavement, approximately .... ft. .... in.

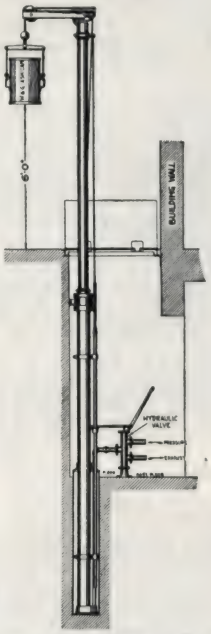
Dean Type D-2 Hydraulic Hoist (Wagon Type)

Furnish and install where shown on the plans, one model D-2 Dean hydraulic ash can hoist, for 75 to 125-lb. water pressure, as manufactured by WASHBURN & GRANGER, INC., 50 Church Street, New York, N. Y. Plunger shall be 5-in. Shelby steel tubing, turned and polished, and shall be of sufficient length to raise the can 6 ft. above the pavement. Cylinder shall be of lap-welded pipe. The crosshead shall be mounted on ball bearings and rotate independently of the steel piston, from the position of hoisting through the area opening to a position above the ash cart. An automatic stop shall be installed to retard the speed and stop the plunger at the extreme limit of the upward stroke. A special 3-way operating valve, with counterbalance, shall be installed. The stuffing box in the head casting shall be of generous depth to provide for ample packing. Hoist shall be complete with special non-rotating hoisting rope and steel bail with safety catches.

The 2-in. supply and exhaust pipe connections between the operating valve and the main piping system are to be furnished and installed by the heating contractor.

Distance from basement floor level to the pavement, approximately .... ft. .... in.





Dean Type D-2 Hydraulic Hoist (Wagon Type)

Specifications for Dean Equipment for Ash Can Hoists

Sidewalk Doors—Furnish the following Dean equipment: One steel, watertight sidewalk frame and doors, to have opening of 4 ft. x 3 ft. 8½ in.; doors shall be ¼-in. diamond top steel plates, brass hinges, set flush, and provided with mechanism so that they may be opened and closed from the boiler room floor level; frame shall be tapped for ¾-in. drain connection. Frame shall be set by the contractor for the pavement.

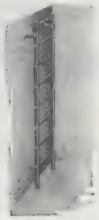
Ash Cans—Furnish 12 Dean ash cans, 17 in. in diameter and 24 in. high, made of No. 16 gauge steel with reinforced bottoms. Provide wrought steel handles with eye for connection to hoisting bail.

Hand Truck—Furnish one Dean ash can truck, of tubular construction, suitable for the above size cans.

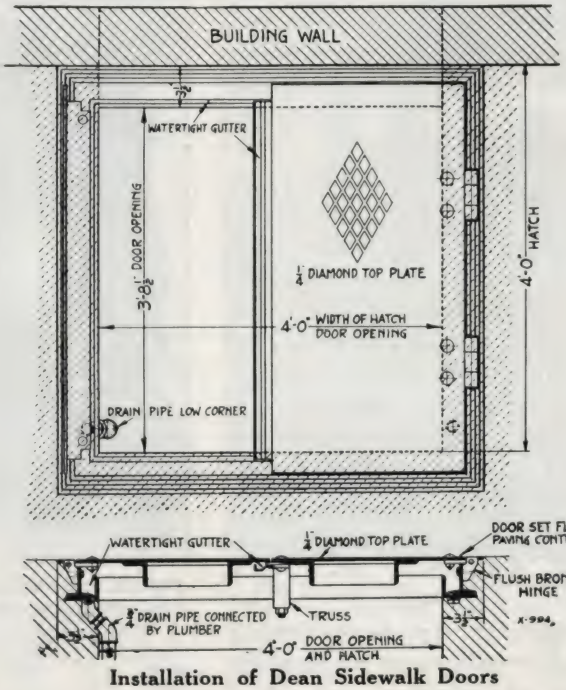
Steel Ladder—Furnish and install in the hatchway one Dean steel ladder, side strips ⅜x2 in., ¾-in. diam. rungs on 12-in. centers, to be 14 in. wide and .... ft. long.

Dean Ash Can

Dean Hand Truck



Steel Ladder



Installation of Dean Sidewalk Doors

ESTABLISHED 1866

GILLIS & GEOGHEGAN

INCORPORATED

TELEPHONE
SPring 7-7800

Manufacturers of Telescopic Hoists

542 West Broadway, NEW YORK, N. Y.

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BIRMINGHAM, ALA., L. L. Overstreet, 2302 Fourth Ave.
BUFFALO, N. Y., The Jones Iron Works, 136 Efner St.
CAMBRIDGE, MASS., Allen & Drew, Inc., 43 Brookford St.
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CHATTANOOGA, TENN., Stephens Builders Supply Co., 1017 E. 9th St.
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CINCINNATI, OHIO, A. W. Frank, 707 Gerke Bldg.
CLEVELAND, OHIO, The R. L. Queisser Co., 9105 Woodland Ave.
COLUMBUS, OHIO, R. L. Watson & Company, 412 Commerce Bldg.
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DES MOINES, IOWA, Preston Daniels, Hubbell Bldg.
DETROIT, MICH., Kennedy & Dawson, 2111 Woodward Ave.
FORT WAYNE, IND., C. L. Schust Roofing Co., Lindley and Parkview Aves.
HUNTINGTON, W. VA., J. J. Weiler & Sons, 202-220 Elm St.
INDIANAPOLIS, IND., Hoover Brothers, Archts. & Bldrs. Bldg.
KANSAS CITY, MO., Robert O. Smith, 2035 E. 19th St.
KNOXVILLE, TENN., C. M. Allen Co., Inc., 712 So. Gay St.
LOS ANGELES, CAL., Frank R. Peck Company, 1007 So. Grand Ave.
LOUISVILLE, KY., R. B. Tyler Company, 1446 Levering St.
MANCHESTER, N. H., Lyons Iron Works
MEMPHIS, TENN., Akers & Company, 229 Madison Ave.
MIAMI, FLA., O. D. Brinson, P. O. Box 974.
MILWAUKEE, WIS., Ph. Gross Hardware & Supply Co., 218 Third St.
MINNEAPOLIS, MINN., Morgan-Gerrish Co., 800 La Salle Ave.
NASHVILLE, TENN., E. T. Kirkpatrick & Co., 63 Arcade Bldg.
NEW HAVEN, CONN., Warner-Miller Co., R. R. Ave. and St. John St.
NORFOLK, VA., J. S. Jones, 259 Arcade Bldg.
OKLAHOMA CITY, OKLA., The Lusco Brick & Stone Co., American Bank Bldg.
OMAHA, NEB., F. H. Turney & Co., 707 So. 27th St.
PHILADELPHIA, PA., Culbert-Whitby Co., 2019 Rittenhouse St.
PITTSBURGH, PA., J. R. Pitcairn, 132 7th St.
PORTLAND, ME., H. K. Dyer, 71 Kennebec St.
RICHMOND, VA., J. S. Archer, Davis Bldg.
ROANOKE, VA., Roanoke Engineering Sales Co., 507 Commerce St.
ROCHESTER, N. Y., Building Specialties Co., Inc., 52 Brown's Race.
ST. LOUIS, MO., Hunkins-Willis Lime & Cement Co., Louderman Bldg.
SALT LAKE CITY, UTAH, Hawley-Richardson-Williams Co., Dooly Bldg.
SAN FRANCISCO, CAL., Vincent Whitney Co., 365 Market St.
SAVANNAH, GA., Charles M. MacLean & Co., 20 E. Bay St.
SEATTLE, WASH., F. T. Crowe & Co., 216 Walker Bldg.
SHREVEPORT, LA., Welsh Building Specialties Co., 310 Ricou-Brewster Bldg.
SYRACUSE, N. Y., H. L. Waterman, Inc., 904 Canal St.
TAMPA, FLA., Stovall & Archer, 1009 Peninsular Telephone Bldg.
TOPEKA, KAN., Capital Iron Works Company, 7th and Holiday Sts.
UTICA, N. Y., American Hard Wall Plaster Co.
WEST JACKSON, MISS., City Coal & Material Co., P. O. Box 418.
WICHITA, KAN., The Lusco Brick & Stone Co., 201 W. Douglas St.
WILKES-BARRE, PA., Robert M. Miller, 400 Coal Exchange Bldg.

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the G&G ELECTRIC REG. U.S. PAT. OFF. Telescopic Hoist
With Automatic Stop and Gravity Lowering Device

Note: It is recommended that *complete* G&G equipment be installed as a unit; but, if desired, any part or parts thereof can be furnished separately.

Where sidewalk opening is so located that building wall does not afford protection when doors are opened, an additional set of spring guard gates can be installed to completely safeguard hoistway (Figs. 12 and 15).

TELESCOPIC HOISTS

Special Models

Special hoists other than our standard models can be designed and built to meet unusual and difficult conditions. See G&G pages 6 and 7.

Uses

G&G telescopic hoists with complete equipment are designed for lifting and lowering loads up to 500 lb. in industrial plants, and for ash removal in office buildings, schools, hospitals, churches, factories, etc. G&G hoist equipment complies with all municipal ordinances. It has the approval of insurance and public building inspectors everywhere and often eliminates violations placed on grade openings. Can be operated in the coldest weather, as no parts are susceptible to freezing.

Fig. 1. Model E Hoist (Electric) at Julia Richman High School, New York

Wm. H. Gompert, Municipal Architect

G&G Sidewalk Doors, equipped with Automatic Door Opening and Closing Device. Spring Guard Gate automatically protects the hoistway on all sides

Boiler Room to Grade Level, Electric, Model E Telescopic Hoist

The G&G Model E telescopic hoist with complete equipment affords a simple, safe and economical method for hoisting and lowering between cellar and sidewalk or between floors, such loads as ashes, rubbish, bags, bales, barrels, crates, coal, garbage, ice, etc. Fig. 1 shows hoist equipment as installed for ash removal. When not in use no part of hoist shows above sidewalk. A few turns of telescoping handle raises hoisting head to proper position over hoistway (Fig. 6). Operator then ascends to sidewalk level by the iron ladder, and proceeds to raise the cans. Hoisting head revolves on ball bearings; depositing can, without lifting, on sidewalk. *Cans are lowered very rapidly by*

Continued on next page

gravity, thus saving electric current. Electric control lever has three positions. At one extreme, load is raised by electric power; at the other extreme, load is lowered by gravity; and in center position, load is brought to an instant stop.

Advantages—Hoist raises 500-lb. load electrically *worm driven* at speed of 60 ft. per minute, and lowers rapidly by gravity. Hoist equipment is compact and very easy to erect. We furnish all necessary clamps and bolts, and blue print showing, in detail, how to erect.

G&G sidewalk doors with guard gates make open hoistway absolutely safe for operator and pedestrians.

Construction—The strongest and most durable materials are used. Hoisting head is cast steel. Steel cable is non-rotating. All gears are machine cut. Every hoist is subjected to thorough working test before shipment, and is given factory coat of paint.

Motor—Hoist has a 1½ hp. alternating or direct current motor with magnetic brake, automatic stop and gravity lowering device, automatic upper limit and single speed controller. Current consumed only when hoisting. Motor is dust-proof and moisture proof. Gears run in grease in grease-tight housing. Master worm gear is of best grade phosphor bronze.

Factor of Safety—No part has a factor of safety of less than 8, based on the maximum rated capacity shown on name plate.

Prices—Are based on *(a)* the size of sidewalk doors required; *(b)* whether checkered steel or vault light leaves; *(c)* location of doors with regard to building wall, see Figs. 7 and 12; *(d)* distance between boiler room floor and grade level; *(e)* kind of electric current available at building.

How to Specify—See G&G page 7.

Size of Area—We strongly recommend that area opening be made 4x4 ft. for all models. This gives the operator room enough to work. If necessary, a smaller or larger area may be provided, but it is not as practical.

G&G Automatic Sidewalk Door Opening, Closing and Locking Device with Safety Spring Guard Gates

This device is illustrated in connection with Model E hoist, but may also be used in connection with Models A, B, C and D. Device operates automatically when telescoping handle of hoist is revolved. Sidewalk doors open and close as hoisting head is raised or lowered. A counterweight is provided so that telescoping works smoothly and easily. A weather-proof warning bell is provided to operate while doors are opening and closing. An important feature is the *self-locking doors, whether open or closed.*

The spring guard gates automatically close up the opening, at the sidewalk level, between the wide-opened sidewalk doors. The gates *cannot be swung inward; swing outward only,* to permit passage of ash can, thus protecting pedestrians and the operator.

G&G swing bail cans and G&G fixed bail cans enable the operator to hook cans from the grade.

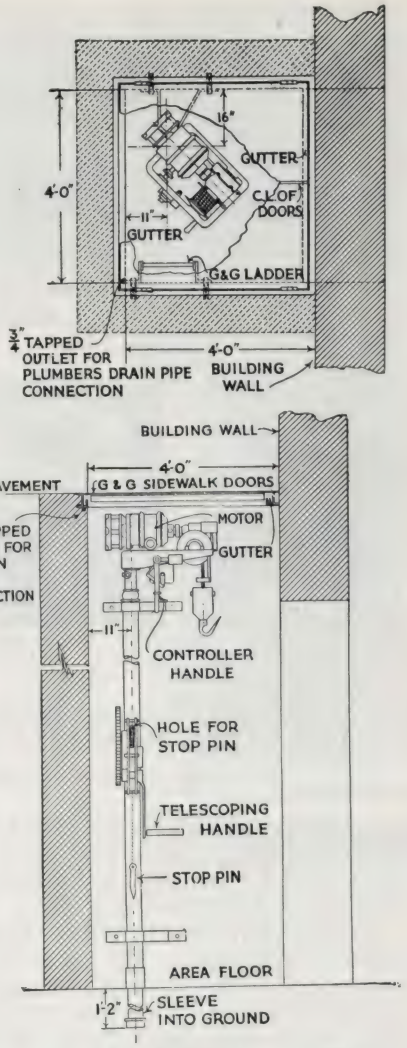

Fig. 5. Model E G&G Telescopic Hoist

Plan and elevation in standard 4x4-ft. area (large enough for all models). Scale, ¼ in. = 1 ft. Copy this on your tracing

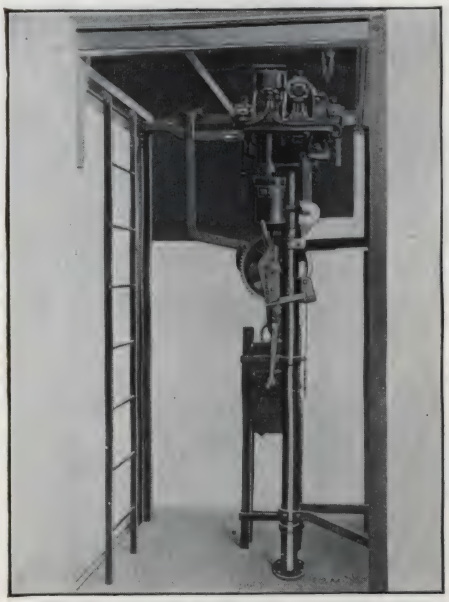

Fig. 2. Model E Hoist (Electric) When Not in Use

Hoist telescopes, and no part shows above street level. Sidewalk doors close down flush with pavement, and lock automatically. When hoisting head is raised, sidewalk doors open and lock into position automatically

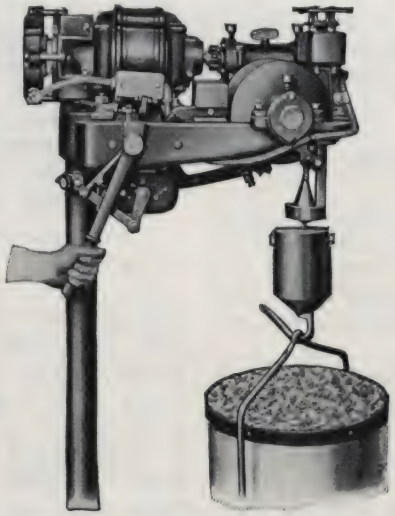

Fig. 3. Model E Hoisting Head

Close up view of latest design hoisting head of Model E Hoist showing lever in hoisting position. Operator pulls lever to raise load electrically and pushes lever to lower load by gravity

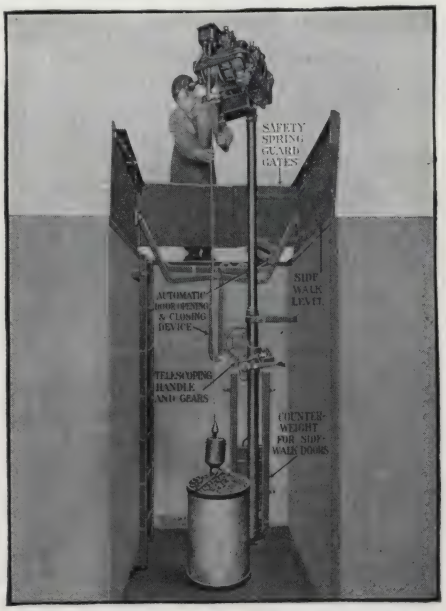

Fig. 4. Model E Hoist (Electric) "Fishing" for Can

After placing fixed bail cans in area, operator ascends ladder and completes removal electrically from grade. The non-rotating cable with weighted hook enables him to raise filled can without leaving sidewalk

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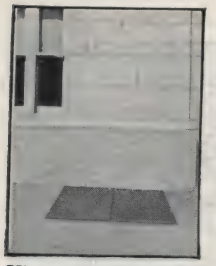
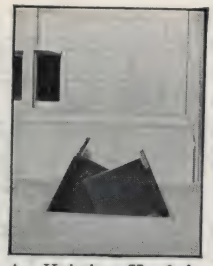
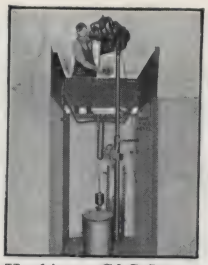

View with Watertight Doors Closed; the Doors and Hinges Are Flush with Sidewalk

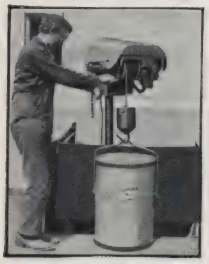

As Hoisting Head is Raised, Sidewalk Doors Automatically Open; Alarm Bell Rings

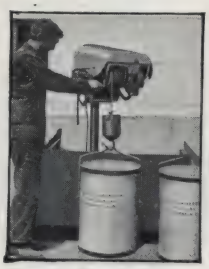
Hooking a G&G Standard Hoisting Can with Swing Bail After Operator Ascends Ladder


Hooking a G&G Standard Hoisting Can with Swing Bail (View from cellar level)

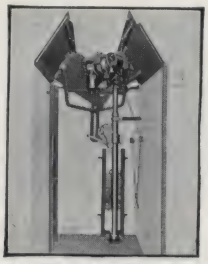
Raising Filled Can Without It Being Necessary for the Operator to Leave the Sidewalk

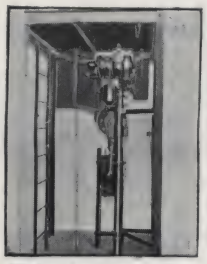
Swinging Hoisting Head (on ball bearings) to Deposit Can on Sidewalk. Can Pushes Gate Open


Can Deposited on Sidewalk without Lifting. Gate Automatically Closes


Two Filled Cans Raised without Leaving Sidewalk

Lowering Empty Cans Quickly by Gravity. This Saves Much Current


As Hoisting Head Is Lowered, Doors Automatically Close; Bell Rings


Hoist in Area, Compact, Out of the Way, Doors Locked Automatically

Exterior View of Closed and Automatically Locked Sidewalk Doors

Fig. 6. Operating Model E (Electric) G&G Telescopic Hoist in Connection with G&G Automatic Sidewalk Door Opening, Closing and Locking Device with Safety Spring Guard Gates at 145 West 55th Street, New York

FRED T. LEY & Co., Architects and Engineers

A complete ash removal equipment. Note that one man, unaided, performs entire operation. Watertight sidewalk doors are self-locking whether open or closed and cannot be tampered with at grade level

Steel sidewalk doors, entire surface checkered or with vault lights, close flush with sidewalk. Equipped with flush bronze hinges, and wrought steel frame with extra deep gutter (see Fig. 9).

Automatic door opening, closing and locking device and sidewalk doors, with automatic spring guard gates, shipped with hoist to any part of the world. Blue print is furnished, showing how to erect. We subject each hoist, door opening, closing and locking device with spring guard gates, and sidewalk doors to a thorough working test before shipment. For this reason, and also because it makes for ease of installation at the building, *this Company prefers to furnish its own sidewalk doors with each hoist and opening and closing device.* (See Fig. 9.)

Prices—Are based on (*a*) the size of sidewalk doors required; (*b*) whether checkered steel or vault light leaves; (*c*) location of doors with regard to building wall (see Figs. 7 and 12); (*d*) distance between boiler room floor and grade level; (*e*) kind of electric current available at building.

Boiler Room to Wagon Height, Electric, Model D Telescopic Hoist

G&G telescopic overhead crane hoist, Model D, with complete equipment, operates electrically (Fig. 7), and is for use in large buildings where the grade level approach permits wagons to drive up alongside of the hoistway leading to boiler room. When not in use, no part of hoist shows above sidewalk.

Raises maximum load of 300 lbs. at an actual speed of 60 ft. per minute. The can illustrated in Fig. 7, weighs about 175 lbs. when filled with ashes. This model can also be constructed for maximum working capacity of 500 lbs.

Motor—Hoist has a 1½ hp. series wound for direct current, squirrel cage for alternating current motor with magnetic service brake, automatic upper limit and single speed controller, giving one hoisting and one lowering speed. Cable is non-rotating. Motor is dustproof and moistureproof. Has Alemite high pressure lubrication with grease cups and special grease gun furnished. Hoist is arranged so operator may raise ash can from cellar into position 6 or 7 ft. above grade, and empty can directly into wagon or truck without rehandling at grade level. Because of great saving in time and labor effected by overhead crane types, architects should plan, if possible, for opening in sidewalk to be near curb or driveway, to permit the use of this type of hoist. (See also Model B, Fig. 12.)

Ash Cans—G&G standard 17x24-in. hoisting cans with swing bail may be emptied without unhooking. This cannot be done with ordinary cans.

Prices—Are based on (*a*) the size of sidewalk doors required; (*b*) whether checkered steel or vault light leaves; (*c*) location of doors with regard to building wall (see Figs. 7 and 12); (*d*) distance between boiler room floor and grade level; (*e*) kind of electric current available at building.

How to Specify—See G&G page 8.

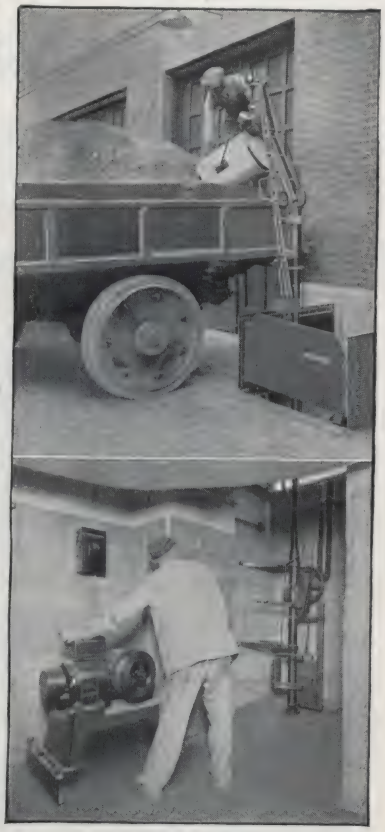


Fig. 7. G&G Model D Overhead Crane Electrically Operated Telescopic Hoist, Installed at R. H. Macy & Co.'s Garage, Long Island City, N. Y.

(One of five G&G Hoists used by them)

ROBERT D. KOHN, Architect, New York

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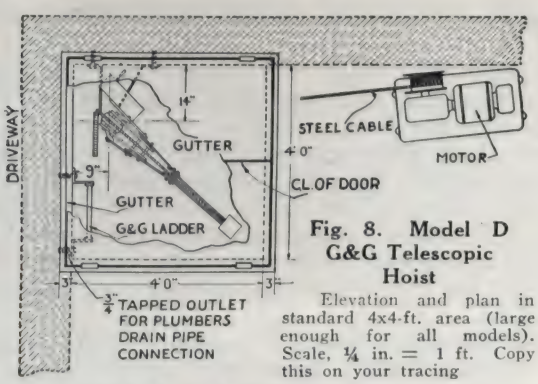
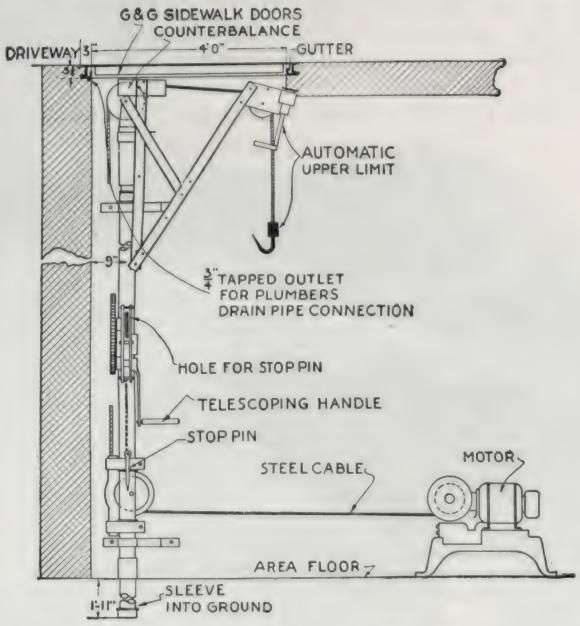


Fig. 8. Model D G&G Telescopic Hoist

Elevation and plan in standard 4x4-ft. area (large enough for all models). Scale, ¼ in. = 1 ft. Copy this on your tracing



G&G Flush Watertight Sidewalk Doors

G&G sidewalk doors are much superior to ordinary ones. They are watertight, have a condensation gutter, tapped for plumber's drain pipe connection, assuring a perfectly dry area. Corners are welded.

Extra Heavy Doors

Our standard sidewalk door is designed to sustain a live load of 300 lbs. per sq. ft. If there is any danger of the ash wagon or heavily-loaded motor trucks running over the door, we recommend that the architect specify our extra heavy flush watertight sidewalk door. This door is designed to be installed in driveway or alley. Note special flush bronze hinges in Fig. 9.

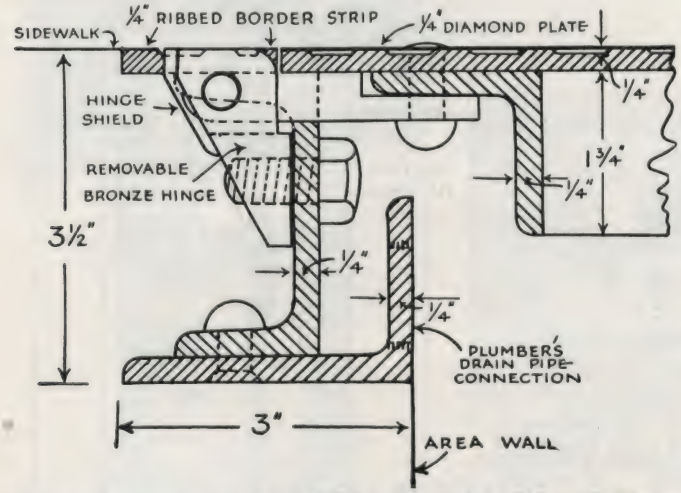


Fig. 9. Construction of G&G Flush Watertight Sidewalk Door

Note special concealed bronze hinges which can be removed without breaking concrete work. Specifications on G&G pages 7 and 8

Boiler Room to Grade Level, Electric Model C Telescopic Hoist (Two-Man Model)

G&G telescopic hoist Model C, with complete equipment, operates electrically, and is used in large buildings where a considerable number of cans or other loads must be handled daily. Raises maximum load of 500 lbs. *to grade level* at speed of 60 ft. per minute.

Motor—Hoist has a 1½ hp. series wound for direct current, squirrel cage for alternating current motor with magnetic service brake, automatic upper limit and single speed controller, giving one hoisting and one lowering speed. Cable is non-rotating. Motor is dustproof and moistureproof.

Prices—Are based on (*a*) the size of sidewalk doors required; (*b*) whether checkered steel or vault light leaves; (*c*) location of doors with regard to building wall (see Figs. 7 and 12); (*d*) distance between boiler room floor and grade level; (*e*) kind of electric current available at building.

How to Specify—Same as for Model D, omtiting words "overhead crane" (G&G page 8) and stating Model C.

Fig. 10. Model E Hoist (Electric) at the Holland Tunnel, New York, N. Y.

(One of two G&G hoists in use) A. C. Davis, Mechanical Engineer for the Commission

Tests That Prove Operating Economy of G&G Electric Hoists

In order to substantiate claims that G&G electric hoists use only a negligible amount of current in their operation, a number of tests have been made for Gillis & Geoghegan by engineers of the Sprague Electric Works of the General Electric Company. The results of these tests show conclusively that in every instance the G&G electric hoist consumes so little current that it offers the most economical means available for removing ashes electrically.

At the Mergenthaler Linotype Co., Brooklyn, N. Y., where a Model D hoist is installed, a total of 26 cans was raised filled and lowered empty for 1¢ current consumption. Distance from grade to boiler room is 12 ft.; average raising time between cellar and top of wagon was 14.6 seconds, and average lowering time 13.8 seconds. 78 cans were raised and lowered in 1 kw-h. Current costs this operator 3¢ per kw-h.

At the Hotel Grand, New York City, where a Model E (spur drive) hoist is installed, a total of 21 cans was raised filled and lowered empty for 1¢ current consumption. Distance from grade to boiler room is 21 ft., 10 in.; average raising time was 11⅜ seconds, and average lowering time 17¾ seconds. 108 cans were raised and lowered in 1 kw-h. Current costs this operator 5¢ per kw-h. This is the same hoist that, after being in use for three years, raised 3500 cans of ashes in one continuous operation (the accumulation after a heavy snowstorm) without the slightest mechanical failure.

At the Hotel Navarre, New York City, a Model E (spur drive) Hoist raised a total of 45 filled cans and lowered them empty for 1¢ of current consumption. Distance from grade to boiler room 9 ft.; average raising time was 6.6 seconds, and average lowering time 6.9 seconds. 227 cans were raised and lowered in 1 kw-h. Current costs this operator 5¢ per kw-h.

15.5 Net Tons Handled for $.0348—At the main Brooklyn, N. Y., building of the New York Telephone Company, a

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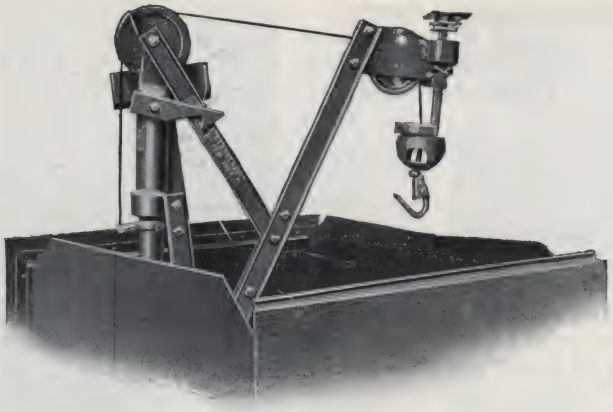


Fig. 11. Close-up View of Model D Overhead Crane—Latest Design

A pull on counterweighted lever raises crane to hoisting position. Note positive automatic upper limit
See Model D description on G&G Page 3

Model E (worm drive) Hoist raised a total of 85 filled cans and lowered empty for 1¢ current consumption. Distance from grade to boiler room is 16 ft. 8 in.; the average raising time was 12.33 seconds, and average lowering time was at the rate of about 200 ft. a minute by gravity. 296 cans were raised and lowered in 1 kw-h. The Bell Telephone System operates 190 G&G hoists in its buildings throughout the country.

The variation in consumption costs is due to difference in distance of lift, difference in the cost of current, and the benefit of gravity lowering device on the worm drive, Model E. Complete figures and details of any or all the above and other tests will be gladly furnished on request.

Exclusive Features of G&G Hoists

The automatic silencer; the automatic steady pin; hoisting head so arranged that it is impossible for the operator to accidentally detach the hoisting head from the standpipe; ball bearings with plates under the hoisting head; hoisting and telescoping handles provided with sliding grips; special woven brake band lining; gears keyed into position; all gears machine cut, pinion gears cut from bar steel; hoisting head, hoisting handle, telescoping handle, silencer, ash can grapple, gear shifting and brake lever of cast steel; ratchet pawl and hoisting hook of drop forged steel, a special steel non-rotating cable.

Fig. 12. Installation of Model B at Columbus Savings Bank, Columbus, Ohio

FRANK L. PACKARD, ARCHITECT

Model B raises the can high enough so that the ashes may be dumped directly into a truck. When the opening is alongside of the curb, a double set of spring guard gates is used to give protection on all four sides.
See also Fig. 15

Boiler Room to Wagon Height, Hand Power, Model B, Telescopic Hoist

Illustration (Fig. 12) shows how this hoist is arranged so that operator, standing at grade level, may raise ash can from cellar to position 6 or 7 ft. above grade, and empty can directly into wagon or truck, without rehandling at grade level. Because of the great saving in time and labor effected by the overhead crane model, architects should plan, if possible, for opening in sidewalk to be near curb or driveway so as to permit the use of this type of hoist. See also Model D, Fig. 7.

Advantages—Hoist is equipped with automatic gear shifting brake device and silencer (Fig. 13), and is so designed that it is practicable for one man to perform entire operation when complete equipment, including G&G swing bail cans, is used.

Raises maximum load of 300 lbs. at speed of 30 ft. per minute. This model can also be constructed for maximum working capacity of 500 lbs.

Factor of Safety—No part has a factor of safety of less than 8, based on maximum rated capacity shown on name plate.

Ash Cans—G&G standard 17x 24-in. hoisting cans with swing bail empty the ashes into the truck without unhooking. This can not be done with ordinary cans.

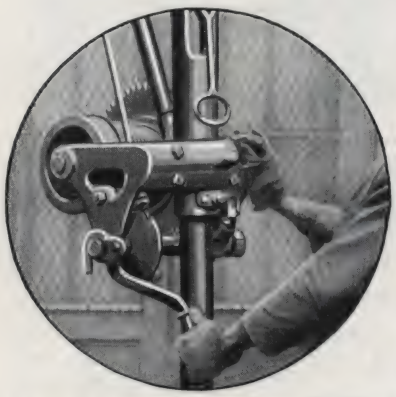


Fig. 13.—Automatic Gear Shifting Brake Device in Operation, Model B Hoist

A single movement of the brake lever automatically shifts gears and applies brake so that load is lowered by gravity. Hoisting handle does not revolve.
Applies to both Model A and Model B.
G&G hand power Telescopic Hoists have certain exclusive and patented features, description of which will be found below

Prices—Are based on (*a*) the size of sidewalk doors required; (*b*) whether checkered steel or vault light leaves; (*c*) location of doors with regard to building wall (see Figs. 7 and 12); (*d*) distance between boiler room floor and grade level.

How to Specify—See G&G page 8.

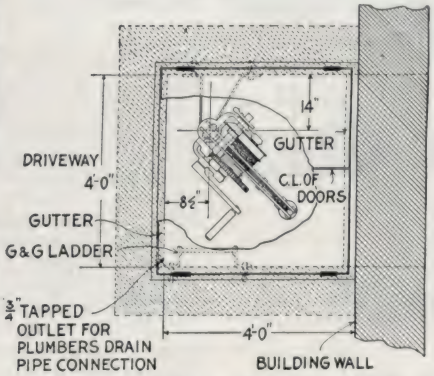
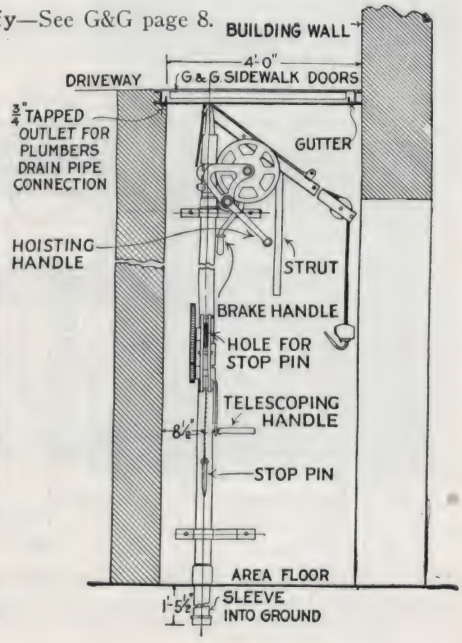


Fig. 14. Model B G&G Telescopic Hoist

Plan and elevation in standard 4x4-ft. area (large enough for all models).
Scale, ¼ in. = 1 ft. Copy this on your tracing



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Boiler Room to Grade Level, Hand Power, Model A Telescopic Hoist

G&G telescopic hoist Model A with complete equipment is illustrated below (Fig. 15).

It is installed in buildings where it is desired to use hand power for raising and lowering loads, and where sidewalk opening is so situated that trucks can not drive alongside.

Advantages—One man, unaided, can operate the hoist. Loads up to 500 lbs. are easily raised at a speed of 30 ft. per minute.

A pressure of only 7 lbs. for each 100 lbs. of load is required on hoisting handle to raise filled cans. Hoist is equipped with automatic gear shifting brake device. For lowering, a powerful band brake is provided. The load is always under perfect control. A single movement of brake lever shifts gears and applies brake, so that *load is lowered with no movement of hoisting handle.* This prevents possible injury to the operator. The cable drum is the only part that moves in lowering. The patented "Silencer" makes hoist extremely quiet in operation.

Prices—Are based on *(a)* the size of sidewalk doors required; *(b)* whether checkered steel or vault light leaves; *(c)* location of doors with regard to building wall (see Figs. 7 and 12); *(d)* distance between boiler room floor and grade level.

How to Specify—See G&G page 8.

Fig. 17. G&G Basement Window Hoist as Installed in P.S. No. 9, Allwood, N. J.

This model requires one man in the basement and one man at grade level. See Figs. 18 and 21 for one-man Hoists

Special Models for Unusual Conditions

The standard G&G Telescopic Hoists, Models A, B, C, D and E will meet the requirements of the majority of buildings. On alteration jobs and on some new buildings there are at times unusual and difficult conditions to be overcome. In such cases, we are prepared to work with architect and to design and construct special hoists.

Models A, B, C, D and E can be furnished without telescopic feature, and standpipe can be mounted either in usual position in area or at grade alongside opening. For buildings previously erected without usual outside area, we recommend Model A Hand Power Non-telescopic Hoist, or Model E Electric Non-telescopic Hoist, to be mounted on inside of building and arranged to swing cans through doorway (see Figs. 18 and 21). By using G&G Fixed Bail Cans, one man can "fish" for and raise as many as can be placed about base of hoist.

In buildings where a doorway is not available the G&G Basement Win-

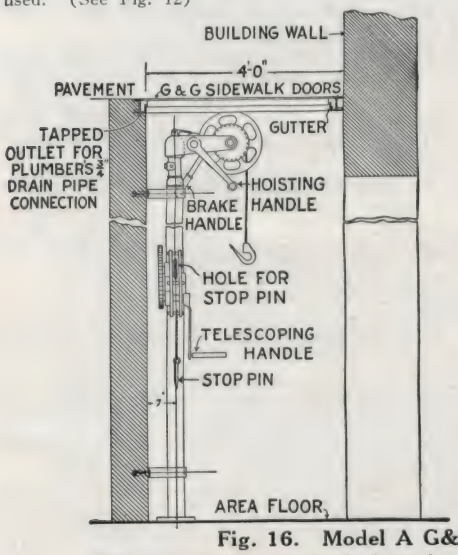
Fig. 15. G&G Hand Power Telescopic Hoist, Model A, as Installed for F. W. Woolworth & Co., 12th and F Streets, Washington, D. C.

B. S. Townsend, Architect

When the building wall does not form one protecting side, a double set of spring guard gates is used. (See Fig. 12)

Fig. 18. G&G Model A Non-telescopic Hoist Installation at the 91st Precinct Police Station, Brooklyn, N. Y.

Hoist can be installed on inside of building so as to swing cans through a doorway. Hand power model is best for small quantities and short lifts. See Fig. 21 for electric model



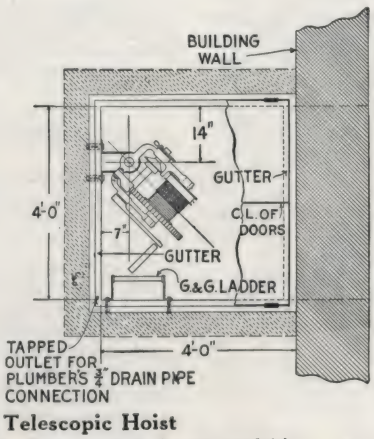


Fig. 16. Model A G&G Telescopic Hoist

Plan and elevation in standard 4x4-ft. area (large enough for all models)
Scale, ¼ in. = 1 ft. Copy this on your tracing

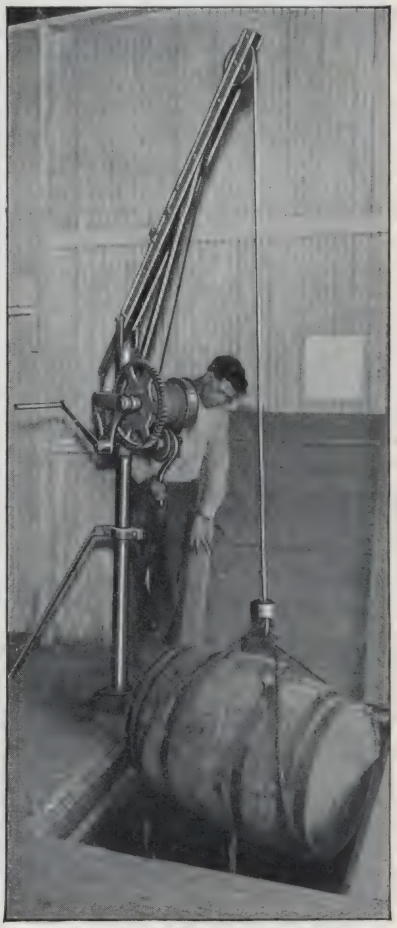


Fig. 19. Model B Non-telescopic Hoist as Installed at Great Western Paper Box Co., St. Louis, Mo.

Barrels, loaded floor trucks, etc., are raised and lowered between floors

Continued on next page

dow Hoist can be installed so as to swing cans through a window (see Fig. 17).

G&G Telescopic Hoists are also used for handling various loads, such as barrels, bales, boxes, crates, trunks, etc., between floors, and can be furnished in capacities up to 1000 pounds, according to the requirements and type of hoist used.

Our Engineers will be glad to co-operate with architect in solution of all special hoist problems, and we will furnish, where necessary and desired, special hooks, slings, grapples, etc.

It will facilitate matters, if when writing, you will inform us as to the following: (1) For what purpose would you like to use a G&G Hoist? (2) Maximum weight of load? (3) Distance of lift? (4) Number of lifts daily? (5) To be installed inside or outside of building? (6) A sketch of conditions will help us to help you.

Fig. 20. Model A Non-telescopic Hoist at P.S. No. 15, Jersey City, N. J.

Installed in open area, hoist will withstand weather conditions if gears and cable are kept well greased

G&G Improved Hoisting Cans with Swing Bail or Fixed Bail

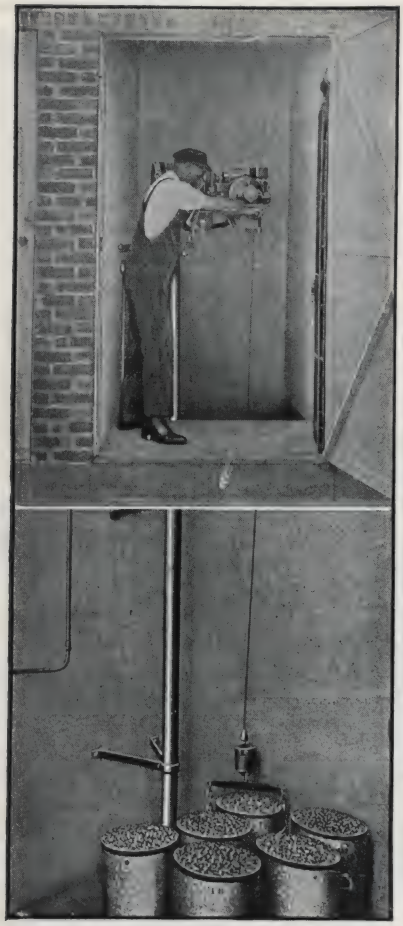


Fig. 21. Model E Non-telescopic Electric Hoist at P. S. No. 70, Borough of Queens, N. Y.

Conditions similar to those shown in Fig. 18. Electric model is used where there is a large quantity of ashes, or where boiler room is unusually deep, or both. Solves the problem where the usual sidewalk doors, if located in an alley, would block traffic

These ash cans are manufactured in GILLIS & GEOGHEGAN'S factory, especially for use with their hoists; are constructed throughout of No. 16 gauge galvanized iron, reinforced at top and bottom with ¼x1¼-in. steel bands. The thickness and weight of the No. 16 gauge iron (very much heavier than the material ordinarily used in making ash cans) makes for great strength and durability.

This company recommends the use of the G&G standard 17x24-in. hoisting can *with swing bail* in all cases with Model B hoist and Model D hoist.

The swing bail can is "balanced"; that is, the can may be easily emptied and will not spill the ashes when being raised. The swing bail is so arranged that it will not drag on the floor when can is being handled in the cellar, and will "stay put" when raised above can.

With Model A and E hoists use our fixed bail cans so that only one man will be required to remove ashes.

The fixed bail can in Fig. 23 is built for gruelling service. Like the swing bail can it will withstand rough treatment and outlast several ordinary ashcans.

Prices — Furnished on request.

Patents Issued

UNITED STATES

April 30, 1912	February 1, 1916	April 24, 1923
May 19, 1914	March 7, 1916	January 6, 1925
June 23, 1914	March 28, 1916	January 6, 1925
{ June 30, 1914 Reissued	March 13, 1917	February 3, 1925
{ October 19, 1915	October 8, 1918	February 9, 1925
August 17, 1915	March 9, 1920	February 17, 1925
December 7, 1915	March 9, 1921	October 27, 1925
December 7, 1915	March 9, 1922	November 10, 1925
	September 19, 1922	February 9, 1926

DOMINION OF CANADA

April 19, 1912	May 9, 1916	May 30, 1922
May 14, 1912	July 25, 1916	November 28, 1922
December 9, 1913	September 5, 1916	April 24, 1923
{ April 7, 1914 Reissued	October 10, 1916	January 12, 1925
{ November 14, 1916	November 21, 1916	April 14, 1925
April 27, 1915	June 1, 1920	April 14, 1925
June 22, 1915	August 31, 1920	June 30, 1925
August 3, 1915	March 9, 1922	July 7, 1925
	May 30, 1922	March 2, 1926

Other patents pending. Also patented in foreign countries.

Fig. 22

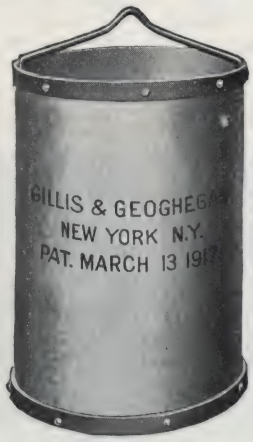


Fig. 23

G&G Standard No. 16 Gauge Galvanized Iron, 17x24-in. Hoisting Cans for Garbage, Ashes and Rubbish

Fig. 22, with *Swing* Bail, Recommended for Use with Models B and D
Fig. 23, with *Fixed* Bail, Recommended for Use with Models A, C and E

How to Specify Complete G&G Telescopic Hoist Equipment

Note:—Provide 4x4 ft. area to use standard size equipment. See ¼-in. scaled plan Model E, Fig. 5; Model D, Fig. 8; Model B, Fig. 14; Model A, Fig 16. For data on how to specify this equipment without using manufacturer's name, see G&G Catalogue filed under A.I.A. Standard Class No. 30i1, or Hoist, G&G Telescopic. Refer also to our formula on filing folder to determine the model best suited to conditions.

Boiler Room to Grade Level, Electric, Model E Telescopic Hoist

(1) Furnish and install where indicated on plans and in accordance with the manufacturer's drawings and instructions, one G&G Telescopic Hoist (with electric motor) Model E with Automatic Stop and Gravity Lowering Device.

(2) Include the following G&G equipment with the hoist, and set the same in the proper manner, all as shown on the manufacturer's drawings.

*Flush watertight sidewalk doors [checkered steel type] [vault light type] with condensation gutter tapped for plumber's drain pipe connection.

Automatic sidewalk door opening, closing and locking device.

Automatic safety spring guard gates.

Electric warning gong.

12 standard 17x24-in. No. 16-gauge galvanized fixed bail ash cans.

Rubber-tired ash can truck.

Heavy iron ladder.

(3) Leave the hoist completely and thoroughly installed, to the satisfaction of the architect.

(4) Above equipment to receive factory coat of paint before shipment and finishing coat of paint after erection.

(5) The necessary wiring and cut-out switch between the switchboard and service lugs on the motor are to be furnished and installed by the electrical contractor at the building.

(6) Before above apparatus is manufactured, this contractor is to submit to the architect for his approval, details and specifications of above equipment together with manufacturer's guarantee for 1 year against defective materials and workmanship.

Continued on next page

Boiler Room to Wagon Height, Electric, Model D Telescopic Hoist

(1) Furnish and install where indicated on plans and in accordance with the install where indicated on plans and in one G&G Telescopic Overhead Crane Hoist Model D with electric motor.

(2) Include the following G&G equipment with the hoist, and set the same in the proper manner, all as shown on the manufacturer's drawings:

*Flush watertight sidewalk doors [checkered steel type] [vault light type] with condensation gutter tapped for plumber's drain pipe connection.

Automatic sidewalk door opening, closing and locking device.

Automatic safety spring guard gates.

Electric warning gong.

12 standard 17x24-in. 16-gauge galvanized swing bail ash cans.

Rubber-tired ash can truck.

Heavy iron ladder.

(3) Leave the hoist completely and thoroughly installed, to the satisfaction of the architect.

(4) Above equipment to receive factory coat of paint before shipment and finishing coat of paint after erection.

(5) The necessary wiring and cut-out switch between the switchboard and service lugs on the motor are to be furnished and installed by the electrical contractor at the building.

(6) Before above apparatus is manufactured, this contractor is to submit to the architect for his approval, details and specifications of above equipment together with manufacturer's guarantee for one year against defective materials and workmanship.

Boiler Room to Wagon Height, Hand Power, Model B Telescopic Hoist

(1) Furnish and install where indicated on plans and in accordance with the manufacturer's drawings and instructions, one G&G Telescopic Overhead Crane Hoist Model B with Automatic Gear Shifting Brake Device and Silencer.

(2) Include the following G&G equipment with the hoist, and set the same in the proper manner, all as shown on the manufacturer's drawings:

*Flush watertight sidewalk door [checkered steel type] [vault light type] with condensation gutter tapped for plumber's drain pipe connection.

Automatic sidewalk door opening, closing and locking device.

Automatic safety spring guard gates.

Electric warning gong.

12 standard 17x24-in. galvanized swing bail ash cans.

Rubber-tired ash can truck.

Heavy iron ladder.

(3) Leave the hoist completely and thoroughly installed, to the satisfaction of the architect.

(4) Above equipment to receive factory coat of paint before shipment and finishing coat of paint after erection.

(5) Before above apparatus is manufactured, this contractor is to submit to the architect for his approval, details and specifications of above equipment together with manufacturer's guarantee for one year against defective materials and workmanship.

Boiler Room to Grade Level, Hand Power, Model A Telescopic Hoist

(1) Furnish and install where indicated on plans and in accordance with the manufacturer's drawing and instructions, one G&G Telescopic Hoist Model A with Automatic Gear Shifting Brake Device and Silencer.

(2) Include the following G&G equipment with the hoist, and set the same in the proper manner, all as shown on the manufacturer's drawings:

*Flush watertight sidewalk doors [checkered steel type] [vault light type] with condensation gutter tapped for plumber's drain pipe connection.

Automatic sidewalk door opening, closing and locking device.

Automatic safety spring guard gates.

Electric warning gong.

12 standard 17x24-in. galvanized fixed bail ash cans.

Rubber-tired ash can truck.

Heavy iron ladder.

(3) Leave the hoist completely and thoroughly installed, to the satisfaction of the architect.

(4) Above equipment to receive factory coat of paint before shipment and finishing coat of paint after erection.

(5) Before above apparatus is manufactured, this contractor is to submit to the architect for his approval, details and specifications of above equipment together with manufacturer's guarantee for one year against defective materials and workmanship.

References—G&G Telescopic Hoists

The following is a partial list of architects who have repeatedly specified the G&G Telescopic Hoist:

Office of the State Architect	Albany, N. Y.
Marye, Alger & Vinour	Atlanta, Ga.
Wyatt & Nolting	Baltimore, Md.
Densmore & Le Clear	Boston, Mass.
Thomas M. James	Boston, Mass.
Monks & Johnston	Boston, Mass.
F. H. Berlenbach	Brooklyn, N. Y.
Walter Ahlschlager, Inc.	Chicago, Ill.
Schmidt, Garden & Erikson	Chicago, Ill.
C. W. & G. L. Rapp	Chicago, Ill.
Graham, Anderson, Probst & White	Chicago, Ill.
Holabird & Root	Chicago, Ill.
Perkins, Fellows & Hamilton	Chicago, Ill.
Weary & Alford	Chicago, Ill.
W. R. McCornack	Cleveland, Ohio
Hubbell & Benes	Cleveland, Ohio
Richards, McCarty & Bulford	Columbus, Ohio
Rawson, Sovers & Thomas	Des Moines, Iowa
Proudfoot, Rawson, Souers & Thomas	New York, N. Y.
C. Howard Crane	Detroit, Mich.
Albert Kahn & Ernest Wilby	Detroit, Mich.
Malcolmson & Higginbotham	Detroit, Mich.
Halstead & Sullivan	Duluth, Minn.
Harry Barton	Greensboro, N. C.
C. Howard Lloyd	Harrisburg, Pa.
Sanguinet & Staats	Houston, Tex.
W. E. Hulse & Co.	Hutchinson, Kan.
D. A. Bohlen & Son	Indianapolis, Ind.
John T. Rowland, Jr.	Jersey City, N. J.
J. H. Felt & Co.	Kansas City, Mo.
Joseph & Joseph	Louisville, Ky.
Van Ryn & De Gelleke	Milwaukee, Wis.
Croft & Boerner	Minneapolis, Minn.
Brown & Van Beren	New Haven, Conn.
Cross & Cross	New York, N. Y.
Carrere & Hastings	New York, N. Y.
Delano & Aldrich	New York, N. Y.
Cass Gilbert	New York, N. Y.
Bertram G. Goodhue Assoc.	New York, N. Y.
Louis E. Jallade	New York, N. Y.
Thomas W. Lamb	New York, N. Y.
McKim, Mead & White	New York, N. Y.
Voorhees, Gmelin & Walker	New York, N. Y.
Peabody, Wilson & Brown	New York, N. Y.
Charles A. Platt	New York, N. Y.
John Russell Pope	New York, N. Y.
Starrett & Van Vleck	New York, N. Y.
C. B. J. Snyder	New York, N. Y.
Trowbridge & Livingston	New York, N. Y.
Warren & Wetmore	New York, N. Y.
John & Allan MacDonald	Omaha, Neb.
Hewitt & Emerson	Peoria, Ill.
Clyde S. Adams	Philadelphia, Pa.
The Ballinger Company	Philadelphia, Pa.
Paul A. Davis, 3rd	Philadelphia, Pa.
Horace Trumbauer	Philadelphia, Pa.
Robert Maurice Trimble	Pittsburgh, Pa.
Claude Bragden	Rochester, N. Y.
Wm. B. Ittner	St. Louis, Mo.
Preston Bradshaw	St. Louis, Mo.
C. H. Johnston	St. Paul, Minn.
Edgar Blair	Seattle, Wash.
Edward M. Gee	Toledo, Ohio
Mills, Rhines, Bellman & Nordhoff	Toledo, Ohio
Milburn, Heister & Co.	Washington, D. C.
A. L. Harris, Municipal Architect	Washington, D. C.

Other References (See also G&G pages 6 and 7)

United States Government: Treasury Department, Washington, D. C., Department of Labor; Post Office Department—James A. Wetmore, Supervising Architect

Illinois Central Railroad, D. D. Jones, Co.'s Eng., Chicago, Ill.

American Telephone & Telegraph Co., New York, N. Y.

Board of Education	Boston, Mass.	Kansas City, Kan.
	New York, N. Y.	Pittsburgh, Pa.
	Baltimore, Md.	Louisville, Ky.
	Kansas City, Mo.	Cleveland, Ohio
	Seattle, Wash.	Washington, D. C.

**If there will be any heavy traffic over the sidewalk doors specify "Extra Heavy Flush Watertight Sidewalk Doors," where indicated by this mark*

G&G ATLAS SYSTEMS

INCORPORATED

Pneumatic Dispatch Tubes

TELEPHONE
SPRING 7-7800

542 West Broadway, NEW YORK, N. Y.

PNEUMATIC TUBE AGENCIES

ATLANTA, GA., THE HILL R. HUFFMAN CO., Bona Allen Bldg.
BALTIMORE, MD., VINCENT D. EASTWOOD, Munsey Bldg.
CAMBRIDGE, MASS., ALLEN & DREW, INC., 43 Brookford St.
CHARLOTTE, N. C., ROSS SALES SERVICE, 16 So. Poplar St.
CHICAGO, ILL., S. I. KAUFMAN, 228 No. La Salle St.
CINCINNATI, OHIO, A. W. FRANK, 707 Gerke Bldg.
CLEVELAND, OHIO, THE R. L. QUEISSER CO., 9105 Woodland Ave.
DALLAS, TEX., GEORGE J. FIX, 2507 Commerce St.
DETROIT, MICH., KENNEDY & DAWSON, 2111 Woodward Ave.
PHILADELPHIA, PA., CULBERT-WHITBY CO., 2019 Rittenhouse St.
PITTSBURGH, PA., J. R. PITCAIRN, 132 Seventh St.
ST. LOUIS, MO., HUNKINS-WILLIS LIME & CEMENT CO., Louderman Bldg.
SEATTLE, WASH., F. T. CROWE & Co., 216 Walker Bldg.

Products

PNEUMATIC DISPATCH TUBES.
POWER-SAVING CONTROL VALVES.
CARRIERS for PNEUMATIC TUBES.

Uses

Where samples, written instructions, mail, documents, small material or other items must be sent between departments, G&G Atlas Pneumatic Dispatch Tubes provide a mechanical messenger service that has proved speedier, more reliable, more efficient and more flexible than human messenger service.

Pneumatic Tubes *save floor space, reduce elevator congestion, hallway and stair traffic,* and the accompanying *noise and confusion.* Buildings which many messengers enter delivering documents should have either a central tube room adjoining the lobby, or the usual outlying station to which all mail, telegrams and messages should be delivered (see Figs. 1, 4 and 7). A Wall Street broker found such arrangement made him a more desirable tenant and 7 minutes were saved on each transaction. A bank was able to eliminate two elevators. The saving in the cost of elevators and the value of rentable space gained on 9 floors (paying dividends during the life of the building) more than paid for the tube system.

Industrial Plants—Tubes are used between the order department and the production manager, the manufacturing and shipping departments, the shipping and billing departments, and between others where frequent transmission of data and small materials may be necessary. See Fig. 4 and above facts relating to messenger traffic in elevators and hallways.

Banks and Office Buildings—Tubes are used for the transmission of mail, telegrams and inter-office documents, especially between tellers' cages and bookkeepers. See Fig. 8 and above facts relating to messenger traffic in elevators and hallways.

Newspaper Offices—Tubes are used for sending classified and display advertising matter to the composing room, for news service between the telegraph room and editorial department and between editorial department and the composing room. See facts above relating to messenger traffic in elevators and hallways.

Hotels—Tubes provide mechanical messenger service for handling guests' mail, telegrams, etc., between various floor clerks and the front offices, between bookkeepers and those departments such as 'phone operators, valet, laundry, dining room, which render services chargeable to guests' accounts. Back-of-the-house departments such as steward, chief engineer and housekeeper also have tube service for sending documents and written instructions.

Hospitals—Tubes handle case records, distribute liquids and surgical dressings, and facilitate prompt, accurate charges to patients. See Fig. 6.

Libraries—Tube lines between the call-slip desk and each bookstack and to special departments are used to order books.

Retail Stores—Tubes are used for handling sales transactions, messages and documents between non-selling departments.

Send for pamphlets describing typical installations in the above and other types of buildings.

Special Advantages

G&G Atlas Pneumatic Dispatch Tubes are always on duty, every hour of the day and every day of the year. Equally efficient in rush or dull periods, they furnish means for a continuous flow of messages, traveling at the rate of 30 ft. a second, unobserved, without confusion and conserving every employee's time.

An important feature is the G&G Atlas Power Saving Control Valve (Fig. 2). Independent of electric or timing elements, it is self-contained. Its action depends upon the speed of air flowing through it. This makes it possible to operate longer lines without blockages, minimizes wear and tear on carriers and bends, and saves electric current. It is superior to spring, timed or electrically actuated devices, because it always shuts off at the correct instant.

Fig. 1. Stone & Webster, Inc., Boston, Mass.

In the home office of Stone & Webster, Architects and Engineers, 3x6 in. oval G&G Atlas Pneumatic Dispatch Tubes provide mechanical messenger service between various departments of Stone & Webster, Inc. and Stone & Webster and Blodget, Inc.

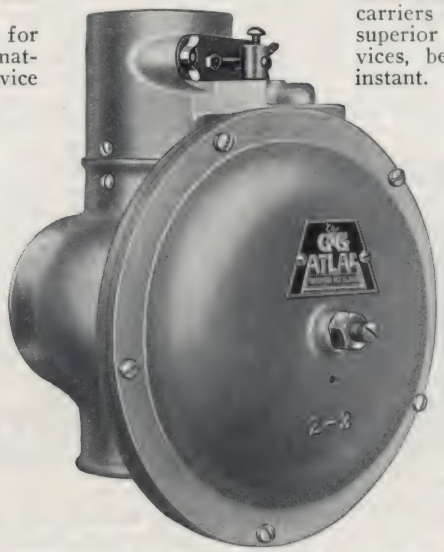


Fig. 2. G&G Atlas Power-Saving Control Valves

These valves permit a pilot flow of air through the line when not in use. When a carrier is inserted, the valve automatically opens until the last carrier in that line discharges. It automatically cuts off in a long drop by gravity.

R. H. Macy & Co., New York, N. Y., uses 656 of these valves; Sears, Roebuck & Co., 175 valves; Montgomery Ward, 193 valves; City Bank Farmer's Trust Co., 60 valves; and the Bank of Mitsui, Tokyo, Japan, 20 valves

Fig. 3. Stevens Hotel, Oak Room, Chicago, Ill.

HOLABIRD & ROCHE, Chicago, Architects

Back-of-the-house departments and those directly serving guests have tube service to the management and the bookkeepers

Continued on next page

Fig. 4. W. J. Gilmore Drug Co. (Wholesalers), Pittsburgh

JOSEPH FRANKLIN KUNTZ, Architect

The Central Station (right), like a telephone switchboard, has 29—3-in. lines reaching out to sales, credit, stock, shipping and receiving departments

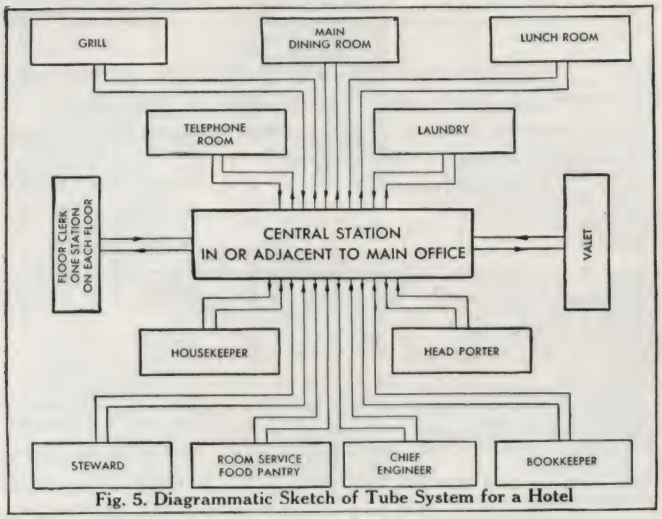


Fig. 5. Diagrammatic Sketch of Tube System for a Hotel

To Specify

Though requirements differ, G&G Atlas Pneumatic Dispatch Tubes can be made to fit every need. It is suggested that the architect or engineer consult us on proposed installations, so that we can work together towards a satisfactory solution of the problem. Send for Data Sheet showing inside measurements of standard carriers and space requirements for tube lines.

Fig. 6. Columbia Presbyterian Medical Center, New York

JAMES GAMBLE ROGERS, Architect

In hospitals, a G&G Atlas Pneumatic Tube System will carry records, bills, reports, bandages and medicine (including liquids in bottles). A central station in or adjacent to Record Room can receive and dispatch carriers to and from In-Patients Nurses' Station on last floor; Out-Patients' Station in each clinic; Bookkeeper-Cashier; Superintendent; Laboratory; Dietitian; Admittance Office; Storekeeper, etc. A diagrammatic sketch showing a typical hospital installation will be sent on request

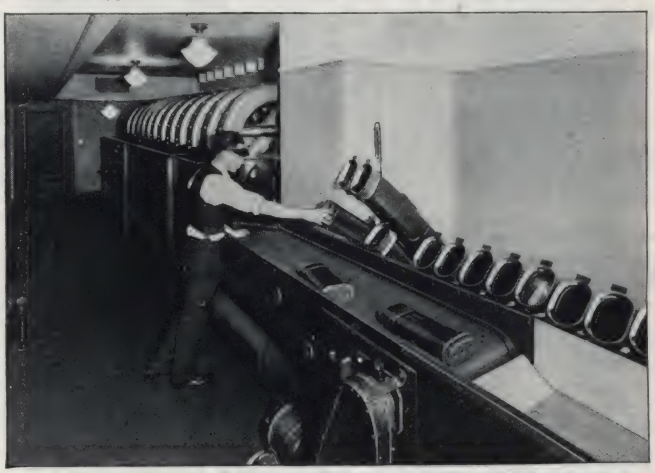


Fig. 7. Equitable Trust Company, New York, N. Y.

TROWBRIDGE & LIVINGSTON, New York, Architects
E. F. ABELL, New York, Equipment Specialist

Central Station with 16 receiving and 16 sending 4x7-in. oval lines. 12 departments have additional direct lines. Note studs in ceiling providing for 10 future lines

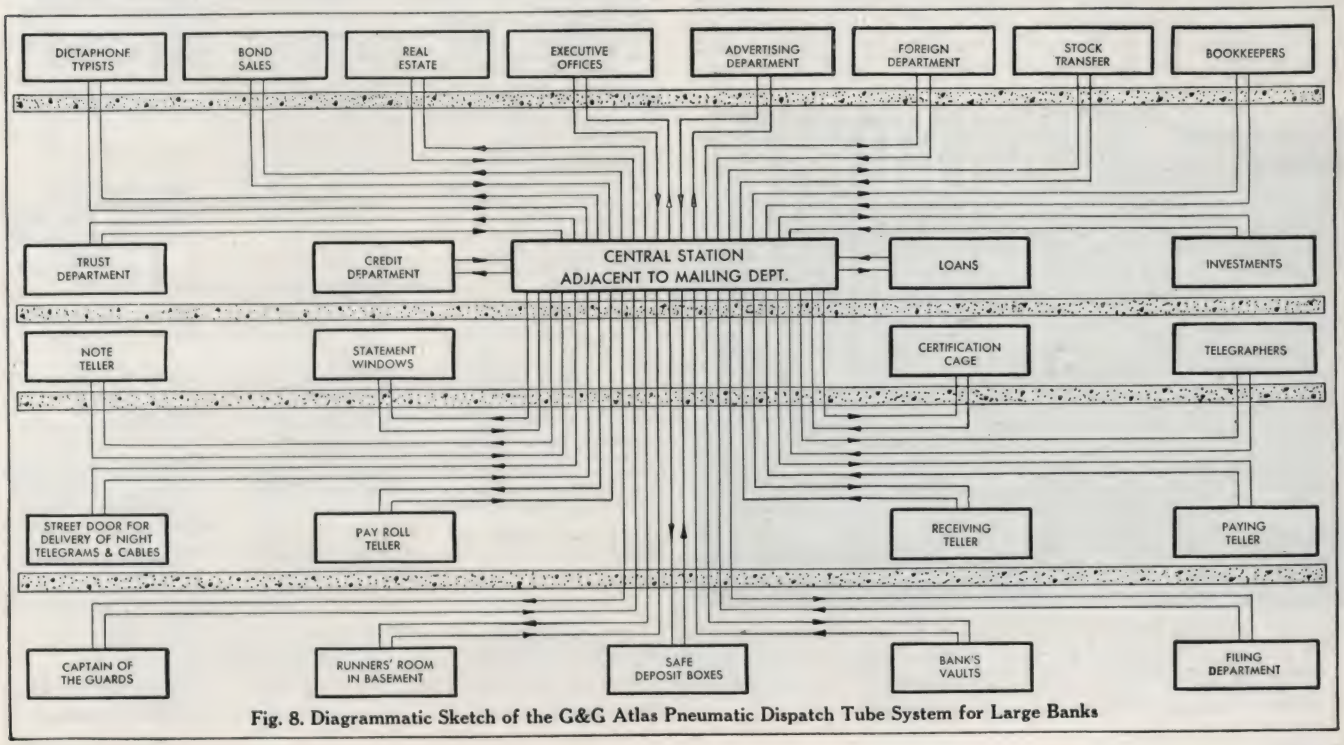


Fig. 8. Diagrammatic Sketch of the G&G Atlas Pneumatic Dispatch Tube System for Large Banks

Continued on next page

Fig. 9. The Halle Bros. Co. (Department Store), Cleveland, Ohio

WALKER & WEEKS, Cleveland, Architects
C. A. WHEELER, Chicago, Fixture Architect

Tube room, Huron Prospect Addition. 78 lines (provision for 32 more), with G&G Atlas Power-Saving Control Valves, serve selling and non-selling departments. Grouped cashiers' desks with G&G Atlas Positive Consecutive Carrier Ejectors on the right

Preliminary Data

The preliminary data necessary to the study of a pneumatic tube installation is as follows:

(1) Plans showing the proposed location of stations and the motor and exhauster.

(2) Inside measurements of carriers required to contain the material to be transported. This will determine the size of the tubes; for example: 1¼, 1½, 2¼, 3, 4 and 5-in. round; 3x6 and 4x7-in. oval. Send for data sheet of standard carrier sizes.

(3) The length of carrier used will determine the radii of bends. Round carriers can be obtained from 3$\frac{1}{16}$ to 12 in. long, and oval carriers can be had from 8½ to 14 in. inside length.

3x6 and 4x7-in. oval tubes are used in factories and other buildings where the article to be dispatched more conveniently fits this shape carrier. 3 or 4-in. round tubes are provided for handling larger quantities than are possible with 2¼-in. lines.

Round tubes, of 1¼-in. outside diameter, with 3¼-in. fibre carriers are used in banks for sending quotations and brief messages. 3x6-in. and 4x7-in. oval tubes with 13-in. leather carriers are generally used because it is preferred not to fold pass books, stock certificates, bonds, leases, etc.

Retail stores use 2¼-in. round tubes with 5-in. brass carriers between the sales counters and the tube room and the 3-in. lines with 10-in. leather carriers for internal communication.

The size of carriers must be determined as a preliminary, because it governs the diameter of the tube lines and the radii of the bends. Pneumatic tube lines are installed to handle carriers of a selected diameter and length. Other carriers of same diameter, but of shorter length, can also be used. The shorter carriers are much more desirable for small documents.

Fig. 10. Central Station for 39 2¼-in. Lines at Montgomery Ward & Co., Fort Worth, Tex.

Other G&G Atlas installations for this company are at Spokane, Wash., Dallas, Tex., Sioux City, Iowa, and Oklahoma City, Okla. 193 Atlas Power Control Valves used in these installations.

Partial List of Installations

NAME OF JOB	LOCATION	ARCHITECT
University of Mich. — Gen. Library	Ann Arbor, Mich.	
Sears, Roebuck & Co.	Atlanta, Ga.	Martin C. Schwab
Johns Hopkins Hospital	Baltimore, Md.	James E. Sperry
St. Paul Garage	Baltimore, Md.	Wyatt & Nolting
S. S. Pierce Co. (Grocers)	Boston, Mass.	
Sears, Roebuck & Co.	Boston, Mass.	Martin C. Schwab
Stone & Webster, Inc.	Boston, Mass.	Company's Engineers
D. M. Read Company	Bridgeport, Conn.	Monks & Johnson
Abraham & Straus	Brooklyn, N. Y.	Starrett & VanVleck
Brooklyn Edison Co.	Brooklyn, N. Y.	Company's Engineers
Oppenheim Collins & Co. (5)	Brooklyn, N. Y.	
N. Y. C. R. R. Passenger Dep.	Buffalo, N. Y.	Fellheimer & Wagner
Bismarck Hotel	Chicago, Ill.	Rapp & Rapp
Foreman-State Natl. Bank	Chicago, Ill.	Graham, Anderson, Probst & White
Stevens Hotel	Chicago, Ill.	Holabird & Roche
Children's Hospital	Cincinnati, Ohio	Matthews & Short
The Halle Bros. Co.	Cleveland, Ohio	Walker & Weeks
Medical Arts Garage	Cleveland, Ohio	Graham, Anderson, Probst & White
Union Trust Co. (Term. Br.)	Cleveland, Ohio	Graham, Anderson, Probst & White
Montgomery Ward & Co.	Denver, Colo.	Company's Engineers
Parke-Davis Company	Detroit, Mich.	Smith, Hinchman & Grylls
Montgomery Ward & Co.	Fort Worth, Tex.	Company's Engineers
Conde Nast Publishing Co.	Greenwich, Conn.	
Public Ser. Electric & Gas Co.	Hackensack, N. J.	
Wise, Smith & Co.	Hartford, Conn.	
L. S. Ayres	Indianapolis, Ind.	
American Can Company	Jersey City, N. J.	
Public Service Corp. of N. J.	Jersey City, N. J.	
Northwestern Natl. Bank	Minneapolis, Minn.	Graham, Anderson, Probst & White
Mil. Co. Emergency Hospital	Milwaukee, Wis.	VanRyn & De Gelleke
Sun Life Assur. Co.	Montreal, Que.	Darling & Pearson
S. S. Kresge Dept. Store	Newark, N. J.	Starrett & VanVleck
Sterling Library at Yale	New Haven, Conn.	James Gamble Rogers
American Bank Note Co.	New York, N. Y.	
American Women's Ass'n	New York, N. Y.	Benj. Wistar Morris
The Bank of Manhattan Tr. Co.	New York, N. Y.	Morrell Smith Walker & Gillette E. F. Abell
Charles D. Barney & Co.	New York, N. Y.	Benj. Wistar Morris
Bellevue Hospital	New York, N. Y.	McKim, Mead & White
Bloomingdale Bros.	New York, N. Y.	
Bonwit Teller & Co.	New York, N. Y.	
Hanover Bk. & Tr. Co.	New York, N. Y.	Buchman & Kahn
Chase Nat. Bk. of the City of N. Y.	New York, N. Y.	Graham, Anderson, Probst & White
City Bank Farmers Tr. Co.	New York, N. Y.	Cross & Cross
Columbia Pres. Med. Center	New York, N. Y.	James Gamble Rogers
Consolidated Gas Co.	New York, N. Y.	Company's Engineers
John Davis & Co. (4 stores)	New York, N. Y.	
A. De Pinna Co.	New York, N. Y.	Starrett & Van Vleck
R. G. Dun & Co.	New York, N. Y.	
Chase Nat. Bk., Equitable Trust Branch	New York, N. Y.	Trowbridge & Livingston E. F. Abell
The Fleischmann Co.	New York, N. Y.	L. Tieman
Guaranty Trust Co.	New York, N. Y.	
Hamburg-American Line	New York, N. Y.	Lansman & Smith
Hotel Lincoln	New York, N. Y.	Schwartz & Gross
Knox Hat Company	New York, N. Y.	Mr. Nevins
R. H. Macy & Co.	New York, N. Y.	Robert D. Kohn
National City Bank of N. Y.	New York, N. Y.	
National City Building	New York, N. Y.	McKim, Mead & White
New York Hospital—Cornell Med. Center	New York, N. Y.	Coolidge, Shepley, Bulfinch & Abbott
New York Stock Exchange (Stock Clear. Corp.)	New York, N. Y.	Company's Engineers
New York Trust Co.	New York, N. Y.	Walker & Gillette
New York World	New York, N. Y.	
Oppenheim, Collins & Co.	New York, N. Y.	
Police Dept. Boro of Man.	New York, N. Y.	Capt. Thos. E. O'Brien
Rogers Peet & Co.	New York, N. Y.	
St. Nicholas Club	New York, N. Y.	
State Office Building	New York, N. Y.	Wm. E. Haugaard
Stern Brothers	New York, N. Y.	
Union Dime Savings Bank	New York, N. Y.	Alfred H. Taylor
Waldorf Astoria Hotel	New York, N. Y.	Schultze & Weaver
Montgomery Ward & Co.	Oklahoma City	Company's Engineers
Public Service Corp. of N. J.	Orange, N. J.	Company's Engineers
First National Bank	Orlando, Fla.	H. M. Reynolds
George Allen, Inc.	Philadelphia, Pa.	Clarence E. Wunder
Bioren & Co.	Philadelphia, Pa.	A. H. Brockie
Blauner's	Philadelphia, Pa.	
Bonwit, Teller & Co.	Philadelphia, Pa.	Clarence E. Wunder
Fidelity Phila. Trust Co.	Philadelphia, Pa.	Simon & Simon
Oppenheim, Collins & Co.	Philadelphia, Pa.	
Strawbridge & Clothier	Philadelphia, Pa.	
W. J. Gilmore Drug Co.	Pittsburgh, Pa.	Joseph F. Kuntz
Joseph Horne & Co.	Pittsburgh, Pa.	C. A. Wheeler
Reading National Bank	Reading, Pa.	
McCurdy & Company	Rochester, N. Y.	R. B. Sherburne
Rochester Times Union	Rochester, N. Y.	
Missouri Pacific R. R. Co.	St. Louis, Mo.	Company's Engineers
Montgomery Ward & Co.	Sioux City, Iowa	Company's Engineers
Montgomery Ward & Co.	Spokane, Wash.	Company's Engineers
First Natl. Bank of Stamford	Stamford, Conn.	Benj. Wistar Morris Smalley & Meyers
Yale & Towne Mfg. Co.	Stamford, Conn.	
Mitsui & Co., Ltd.	Tokyo, Japan	Trowbridge & Livingston
Canadian Bank of Commerce	Toronto, Ont.	Darling & Pearson York & Sawyer E. F. Abell
Library of Congress	Washington, D. C.	David Lynn
Woodward & Lothrop	Washington, D. C.	
Winston-Salem Journal	Winston-Salem, N. C.	Henry Macklin
State Mutual Life Assur. Co.	Worcester, Mass.	Parker, Thomas & Rice
Ward Melville Shoe Co.	Worcester, Mass.	George E. Strehan

HASLETT CHUTE AND CONVEYOR CO.

FACTORY AND ENGINEERING DEPARTMENT
OAKS, PA.

BRANCH OFFICES

ATLANTA, GA., 315 Walton Building
BALTIMORE, MD., 210 Grott Building, 109 E. Pleasant Avenue
BOSTON, MASS., 528 Little Building
CHICAGO, ILL., 1737 Builders' Building
DALLAS, TEX., 1300 Young Street
DETROIT, MICH., 407 C. P. A. Building
HARRISBURG, PA., 114 Walnut Street
LOS ANGELES, CALIF., 4900 Santa Fe Avenue
NEW YORK, N. Y., Room 403, 17 E. 42nd Street
PHILADELPHIA, PA., 1137 Real Estate Trust Building
SAN FRANCISCO, CALIF., 280 Battery Street
SEATTLE, WASH., 1725 Westlake Avenue, No.
MONTREAL, QUE., 215 New Birks Building

Products

SPIRAL CHUTES; GRAVITY ROLLER CONVEYORS; TRAY ELEVATORS and BARREL HOISTS; POWER DRIVEN BELT and CHAIN CONVEYORS; MONO CHAIN OVERHEAD CONVEYORS.

Also Fire Doors required for the above installations.

For our page on Aluminum Chutes, see Manufacturers' Index.

Engineering and Architectural Co-operation

Architects, engineers and plant managers are invited to call for the service of our engineering department at any time. Conveyor layouts are a specialty which we furnish as a part of Haslett service.

Qualified engineers with wide experience that covers store, factory and warehouse handling will be assigned to your inquiries for conveyor information. Other architects and engineers have used this service to their advantage.

Spiral Chutes

The Haslett spiral chute with its patented concave bottom which governs the speed of all kinds of packages is recognized as the safest device of this kind made for lowering heavy or fragile merchandise.

STANDARD SIZES OF HASLETT PATENT CONCAVE CHUTES AND MAXIMUM SIZES OF PACKAGES HANDLED

Diameter	Trough width	Packages		
		Length	Width	Weight
3 ft.	12 in.	15 in.	9 in.	40 lbs.
4 ft.	19 in.	22 in.	14 in.	75 lbs.
6 ft.	24 in.	30 in.	18 in.	200 lbs.
*7 ft.	30 in.	36 in.	23 in.	350 lbs.
†9 ft.	36 in.	48 in.	28 in.	400 lbs.
9 ft. 10 in.	42 in.	52 in.	32 in.	600 lbs.
12 ft.	48 in.	60 in.	36 in.	1000 lbs.
15 ft.	60 in.	72 in.	46 in.	1400 lbs.

*Generally supplied to grocery jobbers.
†Generally supplied to hardware dealers.
Special strength chutes can be built for especially heavy work in all sizes.

Haslett Concave Spiral Chute and Fire Door

Write for our booklet fully describing and illustrating spiral chutes.

This Company also builds flat bed chutes, both enclosed and open, for department store, mail order and light factory work.

SIZES OF STANDARD FLAT BED CHUTES

Diam., ft. in.	Trough width, in.	Core, in.	Diam., ft. in.	Trough width, in.	Core, in.	Diam., ft. in.	Trough width, in.	Core, in.
2-4½	12	4½	6-0	31	10	8-10	48	10
3-4½	18	4½	7-0	36	12	10-0	54	12
5-0	24	12	8-0	42	12	.....	.....	.....

Gravity Roller Conveyors

Haslett ball bearing roller conveyor has shafts running entirely through, insuring perfect alignment. It is light and strong, and the bearings are readily removed for cleaning or replacement.

Stationary, portable, fixed height or adjustable stands, or rods for overhead suspension can be furnished.

Tray Elevators

Haslett vertical and inclined elevators of all types for handling barrels, sacks, cases, baskets, dish trays, etc.

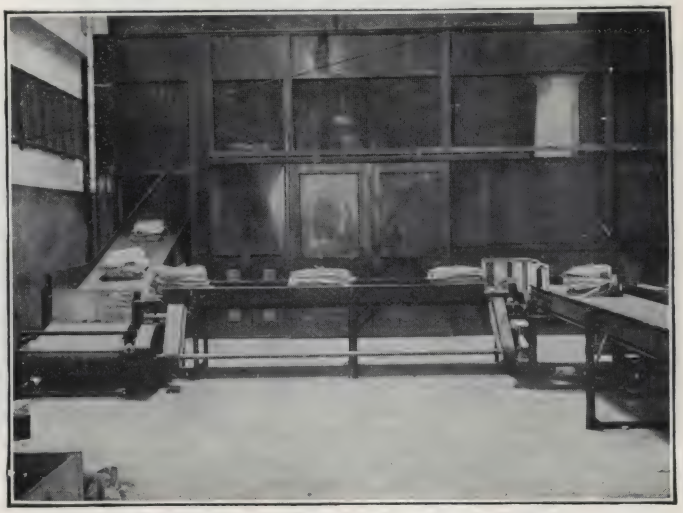
They are made in various sizes for handling anything from bobbin boards to bales of wool.

Designs made to meet requirements.

Power Driven Conveyors

For mail order houses, department stores, factories, etc.

A specialty is made of devising and laying out complete systems, including belt and chain conveyors, inclined elevators, etc., with noiseless transmission.



Belts Conveying Bundles of Newspapers

THE LAMSON COMPANY

Designers and Builders of Automatic Conveying Machinery and Pneumatic Despatch Tubes

GENERAL OFFICES AND WORKS
SYRACUSE, N. Y.

BRANCH OFFICES

ATLANTA, GA., 97 Cone Street
BALTIMORE, MD., Equitable Building
BOSTON, MASS., 213 Congress Street
CHICAGO, ILL., 308 W. Randolph Street
CINCINNATI, OHIO, 119 East Fifth Street
CLEVELAND, OHIO, 1213 West 3rd Street
DETROIT, MICH., 2457 Woodward Avenue
KANSAS CITY, MO., 510 Ridge Arcade Building
LOS ANGELES, CALIF., 730 South Los Angeles Street
MINNEAPOLIS, MINN., 841 Lumber Exchange Building
NEW YORK, N. Y., 9 East 37th Street
PHILADELPHIA, PA., 1317 Race Street
PITTSBURGH, PA., 319 Third Avenue
ST. LOUIS, MO., 709 Pine Street
SAN FRANCISCO, CALIF., 611 Howard Street
SEATTLE, WASH., 720 Fourth Avenue
TORONTO, ONT., 4 Sylvan Avenue
VANCOUVER, B. C., 104 Empire Building
WASHINGTON, D. C., 703 Colorado Building

For Texas, Oklahoma, New Mexico and Western Louisiana business, refer to
THE LAMSON COMPANY OF TEXAS, 905½ Elm Street, DALLAS, TEX.

Products

CONVEYORS; CHUTES; PNEUMATIC TUBES.
AUTOMATIC TRAY CONVEYORS.

Also manufacturers of Selective Pick-up and Sweep-off Carriers; Gravity Roller Conveyors; Light Hand Power Elevators and Lifts for carrying papers and materials in industrial plants; Wireline Cash and Parcel Carriers for carrying cash, as well as sales slips, and parcels; Sheet Writers' and Drivers' Bins.

Scope of Use

Used in stores, offices, factories, mercantile plants, libraries, banks, hotels, post offices, etc., for carrying money, papers and materials between departments or buildings.

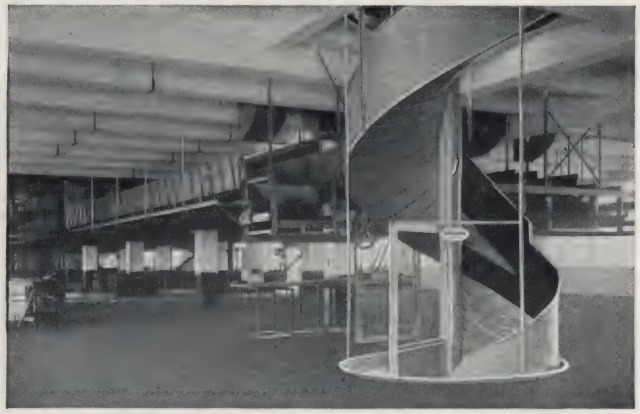
Co-operative Service

Architects, engineers and contractors are invited to avail themselves of Lamson experience and service.

Specialists employed by this company are constantly solving complicated conveying and carrying problems. Full information covering any problem to which Lamson conveyors may be adapted will be gladly furnished.

Lamson Belt Conveyor

Part of complete belt conveyor system for handling merchandise in the wholesale drug warehouse of Lehn & Fink, New York, N. Y. Conveyors simplify and speed up the work of classifying, sorting, and shipping



Lamson Power Conveyor and Spiral Chute

Combination power conveyor system and chute for handling sacks of mail in the Van Buren Terminal, Chicago Post Office. Lamson heavy duty power conveyor systems carry all kinds of materials in sacks, bags, boxes, crates, barrels, and other containers

Lamson Automatic Vertical Elevator

Part of an extensive system in the National Cash Register Plant, Dayton, Ohio. Delivers tote boxes to any department. This type of system is extensively used in industrial plants and warehouses

Lamson Inclined Power Conveyor

Inclined power conveyor raises boxes of empty bobbins between floors. The gravity spiral in background returns boxes of full bobbins furnishing a continuous operating system between floors

Central Pneumatic Tube Desk

Makes possible a production control system by bringing all job tickets to a central point

Continued on next page

The TRAYVEYOR

The Trayveyor

The Lamson Trayveyor is an automatic, precision-built, sanitary machine for conveying dishes and food, in either trays or boxes, up and down between floors. It is made in the following models: double-duty, ascending, descending, and reversible.

Uses

Nearly every cafeteria, restaurant, hotel, hospital, club, and department store is faced with the problem of space economy for its dining rooms. Hence the need for placing the dish-washing department or kitchen on another floor with a Trayveyor connecting it with the serving floor or floors.

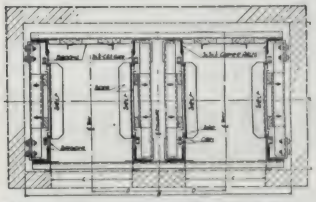
Features of the Trayveyor

In a single shaft—no larger than that required for an ordinary dumbwaiter—the Lamson Trayveyor provides a continuous up and down movement of trays or boxes through a train of four endless ¾-in. hardened steel-roller chains to which carrying shelves are attached at intervals of about 2 ft. Chains travel at an average speed of 20 ft. per minute delivering 8 to 10 trays a minute. Capacity can be increased to 12 or 13 trays a minute if belt take-off is used.

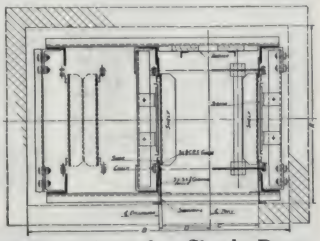
Sanitary Enclosure

Trays travel through a sanitary enclosure of painted galvanized sheet steel. All joints are flush and carrying chains are hidden. Allegheny metal can be had, if desired, at a slightly increased cost.

Space Requirements



Dimensions for Double-Duty



Dimensions for Single-Duty

SIZES IN INCHES

Size of tray	A	B	C	D
12¼x16½	26	46	13½	*11 7/16
12¼x16½	26	38	13½	7 7/16
13⅞x17¾	27	49	15	*12 3/16
13⅞x17¾	27	40	15	8 3/16
15⅜x20¾	30	51	16½	*12 15/16
15⅜x20¾	30	41	16½	7 15/16
16½x22½	32	53	17½	*13 7/16
16½x22½	32	43	17½	8 7/16

*Double-Duty dimensions.

Protective Devices

Circuit breakers automatically stop the equipment if trays or boxes are not removed upon arrival at receiving stations. An electro-mechanical overload protector stops the Trayveyor instantly in case of overload and provides a positive check against the carelessness of incompetent help.

Precision-Built

The Trayveyor is precision-built throughout and requires less power than other machines of this type.

Discharge Station

Either belt or gravity is used for automatically taking the trays or boxes from the Trayveyor to the scraping table.

Centralized Lubrication

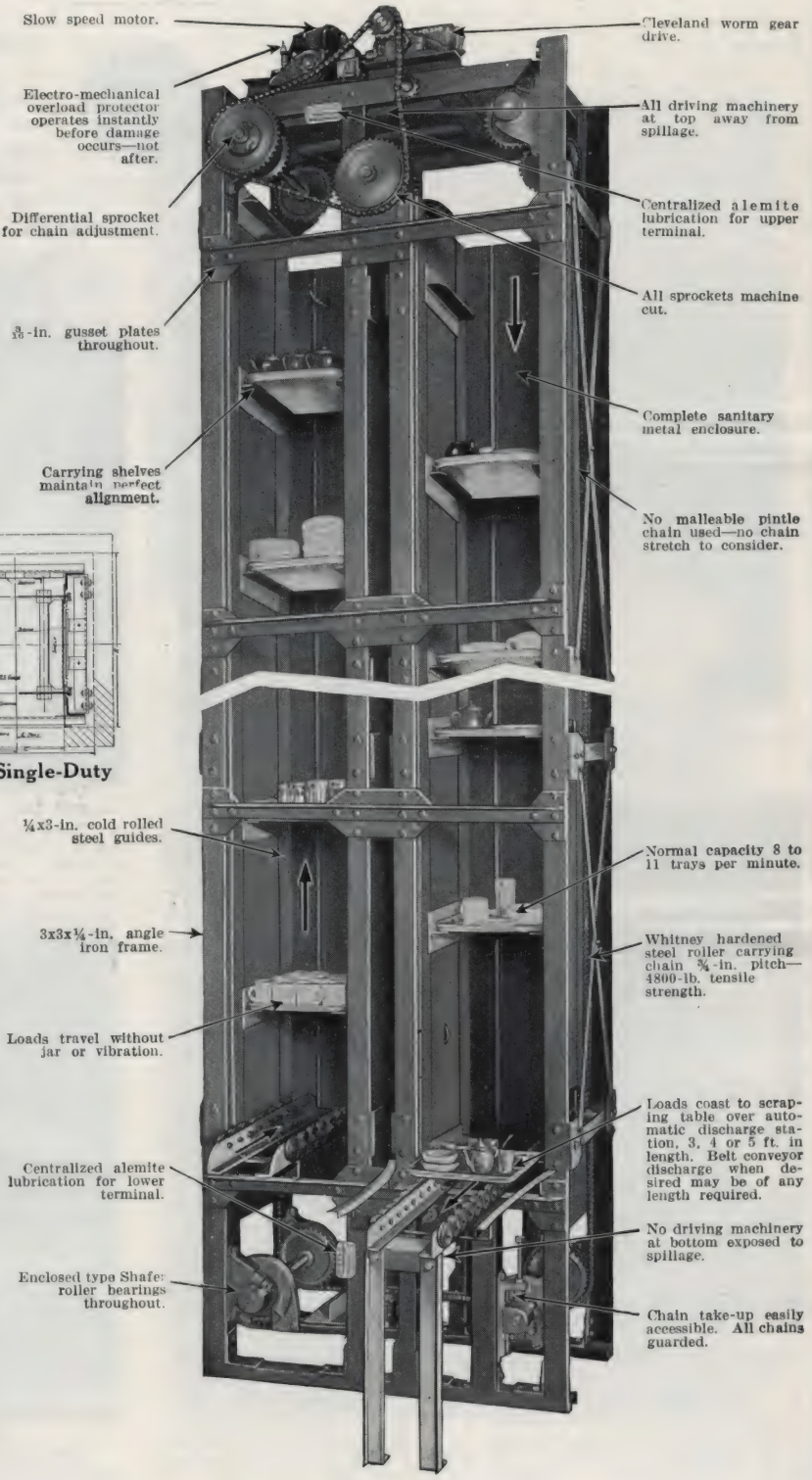
In ordinary service, the Trayveyor needs lubricating only once every six six months. It is equipped throughout with alemite fittings—seven at the top and six at the base.

Quiet

Operation is exceedingly quiet because of the mechanical perfection of the entire unit.

Exclusive Features

Exclusive features of the Trayveyor are shown on the illustration below. See A.I.A. File No. 33d1 for detailed specifications.



ESTABLISHED 1876

LOGAN CO.

INCORPORATED 1885

Manufacturers of Gravity and Power Conveyors

560 North Buchanan Street, LOUISVILLE, KY.

BRANCH OFFICES

NEW YORK, N. Y., 50 Church Street
CHICAGO, ILL., 35 E. Wacker Drive
PITTSBURGH, PA., 1007 Union Bank Bldg.
DETROIT, MICH., 8855 Woodward Avenue
WORCESTER, MASS., 83 Olean Street
INDIANAPOLIS, IND., 1002 E. Washington
CLEVELAND, OHIO, 1872 Taylor Boulevard
ST. LOUIS, MO., 3820 Washington Boulevard
SAN FRANCISCO, CAL., 580 Market Street
BUFFALO, N. Y., 333 Jackson Building
KANSAS CITY, MO., 6035 Oak Street
LOS ANGELES, CAL., 420 San Pedro Street
ATLANTA, GA., Bona-Allen Bldg.
DALLAS, TEX., 5936 Bryant Parkway
BIRMINGHAM, ALA., Brown-Marx Bldg.
DENVER, COLO., 221 First Nat'l Bank Bldg.
SALT LAKE CITY, UTAH, 415 Dooly Block
MEMPHIS, TENN., 63 So. Third Street
HAVANA, CUBA, Manzana De Gomez 564
VANCOUVER, B. C., 567 17th Avenue, West

Products

GRAVITY and POWER CONVEYORS.

Gravity Roller Conveyors; Live Roller Conveyors (Logan patented construction); Steel Spiral Chutes; Roller Spirals; Patented "Alligator" Switches; Belt Conveyors; Inclined and Vertical Elevators; Portable Conveyors; Apron Conveyors; Chain Conveyors; Carrousel Conveyors; Bucket Elevators; Screw Conveyors; Scraper Conveyors; Special Conveyors.

TRADE-MARK

Service

Logan Conveyors, gravity and power types, can be adapted to handle any kind of package or material. The experience, engineering resources and engineering ingenuity of an organization in its fifty-fourth year of business are at the disposal of prospective users without obligation.

The illustrations below are suggestive of the wide range of application.

Logan Inclined Apron Conveyor, Topping Bros., New York
This equipment handles kegs and boxes of heavy hardware from sub-basement to first floor, or vice versa

Logan Belt Conveyor
Empty containers are transported from receiving platform, across a bridge and over to second floor of warehouse

Four Lines of Logan Live-Rollers
Racks of shoes are carried through progressive machine operations at plant of Wolverine Shoe and Tanning Corp. Deflecting arms automatically transfer racks from main lines to storage lines in center

Logan Swing-Tray Vertical Elevator, Coca-Cola Co., Chicago
This elevator is used for lifting 500-lb. syrup barrels from the first to the second floor where they are automatically discharged by means of receiving arms

3-story Logan Spiral Chute, Open Type, West Disinfecting Co.
Fiber cartons of filled containers, ready for shipment, are deflected at second floor for temporary storage or pass on to first floor shipping department

Logan Double-Deck Roller Spiral at the Standard Oil Plant in Baton Rouge
An extensive unit of gravity rollers on which tons of material are handled daily, with no expenditure for power. Spirals can be made single or multiple to suit the customer's requirements

SAMUEL OLSON & COMPANY, INC.

Conveying and Elevating Machinery; Pneumatic Tube Systems; Subveyor Systems

1230 North Kostner Avenue
CHICAGO, ILL.

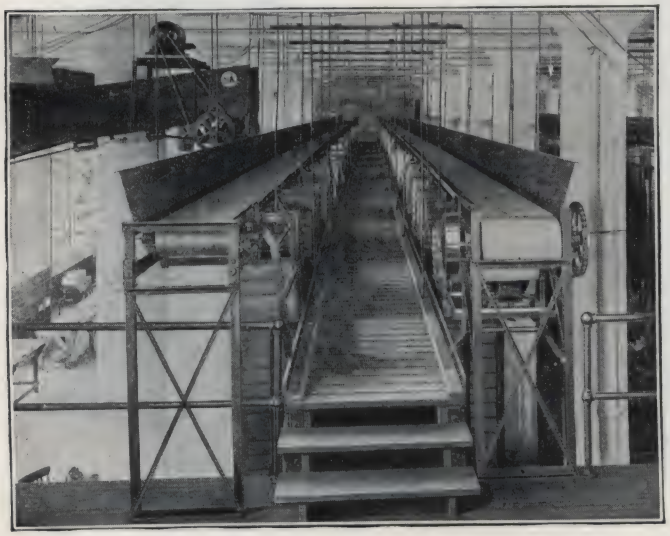
NEW YORK OFFICE, Fifth Avenue Building
SAN FRANCISCO OFFICE, Rialto Building
LOS ANGELES OFFICE, Chamber of Commerce Building
OFFICES IN PRINCIPAL CITIES

Products

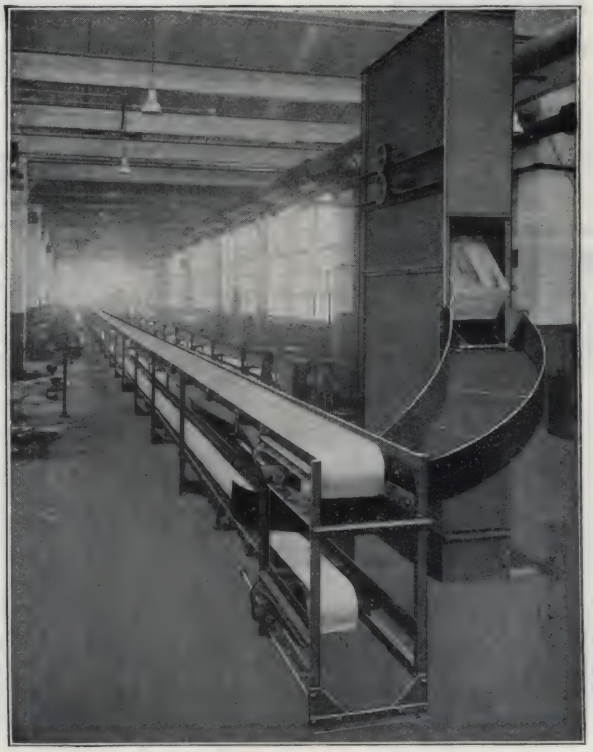
CONVEYING and ELEVATING MACHINERY for handling materials of every description: Apron, Belt and Gravity Conveyors, Spiral Chutes, Automatic and Pivoted Tray Elevators, Flour Blending Systems, Bread Proofers and Coolers, Subveyors for dish and food handling, Subveyors for handling standard sized containers and tote boxes in industrial plants; Pneumatic Tube Systems for handling cash, records, correspondence, etc.; Soiled Linen and Refuse Chutes.

General Mills, Inc., Installation
This system loads cars at the rate of seventeen hundred 196-lb. sacks per hour

Hydrox Co. (Chicago, Ill.) Installation
The apron conveyor illustrated is but one of seven conveyor units installed in this plant



National Bellas Hess Co. (Kansas City) Installation
SAMUEL OLSON & Co. completely equipped this plant with an elaborate conveying and elevating system



Patented Automatic Elevator
The dominating feature of this elevator is that it is possible to unload on the elevating side

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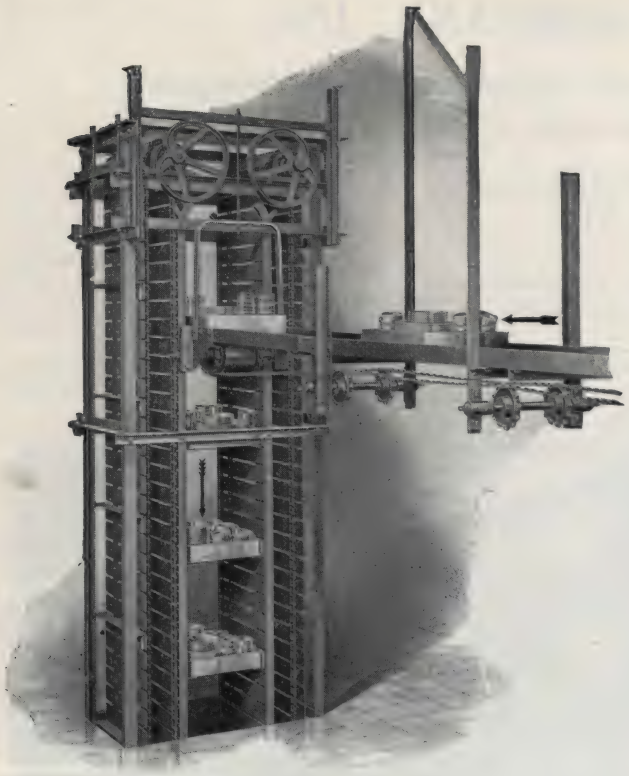
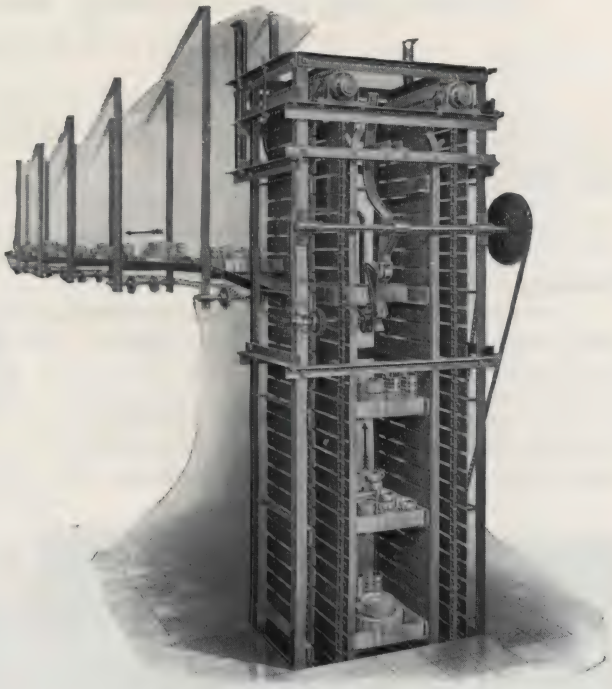
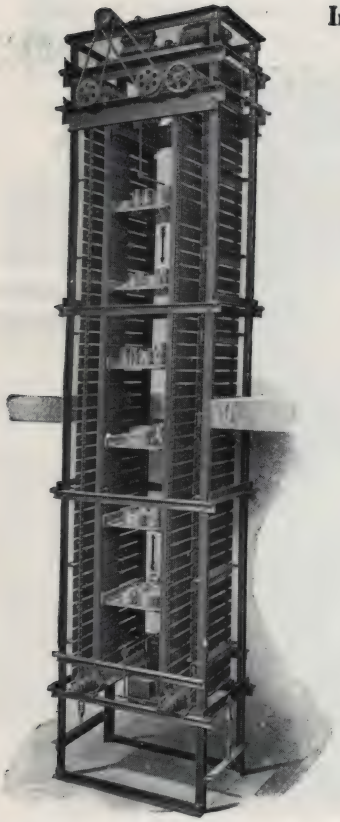


Model "I" Subveyor



Model "J" Subveyor



Model "F" Subveyor

Industrial Applications of Subveyors (Patented)

Subveyors have distinct industrial applications in plants having standard sized containers or products to elevate, lower or carry horizontally. Subveyors discharge automatically from vertical to horizontal on up travel (Model "J") from horizontal to vertical on down travel (Model "I") and from vertical to horizontal on down travel (Model "A"). Model "F" elevates or lowers continuously. These various models can be combined so as to function with each other

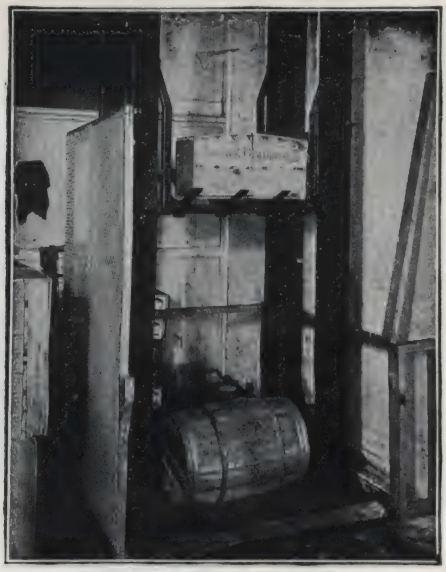
Subveyors are Successfully Handling:

Automobile transmissions
Batteries
Cartons
Tote boxes
Boxes, variety of descriptions
Food on trays
Dishes on trays
Pallets of loaf sugar
Talking machines

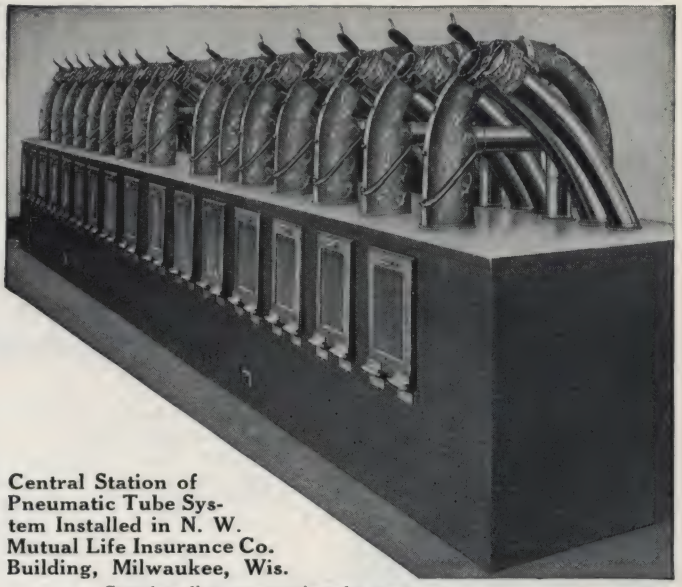
We will gladly mail complete data on Subveyors showing the various models manufactured and their application.

Model "A" Subveyor

Continued on next page

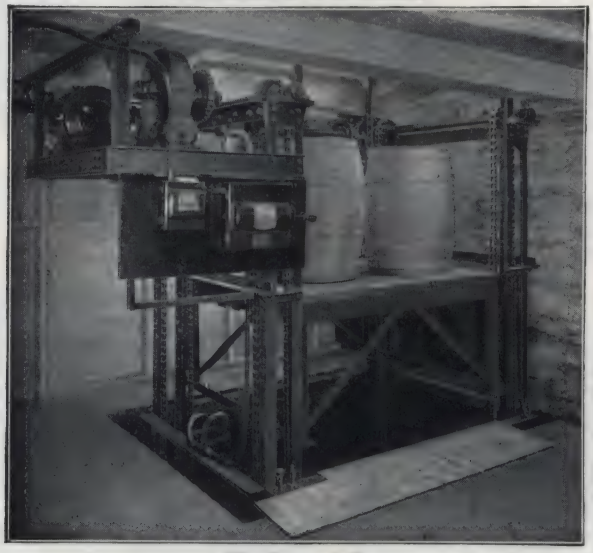


Pivoted Tray Elevator
The logical equipment where exceptionally heavy or bulky merchandise is to be handled

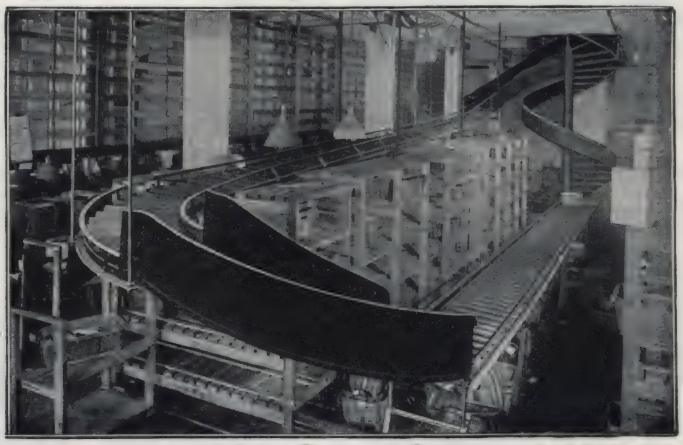


Central Station of Pneumatic Tube System Installed in N. W. Mutual Life Insurance Co. Building, Milwaukee, Wis.

Complete line pneumatic tube systems manufactured. Catalogue mailed on request



Platform Lift
A sturdy electrically operated lift. Note construction



Gravity Conveyor System
Part of a conveying system installed in one of the large wholesale drug houses

Disappearing Ash Lift
Designed for buildings such as apartments, stores, small banks, etc.

Bucket Elevator
A complete line in either steel or wood for handling sand, gravel, cement, coal, ashes, grits, seed, grain, flour, crushed ice, lime, etc.

Spiral Chute
A complete line is manufactured

STANDARD CONVEYOR COMPANY

Manufacturers of Conveying Machinery and Equipment

NORTH ST. PAUL, MINN.

BRANCH OFFICES

NEW YORK, N. Y., R. E. Cummings, Room 1512, 461 8th Avenue
CLEVELAND, OHIO, E. E. Boberg, 5005 Euclid Avenue
CINCINNATI, OHIO, Dudley F. Holbert, 1106 Ingalls Building
KANSAS CITY, MO., H. P. Duval, 1321 Union Avenue
CHICAGO, ILL., H. A. McDowell, 400 W. Madison Street
SEATTLE, WASH., G. Hagstrom, 321 Lumber Exchange Building
ST. LOUIS, MO., Hugo Fehlenberg, 3104 Magnolia Avenue

STANDARD CONVEYOR COMPANY

Products

Gravity—Roller Conveyors; Wheel Conveyors; Spiral Chutes; Straight Chutes.

Power—Belt Conveyors; Slat Conveyors; Automatic Inclined and Straight Lift Elevators; Dish Tray Elevators.

Portable—Tiering Machines; Piling Machines; Boat Loading and Unloading Equipment.

Pneumatic—Tube Systems.

Also Fire Escapes, Spiral (open and closed); Trolley Conveyors; Selective Automatic Elevators.

Service

For twenty-five years, the Standard Conveyor Company has been studying the individual requirements of industries and businesses who recognize the need of cutting the cost of merchandise handling. This organization is therefore prepared to give expert service and advice to architects, engineers, contractors, or prospective users of conveying equipment. Standard Installations are designed by experienced engineers according to the most efficient engineering and construction principles.

Standard Engineers are at your service. We will be pleased to send Catalog "O," or any other information that may be of assistance to you in solving your material handling problems.

Belt Conveyor

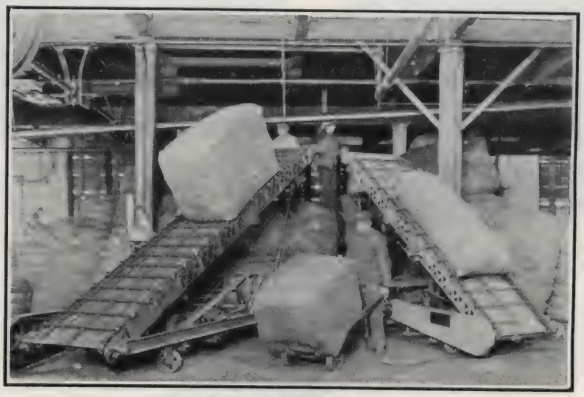
Especially adapted for handling bundles and cartons in dry goods and department stores

Lowerlift

Machine brings trays up on one side and at the same time lowers them on the other. Loads or unloads from top or bottom, front or side

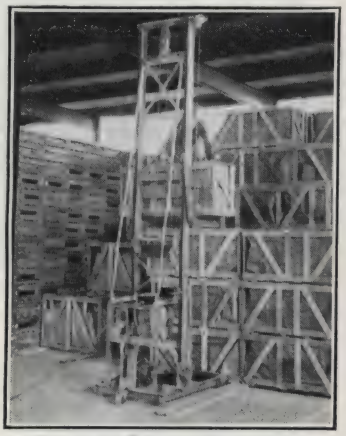
Central Desk of Pneumatic Tube Systems

Dispatches cash, messages, small articles



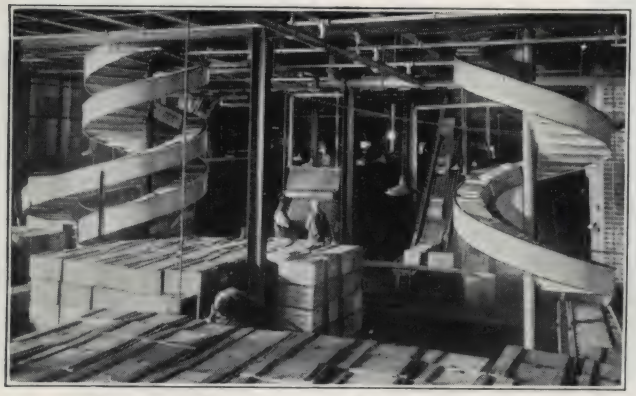
Piling Machines

One machine is built to elevate bales and the other to pile large sacks. Elevating height 10 to 30 ft.



Tiering Machine Elevating Crated Commodities

Only one man required



Combination System

Consisting of spiral chutes, inclined elevator and roller conveyors for handling cases between floors

Gravity Roller Conveyors

Carrying commodities between various machines

Continued on next page

STANDARD LOWERLIFT

A Two-way Dish Tray Elevator that occupies the space of the ordinary one-way machine

Type of Machine

The Lowerlift is a vertical single strand tray conveyor designed especially for elevating or lowering trays of dishes from dining room to kitchen or dishwashing machine and reverse. If this machine were to lay flat it would resemble a small cable car line. The cars in this instance being the carriers for handling the trays. Automatic stops and safety devices prevent damage or breakage. Trays cannot override the top or bottom points without the machine coming to a stop.

Mehcanical Features

The tray carriers consist of two malleable iron fingers which are parallel to the position of loading. They are the rigid type—that is, always remaining in the same relative position as they travel around the runway of the Lowerlift.

The position of loading or unloading this machine is that the operators can stand in front or to the side, the handling being equally easy from either position. Predetermined stopping can be arranged so that any one may control the machine from the base, top, or intermediate position as desired.

Simplicity of Operation

As a standard arrangement the drive mechanism is at the base of the machine when it operates from the basement to upper floors. This eliminates maintenance interruption on the main floors. Only two bearings at the top of the machine require lubrication. All other working parts are centralized at the bottom of the machine.

Hardened steel roller bearing chain eliminates frequent adjustment due to stretching. Short links, hardened steel, and roller bearings all mean longer service and quiet operation.

Space

The floor space occupied is remarkably small considering that it is a two-way machine, requiring only 3 ft. 9 in. x 2 ft. Drive mechanism can be placed at back or side of machine or suspended.

Speed

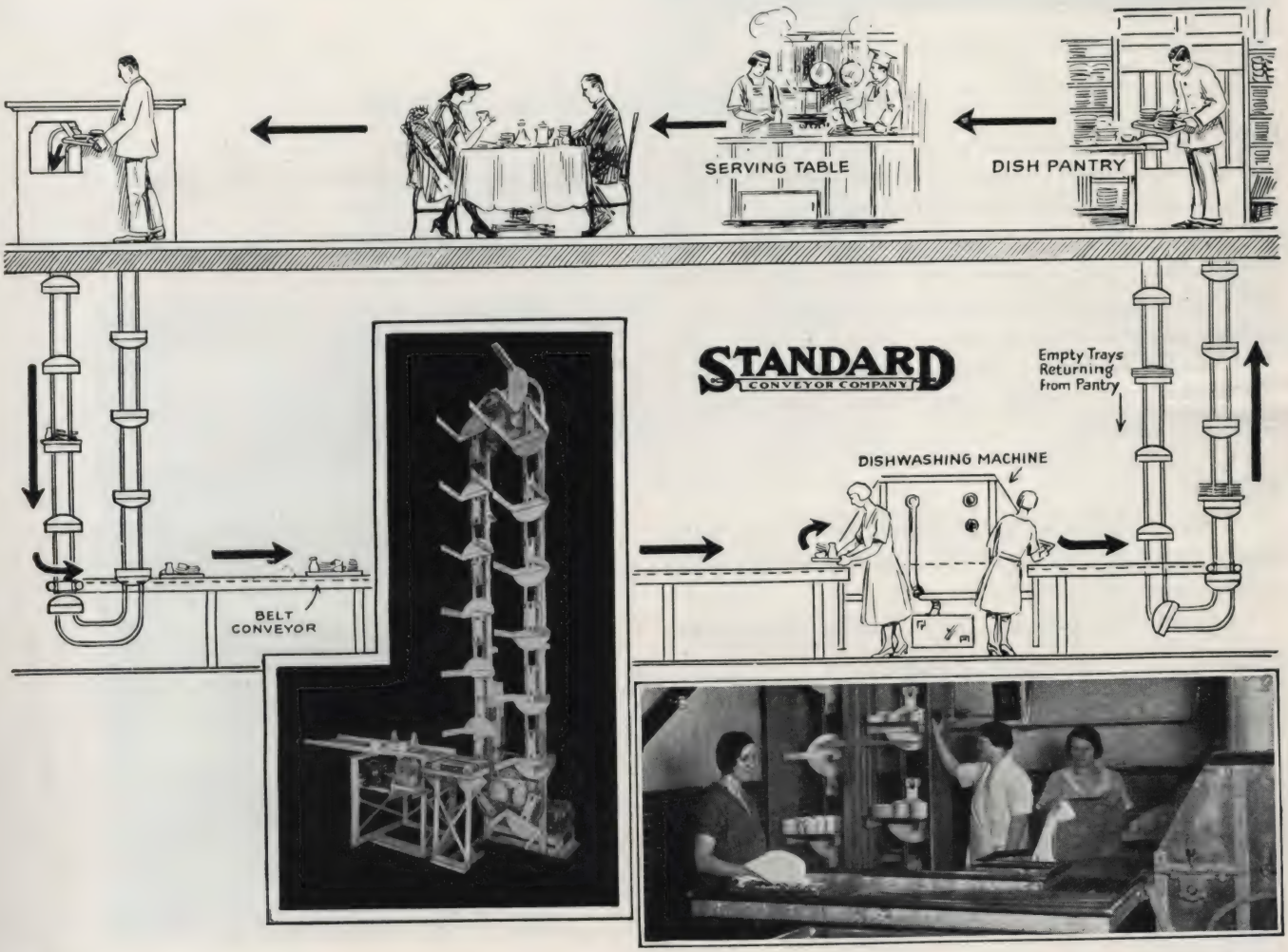
The Standard speed is 22 ft. per minute.

Uses

Lowerlifts are designed for the usual restaurant service which involves the handling of aluminum dish trays of either the rectangular or oval type. Cafeterias, tea rooms, hotel restaurants, hospital diet kitchens, are now using Lowerlifts to save space.

Junior Lowerlift

An inexpensive single platform elevator used where the high capacity of the larger model is not required. It occupies very small space and can be operated in corners or under counters.



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STANDARD SELECTIVE ELEVATOR

Electrically Controlled

Loads and discharges at any predetermined point indicated on control board.

Operator simply sets indicator for discharge at any floor desired and elevator will pick up and discharge load automatically.

Any operator on any floor can set indicator without interfering with other floors.

Uses

Practically unlimited. Adapted to needs of libraries for books; insurance companies for policies; hospitals for charts; newspapers for sterotype plates; and industrial tote pans. Can as well be a part of general merchandise conveying systems where selective or pre-determined discharge without manual effort is desired.

Elevator can be built without selective features at first and these can be added when needed.

Sizes

Machine can be designed to take care of almost any size product.

Further Details

This machine is outstanding in design, construction and ingenuity. It has far-reaching possibilities of application.

We invite architects and engineers to investigate this mechanism.

Further details will be sent upon request or they may be obtained by calling one of our engineers to explain the multiplicity of uses for it.

STANDARD PNEUMATIC TUBE SYSTEMS

Uses

The Standard Pneumatic Tube System is used for the intercommunication between departments.

The handling of the following articles is facilitated by the use of tube systems: advertising copy; bottles; cash; miscellaneous correspondence; deposit books; railroad orders; hospital charts; hotel keys and mail; small tools; laboratory samples; general office correspondence, such as orders, mail, bills of lading, department memorandums.

Types

Tube systems are built in several types to meet the service requirements under various conditions. The various types are as follows:

(1) The Foot Power Tube System (2¼-in. size only).

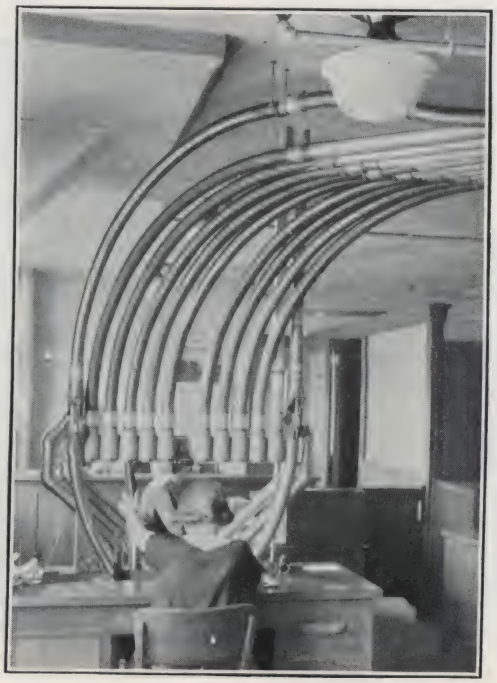
(2) Single Tube Automatic Pressure (reduced air pressure, or direct low pressure).

(3) Vacuum-Pressure (with combination vacuum incoming lines serving several stations each, and independent pressure lines to each substation for returning carriers).

(4) Vacuum. (Independent twin lines, or combination lines.)

Sizes

2¼, 3 and 4-in. diameter; 3x6 and 4x7-in. oval. The principle of operation, however, is the same, the size and shape of the carrier being determined only by the use that the customer has for it.



THE TELEVATOR CORP.

TELEPHONES
CHELSEA 5290, 5291, 5292 269 West 23rd Street, NEW YORK, N. Y.

For The Televator—a self-contained portable electric dumbwaiter, see Manufacturers' Index

THE TELEVEYOR—A PORTABLE ELECTRIC TRAY CONVEYOR FOR SERVICE BETWEEN TWO FLOORS IN BOTH DIRECTIONS

Televeyors are continuous duty electric tray conveyors, entirely self-contained in portable telescopic steel cabinets. They combine in a single unit the complete mechanical and electrical equipment, and the enclosure or shaftway for service between two connecting floors.

Televeyors are designed for service in restaurants, hotels, factories and industrial establishments, where it is desired to carry trays or uniform size boxes from one floor to the next floor in either direction.

No Construction, No Installation

Televeyors require no construction or installation because the mechanical and electrical equipment is mounted and fully wired at the factory, and after a rigid test is delivered, a complete operating unit ready for service.

Any handy man can place the equipment in service by making a few minor adjustments in accordance with simple instructions forwarded with each unit.

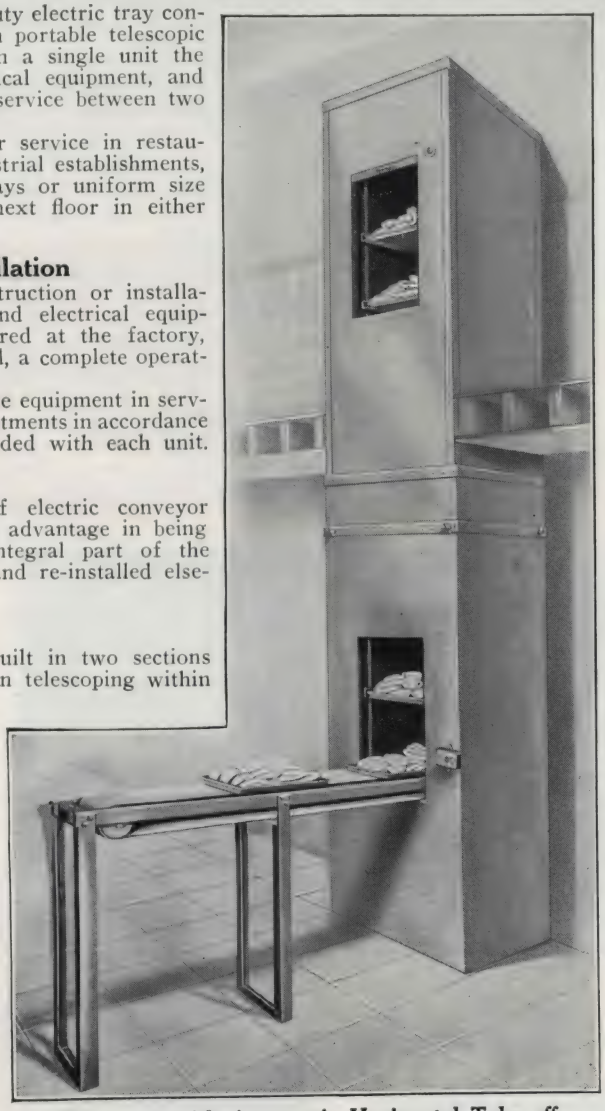
Portability

Televeyors, in the line of electric conveyor equipment, have an outstanding advantage in being portable. They are not an integral part of the building and can be removed and re-installed elsewhere without difficulty.

Steel Cabinet Enclosures

Televeyor enclosures are built in two sections of sheet steel, the upper section telescoping within the lower section. Each section has an access opening fitted with a counterbalanced sliding door, and at the base of each cabinet four ball bearing pivot castors are provided for the purpose of rolling the Televeyor into position under the floor opening.

The device which controls the raising, and lowering of the interior telescopic section is operated by means of a ratchet lever, making it possible for one man to fully extend the Televeyor to the upper floor, when the two sections are securely anchored to each other by means of specially designed bolts.



Televeyor with Automatic Horizontal Take-off

Control System

A three-button station, marked "Up"—"Stop"—"Down," is provided at the lower level, and by momentary pressure on the buttons, directs the travel of the Televeyor or brings it to a stop. In addition, an emergency stop button is provided on the upper level, also automatic safety switches at the top and bottom limits of travel, so that if the tray or material being carried comes in contact with these switches, the Televeyor stops instantly, and can only be started again when the tray or material (in contact) has been removed. These limit switches serve a twofold purpose—to prevent overtravel, and to eliminate the necessity of having an attendant on continuous duty.

Mechanical and Electrical Equipment

A complete, easily accessible, fully enclosed power unit consisting of a motor, reduction gears and control panel is securely mounted at the base of the cabinet.

Steel roller chains with an ultimate strength of 7000 lbs. are used for both the drive and carrier system, and in combination with ball bearing equipment throughout, result in extremely smooth and quiet operation. A very simple take-up adjustment requiring no mechanical skill is provided at the top of the Televeyor, by means of which the entire conveyor system is kept in perfect alignment.

Televeyors are equipped with a 6-ft. flexible extension for power attachment. Light duty Televeyors can be operated by merely plugging into any ordinary light socket or base outlet, the current available being ample to drive all Model L (light duty) equipment. Model H (heavy duty) Televeyors require power from a motor circuit.

Automatic Take-off Conveyor

Where it is desired to have the trays or boxes carried from the Televeyor on a horizontal plane on the lower floor, an automatic horizontal belt conveyor section can be furnished.

Standard horizontal take-off conveyors extend 5 ft. beyond the front face of the Televeyor enclosure, but where local conditions require a longer horizontal travel, special lengths can be provided.

Standard Televeyor Equipment

Televeyor standard equipment conforms to the dimensions required to carry popular size trays. In respect to capacity, light duty Televeyors are powered to carry an average load of 10 lb. per tray, but where the average load per tray is likely to exceed 10 lb. heavy duty Televeyors should be specified and installed.

Televeyors in the standard models are finished with battleship gray machinery enamel.

Where wall conditions or fixtures have to be matched or the equipment made to harmonize with special interior decorations, the straight steel Televeyor structure will serve as an excellent base for any type of decorative treatment or construction that may be necessary.

STANDARD TELEVEYOR MODELS

Model No. 35-21

Tray	13⅞ x 10¾ in.
35 L-21	Light duty
35 LT-21	Light duty with take-off
35 H-21	Heavy duty
35 HT-21	Heavy duty with take-off
Cabinet enclosure and floor opening	2 ft. 11 in. x 1 ft. 9 in.

Model No. 37-22

Tray	16½ x 12¾ in.
37 L-22	Light duty
37 LT-22	Light duty with take-off
37 H-22	Heavy duty
37 HT-22	Heavy duty with take-off
Cabinet enclosure and floor opening	3 ft. 1½ in. x 1 ft. 10½ in.

Model No. 39-24

Tray	17¾ x 13⅞ in.
39 L-24	Light duty
39 LT-24	Light duty with take-off
39 H-24	Heavy duty
39 HT-24	Heavy duty with take-off
Cabinet enclosure and floor opening	3 ft. 3 in. x 2 ft.

All standard models are motored and geared to an operating speed that will deliver trays in either direction at the rate of twelve per minute.

ECONOMY ENGINEERING COMPANY

Manufacturers of Economy Portable Lifters, Elevators and Storage Racks

2685 West Van Buren Street, CHICAGO, ILL.

NEW YORK, N. Y., 342 Madison Avenue

SALES REPRESENTATIVES LOCATED IN PRINCIPAL CITIES

(Name and address of nearest representative sent on request)

Product

PORTABLE ELEVATING EQUIPMENT, commonly termed "Portable Elevators," "Tiering Machines," "Lifters," "Stackers," etc.; STEEL RACKS for storing barrels, drums, tote-boxes, steel shapes; the RED ROCKER, a stand for barrels and drums of liquid, designed to permit easy withdrawal of contents.

The Company

For 29 years ECONOMY ENGINEERING COMPANY has specialized on portable elevator construction. Economy was the first to provide all-steel construction, hinges in uprights, steel cable hoist, a positive floor lock, electric motor drive, telescoping frame, dual brakes, etc. No problem is too large or complicated for our engineering division to meet satisfactorily. Economy machines will be found in service in every field of manufacturing.

Economy Portable Elevators

Six standard models of Economy Portable Elevator or variations therefrom fit every lifting, stacking and tiering requirement.

Capacities—Standard machines are built in capacities from 500 to 2000 lb. Special capacities provided up to 8000 lb.

Power—Either hand power or electric to operate from light socket or power line.

Heights—Built to specified height with special hinge frame or telescoping feature, giving door height clearance while providing elevating range up to ceiling.

Frame—Heavy steel channels, cross braced, riveted and bolted, give maximum strength and rigidity.

Safety—Significant brake design and great overload capacities provide highest factor of safety.

Steel Racks

Standard steel rack sections for 50-gal. barrels or drums, tote-boxes, steel shapes, etc.

Barrel Stands

Economy "Red Rocker" barrel stands for storing barrels or drums so contents are quickly available. Ideal for engine rooms, garages, textile mills, chemical plants, etc.

(1) From 6 to 30 Ft. Above the Floor with an Economy Electric Telescoper

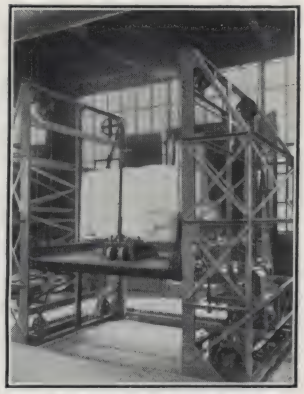
Fisher Building at Detroit uses this machine for cleaning and general maintenance work outside as well as inside

(2) Stationary Type Electric Lifter of 2500 Lb. Capacity

The door opening loop on platform causes trap door overhead to open and close automatically

(3) Eliminating Dangers of the Ramp with an Economy Lifter

Platform is controlled by means of the hand cable device shown at extreme left and stops automatically at both floor levels



(4) Unloading Freight Cars with 5000-lb. Capacity Economy Four-post Type Electric

This type is entirely self-contained and requires only a shallow pit. Push button control

(5) A Battery of Three Special Stationary Paper Roll Hoists

The three machines shown are used for elevating rolled stock from one floor directly into the presses on the floor above

(6) Showing How the Machines at the Left Serve the Presses

The arms of the lifters support the roll, as shown, until the core is inserted—all manual lifting is avoided

(7) Economy Hand Power Lifter and Three-high Barrel Rack

Folding skids attached to base of machine make it easy to roll barrels on to the platform

(8) Economy Reel Racks Served by Hand Power Machine

They give this orderly appearance to the interior of the warehouse of a large eastern electric company

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